ENGINE SECTION 1

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

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

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

FUJI HEAVY INDUSTRIES LTD.

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

FUEL INJECTION (FUEL SYSTEM)

FU(H4SO 2.0)

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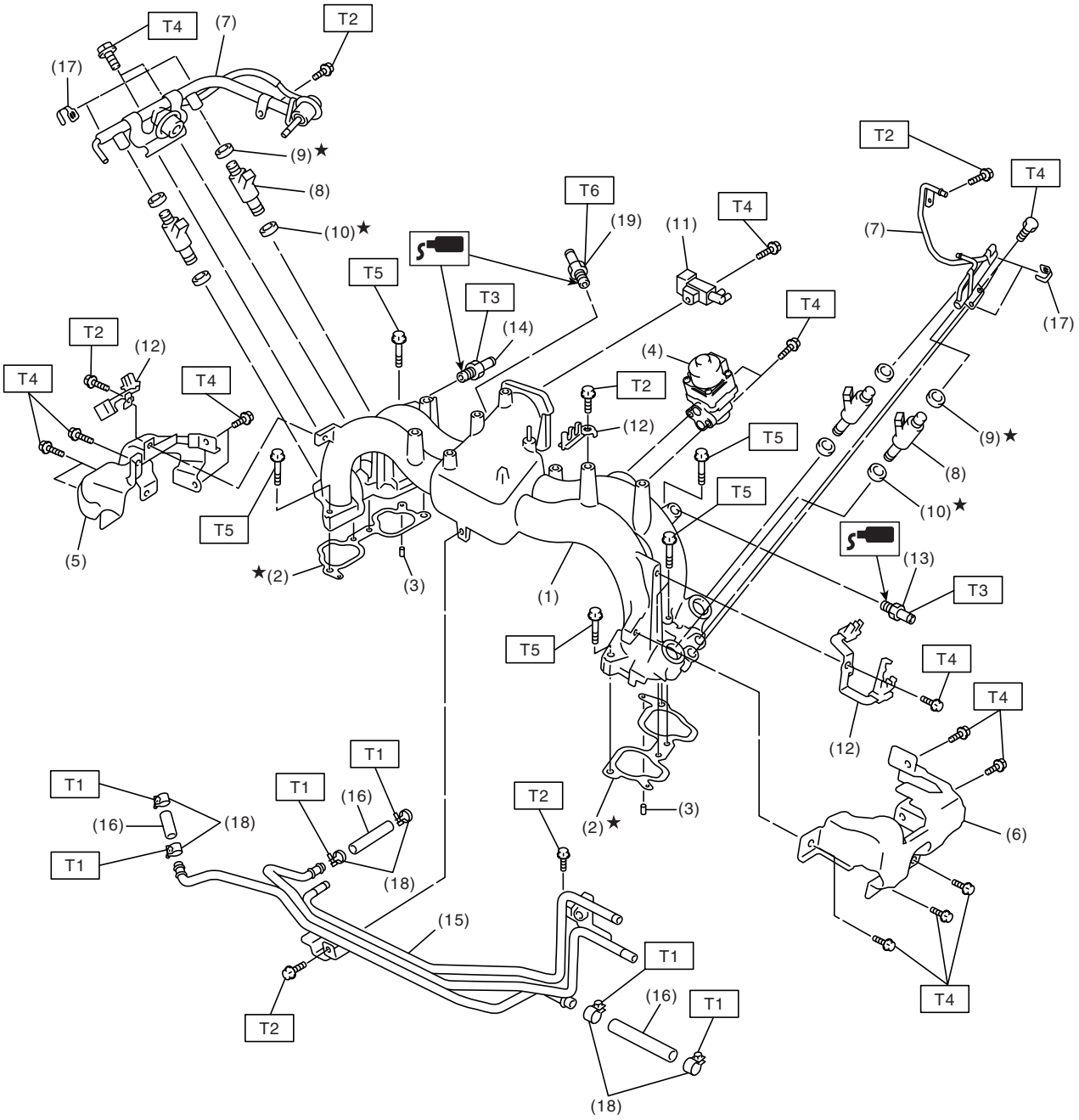
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	441 — 686 kPa (4.50 — 7.00 kgf/cm^2, 64.0 — 99.5 psi)
	Discharge rate	75 ℓ (19.8 US gal, 16.5 Imp gal)/h or more [12 V at 300 kPa (3.06 kgf/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

1. INTAKE MANIFOLD

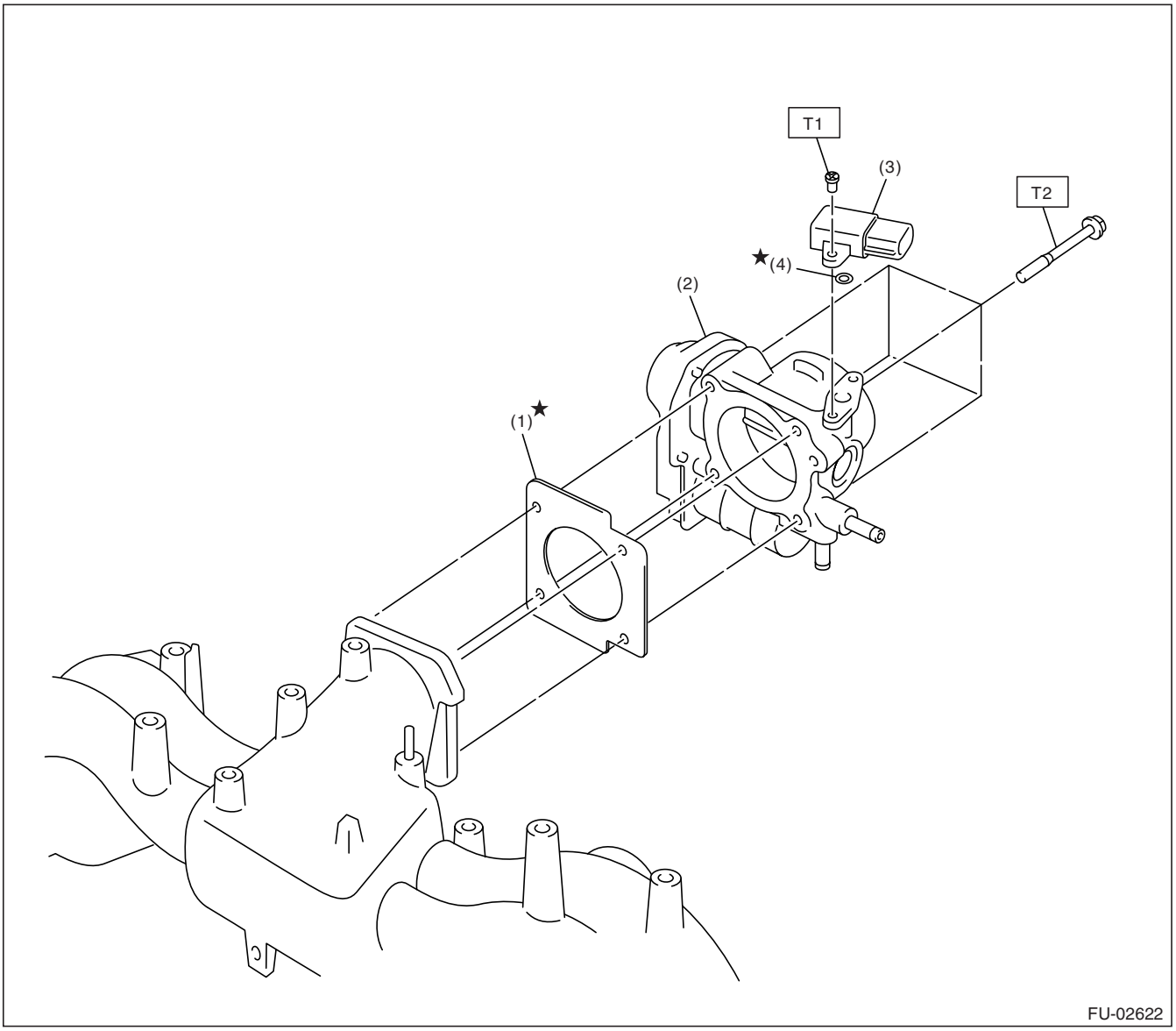


FU-02056

(1) Intake manifold
(2) Gasket
(3) Guide pin
(4) EGR valve (EC, EK, K4, ER model)
(5) Fuel pipe protector RH
(6) Fuel pipe protector LH
(7) Fuel injector pipe
(8) Fuel injector
(9) O-ring
(10) O-ring
(11) Purge control solenoid valve
(12) Plug cord holder
(13) Nipple (LHD model)
(14) Nipple (RHD model)
(15) Fuel pipe ASSY
(16) Fuel hose
(17) Clip
(18) Clamp
(19) PCV valve

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 6.4 (0.65, 4.7)
T3: 17 (1.7, 12.5)
T4: 19 (1.9, 14)
T5: 25 (2.5, 18)
T6: 23 (2.3, 17)

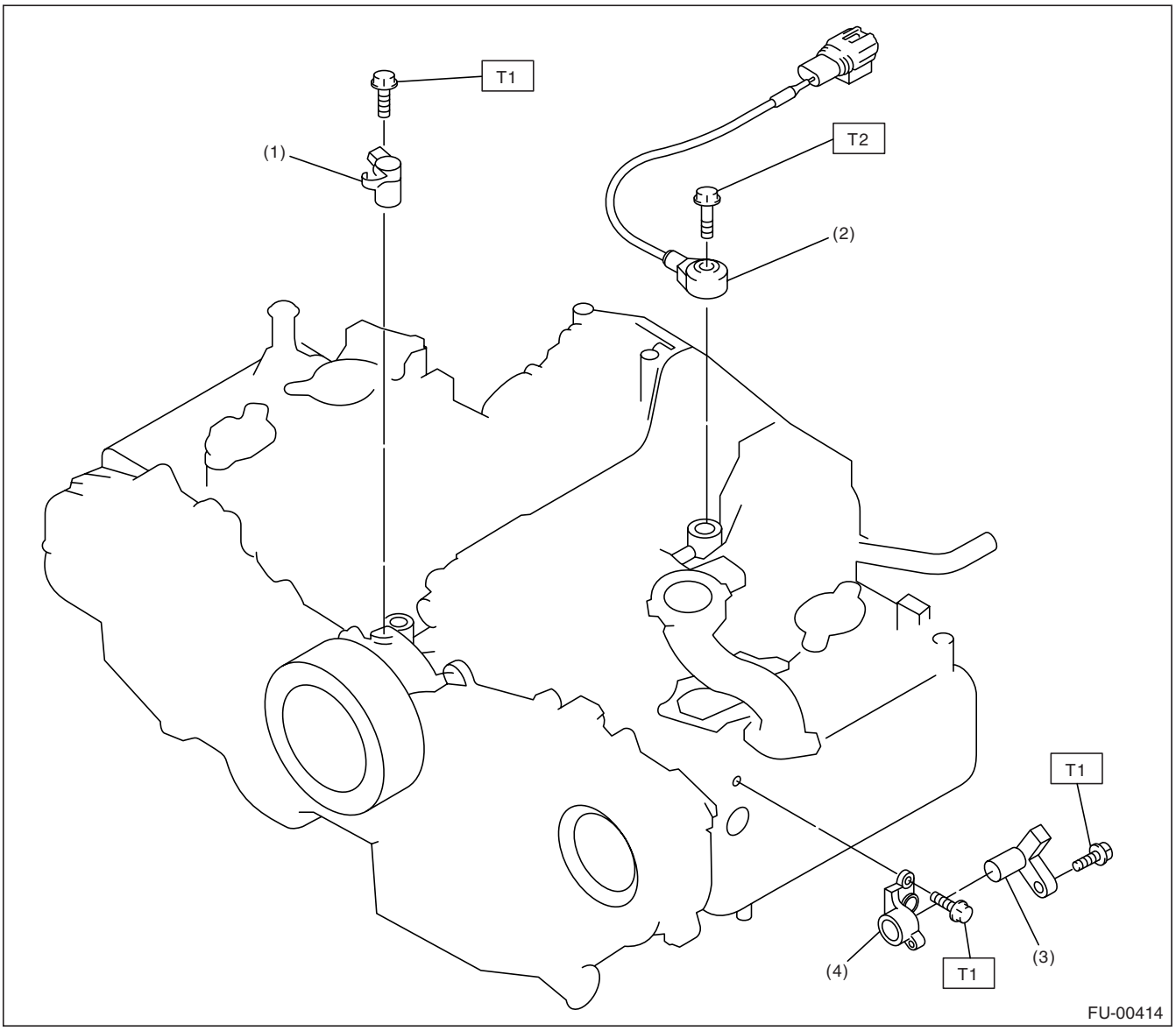
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle body
(3) Manifold absolute pressure sensor
(4) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2 (0.2, 1.5)
T2: 8 (0.8, 5.9)

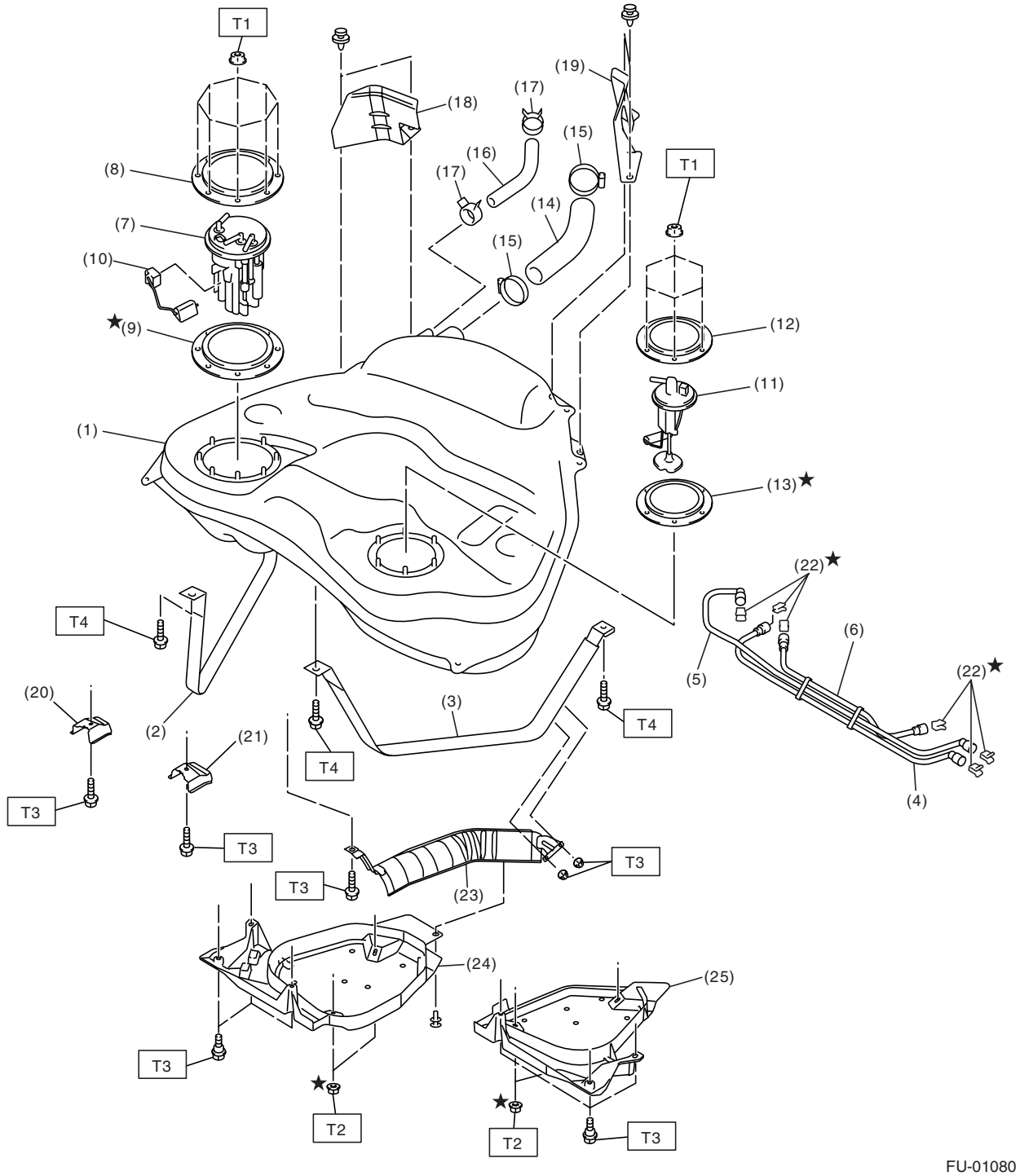
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.7)

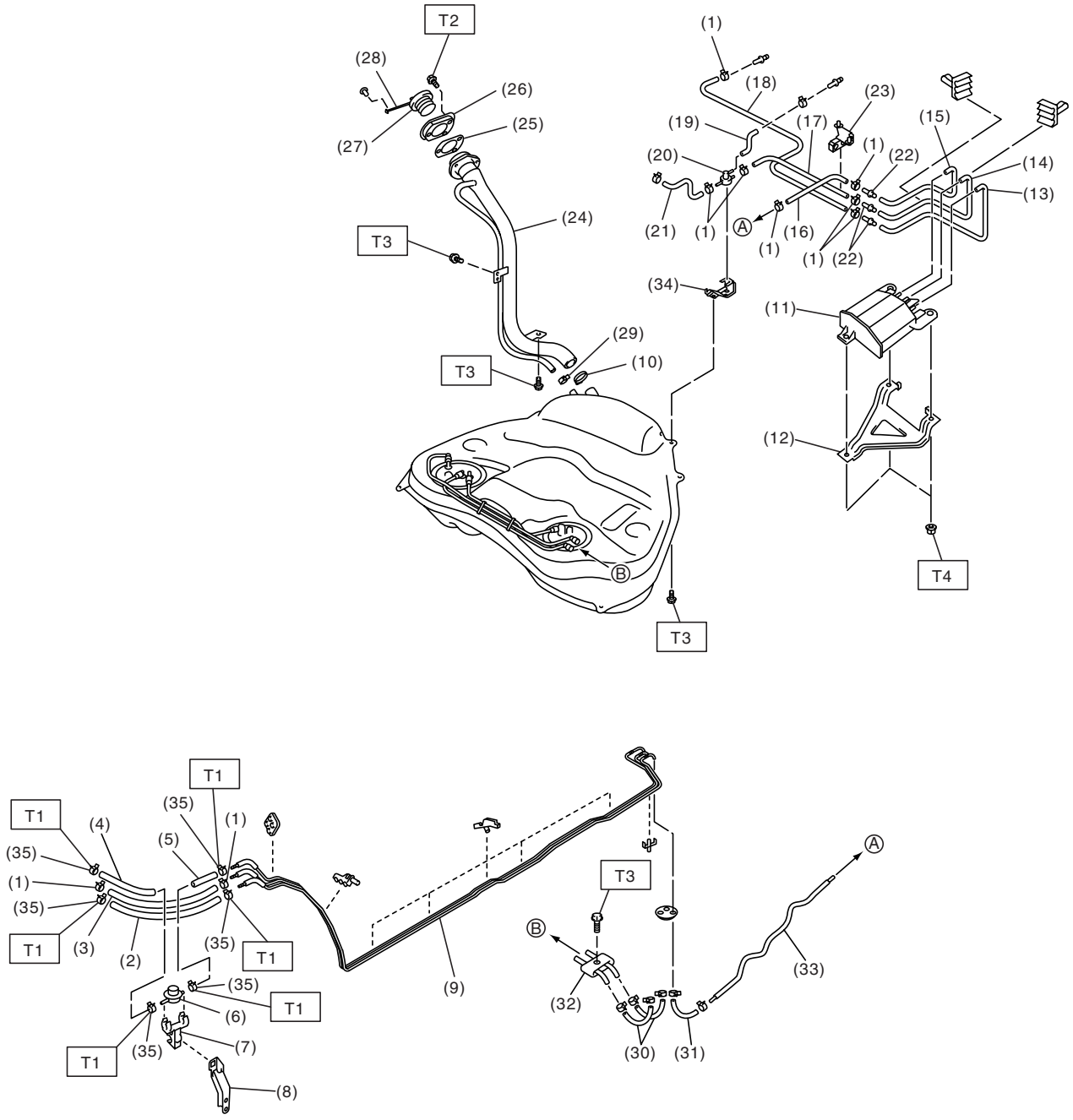
4. FUEL TANK


T1
(19)
(17)
(18)
(15)
(16)
(17)
T1
(8)
(14)
(7)
(15)
(10)
★(9)
(12)
(11)
(1)
(13)★
(22)★
T4
(6)
(5)
(22)★
(20)
(3)
(2)
(21)
T4
T4
T3
T3
T3
T3
(23)
(24)
(25)
T3
★
★
T2
T2
T3
FU-01080

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump ASSY
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Fuel tank protector RH (Rear)
(19) Fuel tank protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***4.4 (0.45, 3.2)***
T2:	***9 (0.9, 6.6)***
T3:	***17.5 (1.78, 12.9)***
T4:	***33 (3.4, 24.3)***

5. FUEL LINE



FU-02591

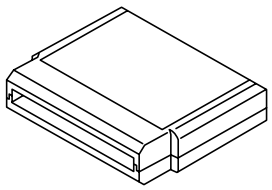
(1) Clip
(2) Fuel return hose
(3) Evaporation hose A
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel damper
(7) Fuel damper holder
(8) Fuel damper bracket
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Connector
(33) Purge pipe
(34) Two-way valve bracket
(35) Clamp

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*1.25 (0.13, 0.94)*
T2:	*4.4 (0.45, 3.2)*
T3:	*7.5 (0.76, 5.5)*
T4:	*8.3 (0.85, 6.1)*

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

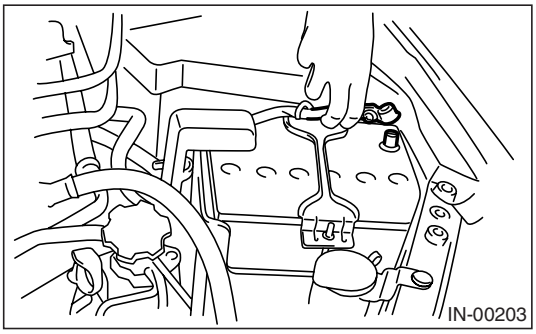
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

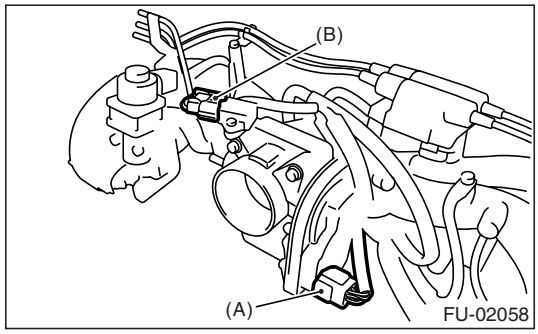
2. Throttle Body

A: REMOVAL

1) Disconnect the ground cable from battery.

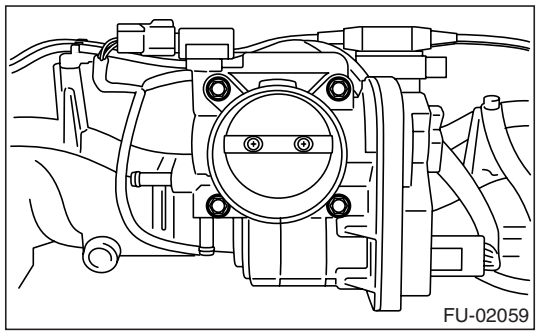


2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
3) Disconnect the connectors from the throttle position sensor and manifold absolute pressure sensor.



(A) Throttle position sensor
(B) Manifold absolute pressure sensor

4) Disconnect the engine coolant hoses from throttle body.
5) Remove the bolts which install throttle body to the intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

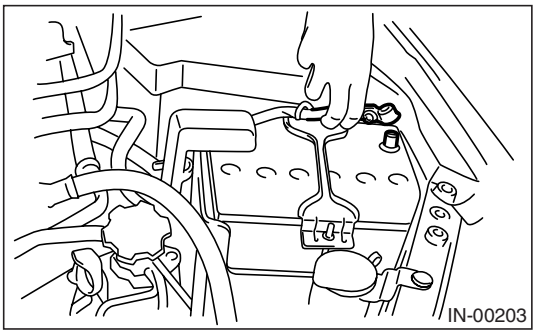
NOTE:
Use a new gasket.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

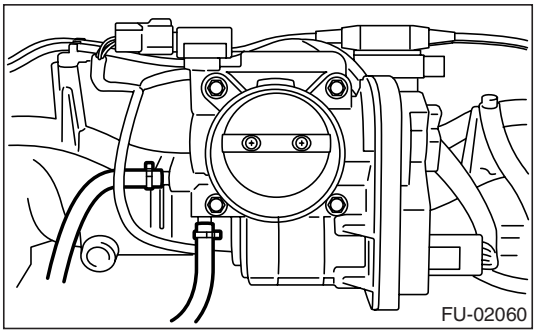
3. Intake Manifold

A: REMOVAL

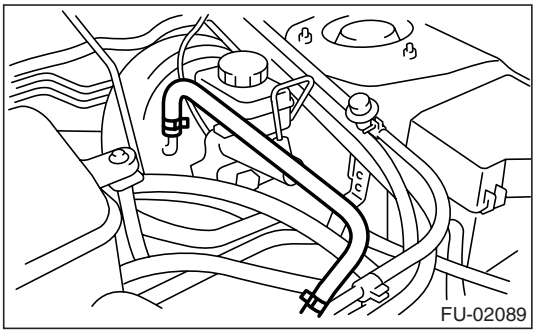
1) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.
3) Disconnect the ground cable from battery.



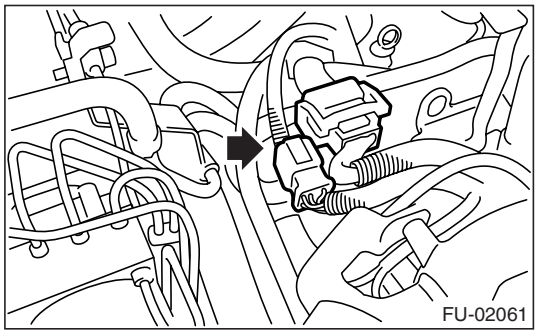
4) Remove the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
5) Disconnect the spark plug cords from spark plugs.
6) Disconnect the engine coolant hoses from throttle body.



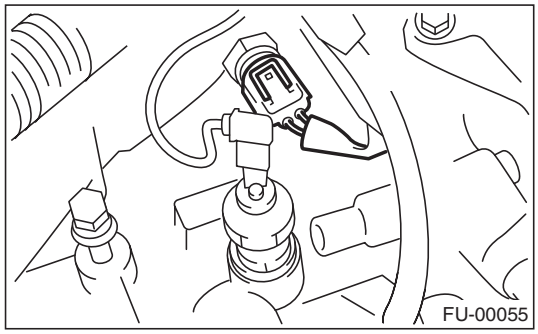
7) Disconnect the PCV hoses from intake manifold.
8) Disconnect the brake booster hose.



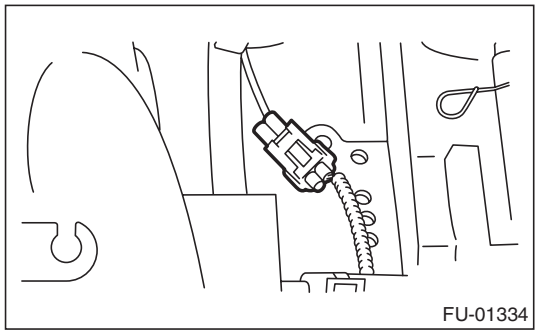
9) Disconnect the engine harness connectors from bulkhead harness connectors.



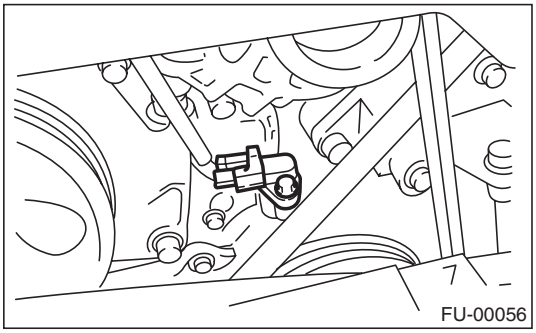
10) Disconnect the connectors from engine coolant temperature sensor.



11) Disconnect the knock sensor connector.

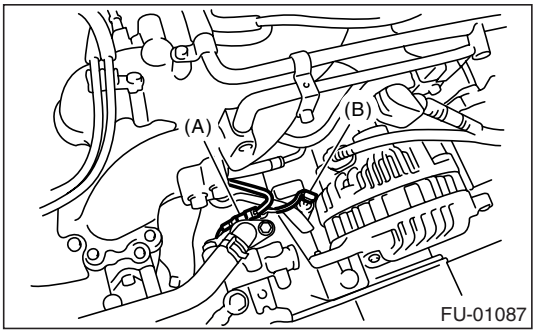


12) Disconnect the connector from crankshaft position sensor.

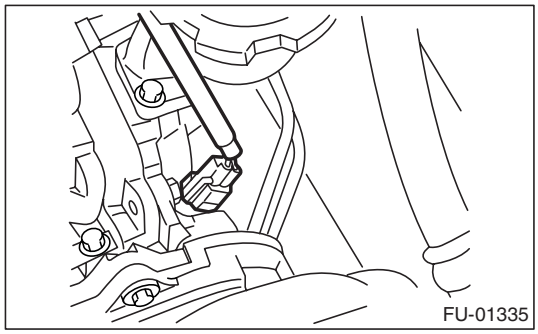


13) Disconnect the connector from power steering pump switch (A).

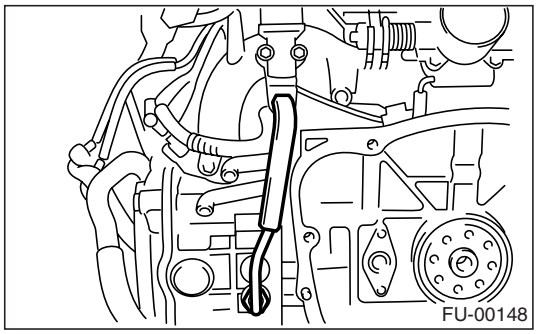
14) Disconnect the connector from oil pressure switch (B).



15) Disconnect the connector from camshaft position sensor.

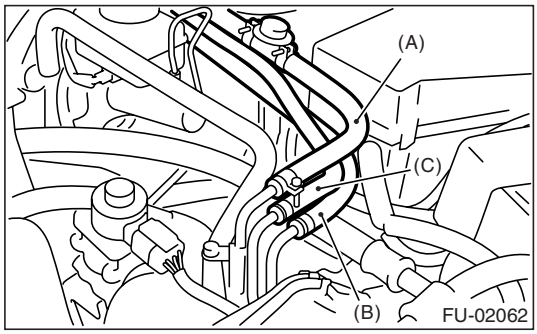


16) Remove the EGR pipe from intake manifold. (EC, EK, K4, ER model)



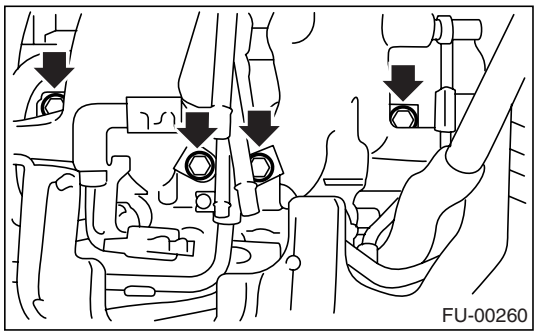
17) Disconnect the fuel hose from fuel pipe.

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



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

18) Remove the bolts which secure intake manifold to cylinder head.



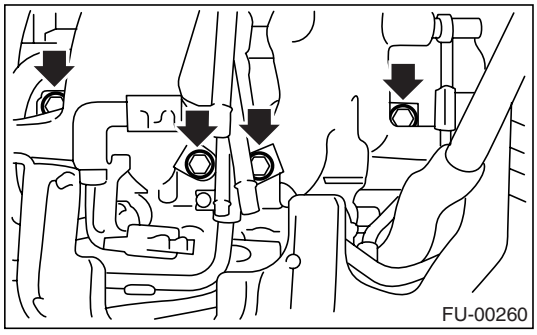
19) Remove the intake manifold.

B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

NOTE:
Use a new gasket.

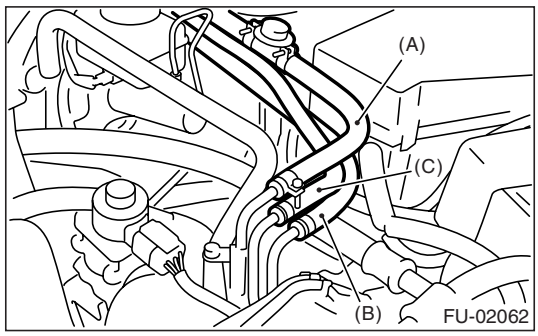
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



2) Connect the fuel hoses.

NOTE:
If fuel hoses or clamps are damaged, replace them with new ones.

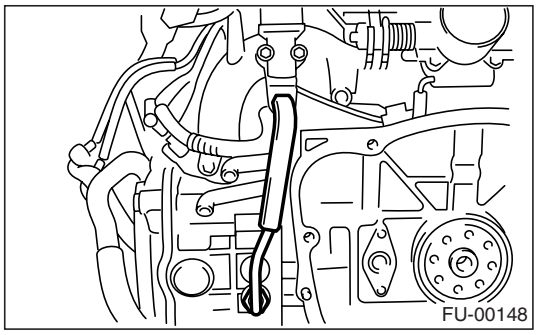
Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



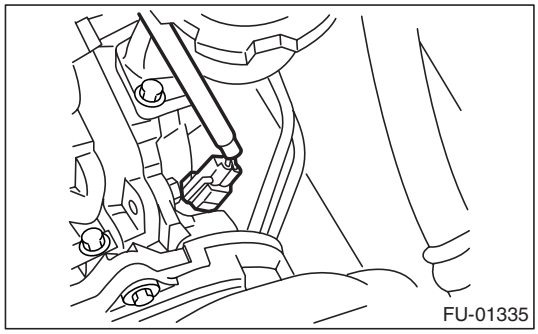
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

3) Install the EGR pipe to intake manifold. (EC, EK, K4, ER model)

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

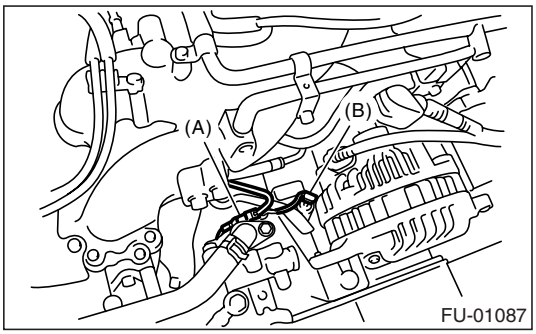


4) Connect the connector to camshaft position sensor.

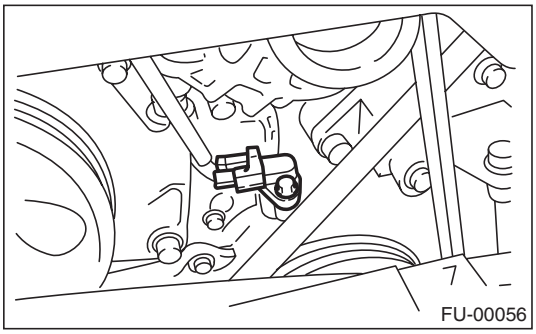


5) Connect the connector to power steering pump switch (A).

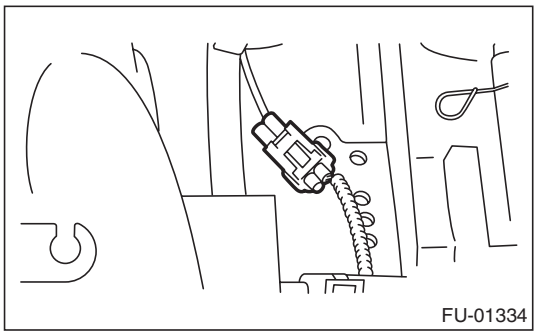
6) Connect the connector to oil pressure switch (B).



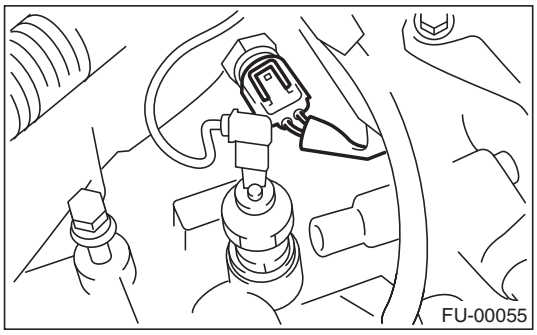
7) Connect the connector to crankshaft position sensor.



8) Connect the knock sensor connector.

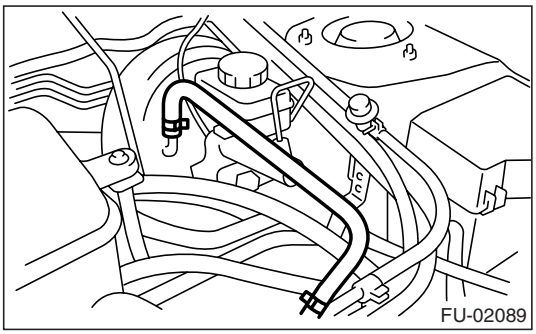


9) Connect the connectors to engine coolant temperature sensor.

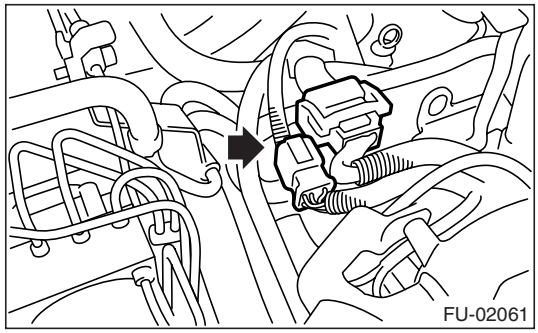


10) Connect the PCV hose to intake manifold.

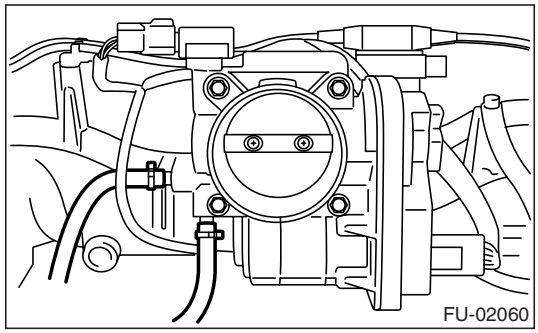
11) Connect the brake booster hose.



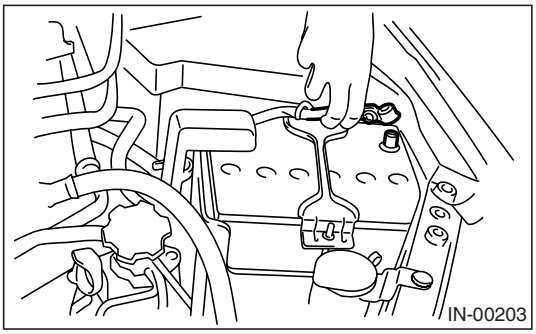
12) Connect the engine harness connectors to bulkhead harness connectors.



13) Connect the engine coolant hoses to throttle body.

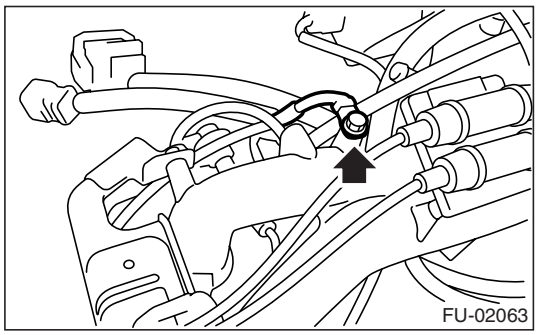


14) Connect the spark plug cords to spark plugs.
15) Install the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Intake Chamber.>
16) Install the fuse of fuel pump to main fuse box.
17) Connect the ground cable to battery.

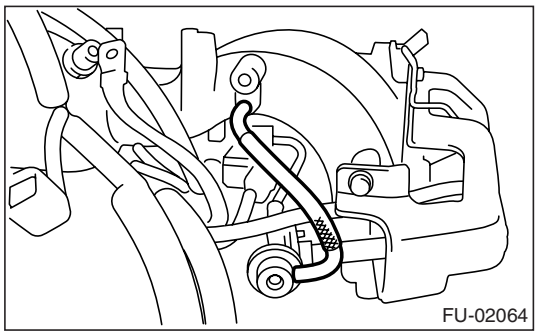


C: DISASSEMBLY

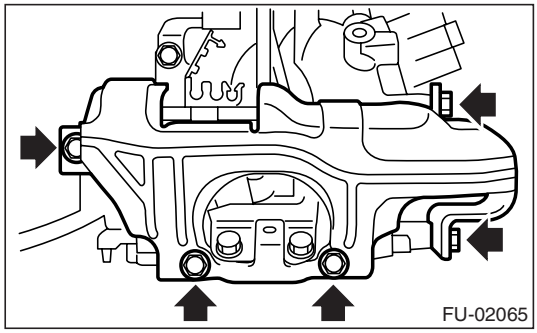
1) Disconnect the engine ground terminal from intake manifold.



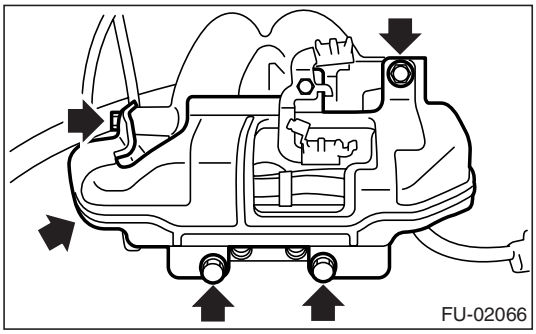
2) Remove the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, REMOVAL, Ignition Coil and Ignitor Assembly.>
3) Remove the throttle body. <Ref. to FU(H4SO 2.0)-10, REMOVAL, Throttle Body.>
4) Remove the EGR valve. (EC, EK, K4, ER model) <Ref. to FU(H4SO 2.0)-28, REMOVAL, EGR Valve.>
5) Disconnect the pressure regulator vacuum hose from intake manifold.



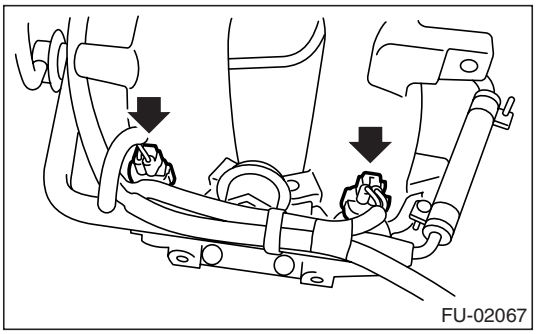
6) Remove the fuel pipe protector LH.



7) Remove the fuel pipe protector RH.

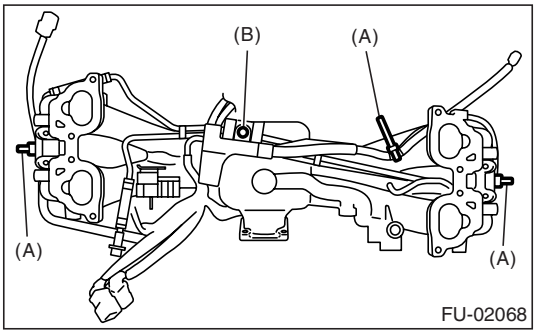


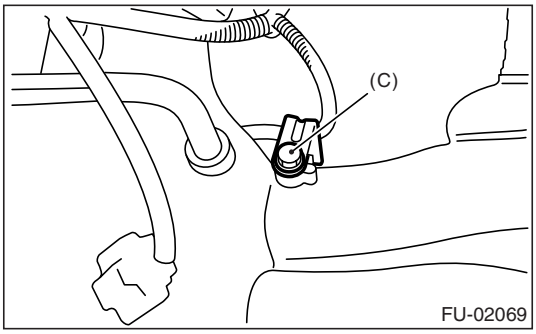
8) Disconnect the connector from fuel injector.



9) Remove the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, REMOVAL, Purge Control Solenoid Valve.>

10) Remove the harness band (A) and bolts (B), (C) which secure engine harness to intake manifold.

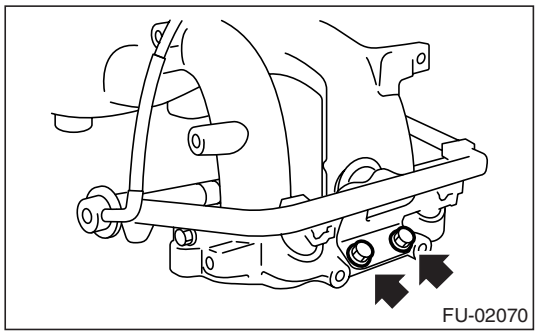


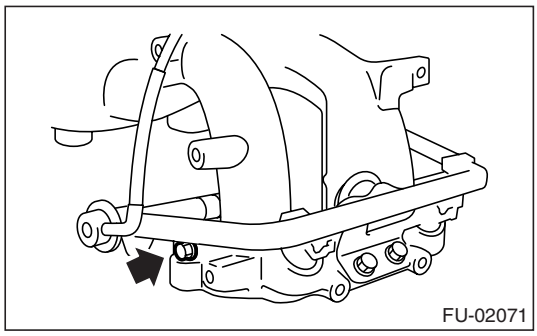


11) Remove the engine harness from intake manifold.

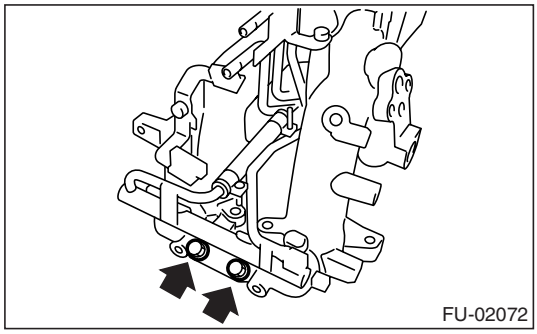
12) Remove the bolts which install injector pipe on the intake manifold as shown in the figure.

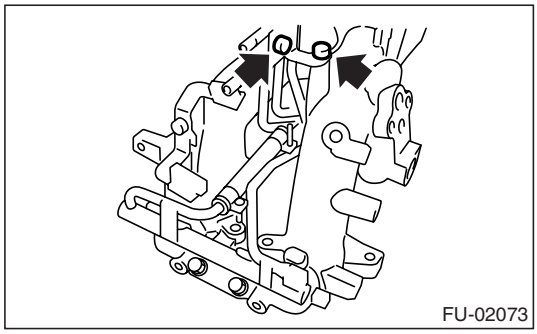
- RH Side



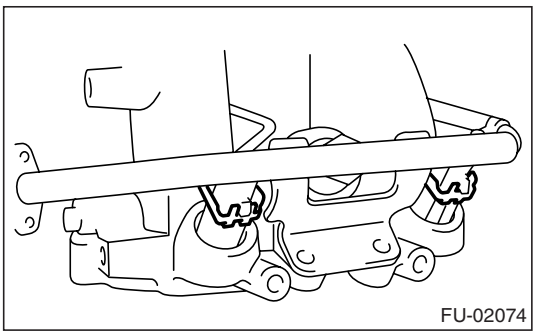


- LH Side



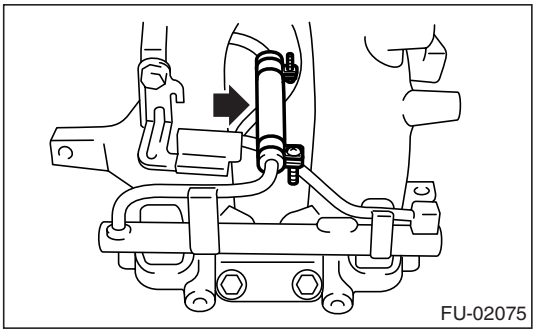


13) Remove the fuel injectors.
(1) Remove the clip which secures fuel injector from injector pipe.

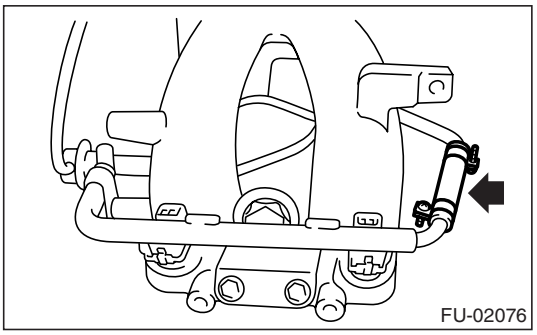

FU-02074

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

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

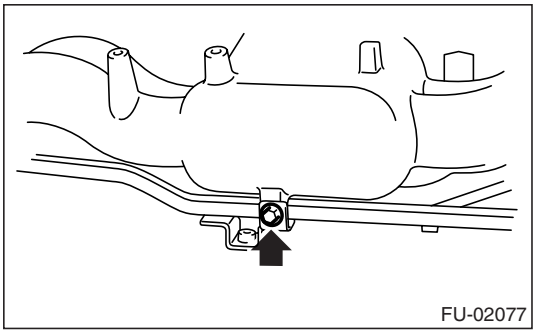

FU-02075

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


FU-02076

16) Remove the fuel injector pipe.

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


FU-02077

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

D: ASSEMBLY

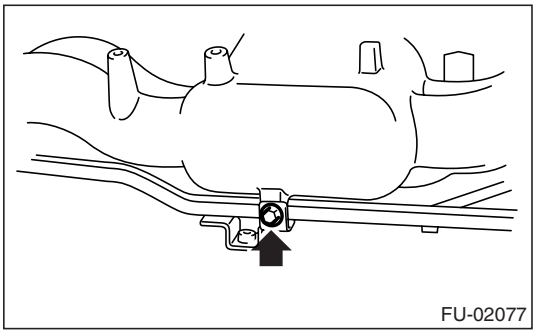
NOTE:
When assembling the nipple, apply liquid gasket.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
17 N·m (1.7 kgf-m, 12.5 ft-lb)

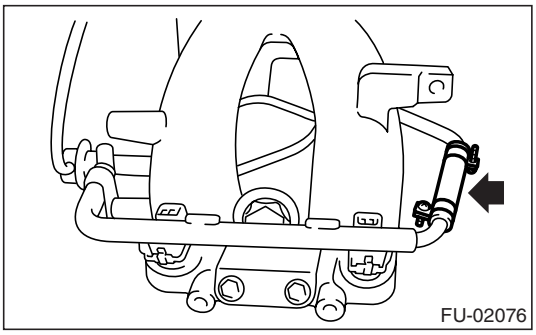
1) Install the fuel pipe assembly and pressure regulator to intake manifold.
2) Tighten the bolt which installs fuel pipes on intake manifold.

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


FU-02077

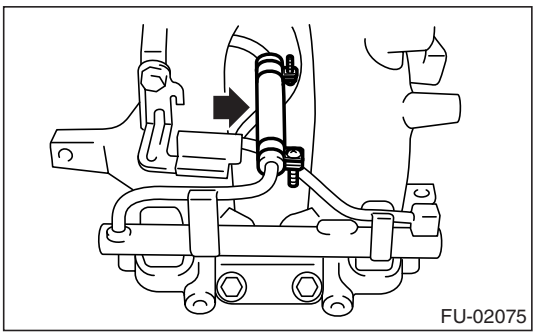
3) Connect the fuel injector pipe RH to fuel hose, and tighten the clamp.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

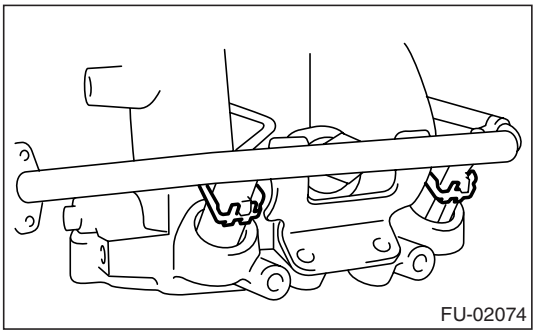


4) Connect the fuel injector pipe LH to fuel hose, and tighten the clamp.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

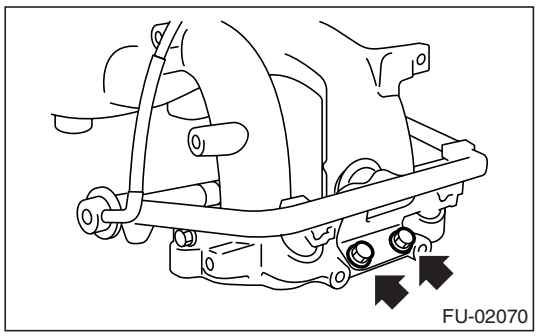


5) Install the fuel injectors.
6) Install the clip which secures fuel injector.

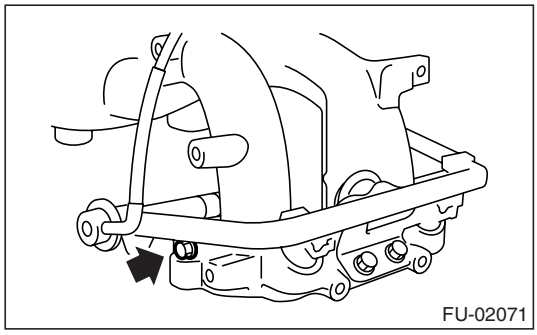


7) Tighten the bolts which install injector pipe on intake manifold.
- RH Side

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

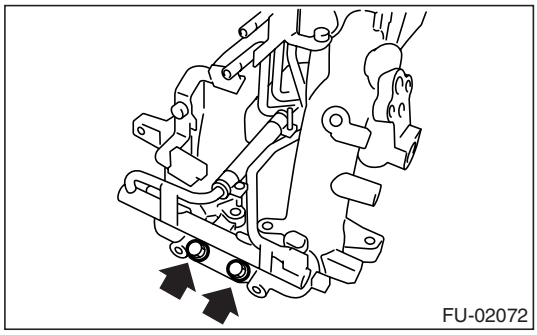


Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

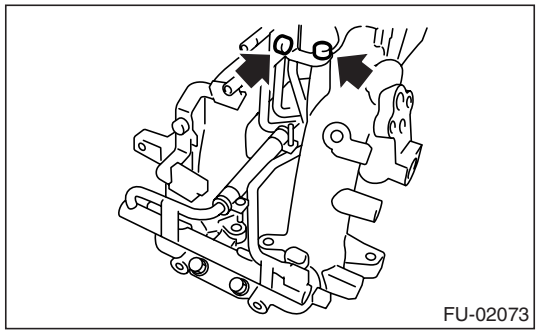


- LH Side

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

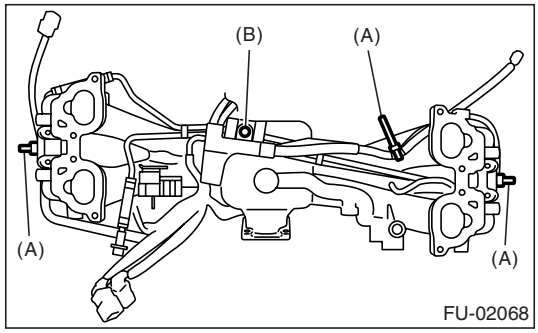


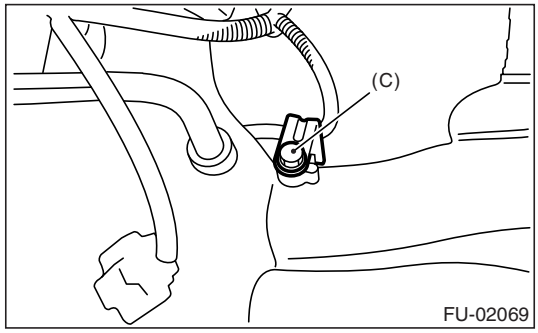
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



8) Install the engine harness to intake manifold.
9) Hold the engine harness by harness band (A) and bolts (B), (C).

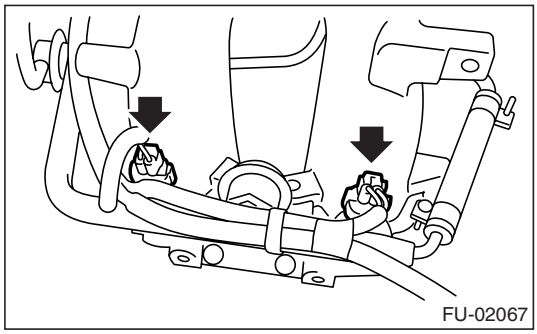
Tightening torque:
(B): 16 N·m (0.6 kgf-m, 11.8 ft-lb)
(C): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)





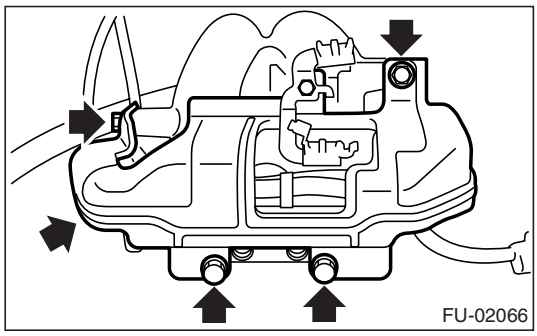
10) Install the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, INSTALLATION, Purge Control Solenoid Valve.>

11) Connect the connectors to fuel injector.



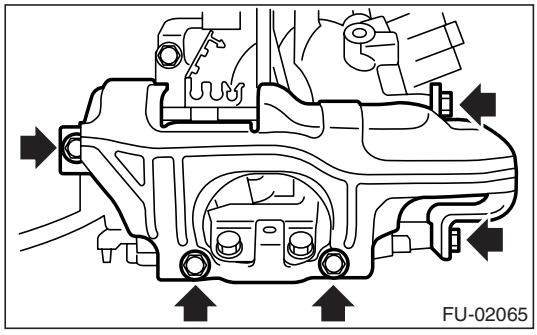
12) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

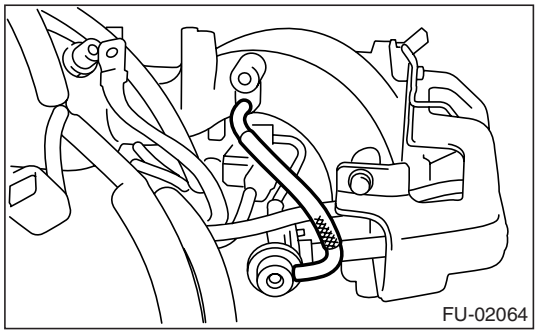


13) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

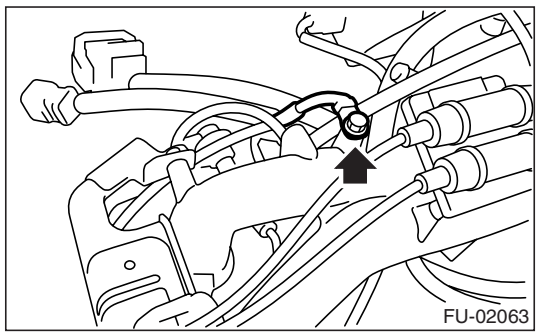


14) Connect the pressure regulator vacuum hose to intake manifold.



15) Install the EGR valve. (EC, EK, K4, ER model) <Ref. to FU(H4SO 2.0)-28, INSTALLATION, EGR Valve.>
16) Install the throttle body to intake manifold. <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>
17) Install the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, INSTALLATION, Ignition Coil and Ignitor Assembly.>
18) Install the engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



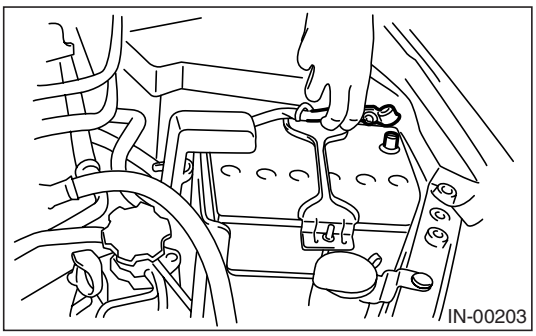
E: INSPECTION

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

4. Engine Coolant Temperature Sensor

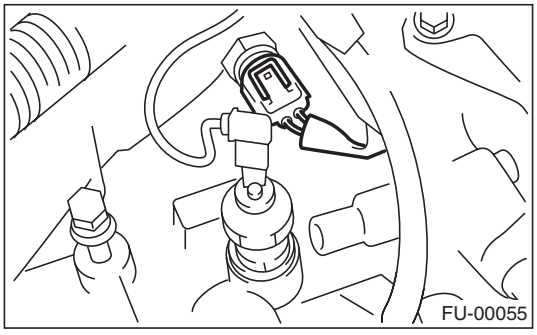
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>

3) Disconnect the connectors from engine coolant temperature sensor.



4) Remove the engine coolant temperature sensor.

B: INSTALLATION

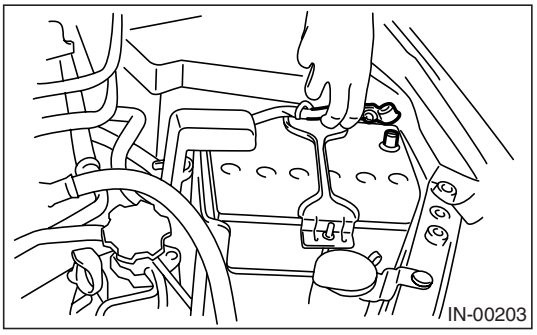
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)

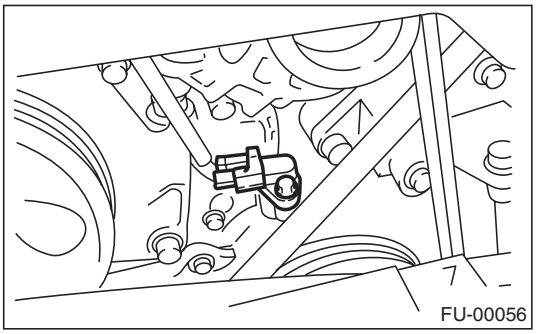
5. Crankshaft Position Sensor

A: REMOVAL

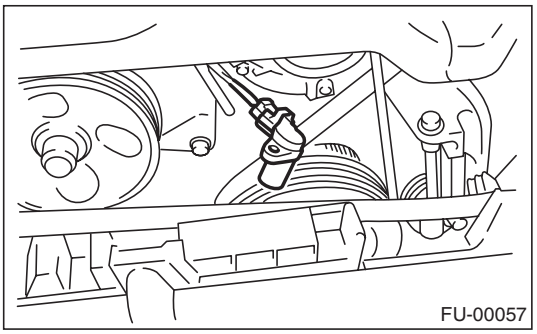
1) Disconnect the ground cable from battery.



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



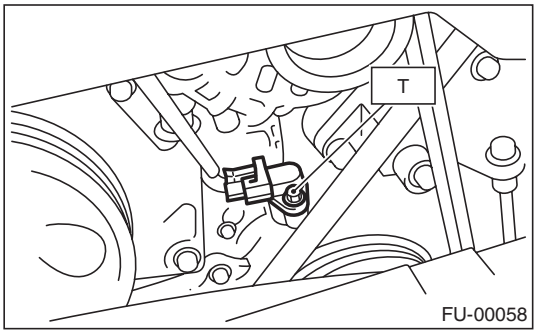
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

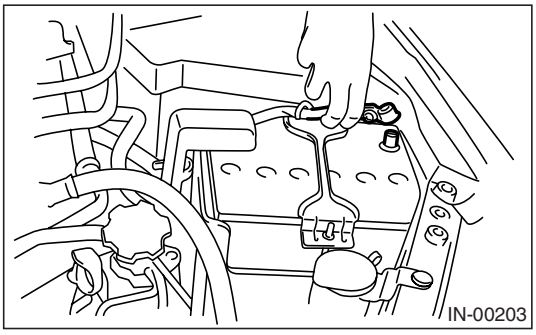
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



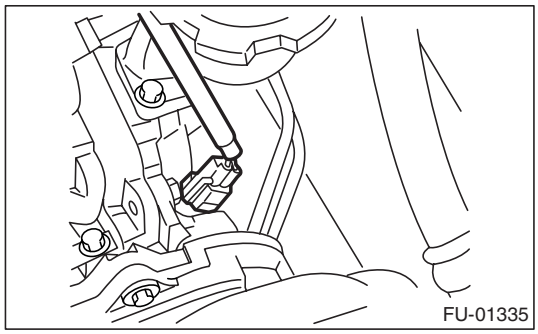
6. Camshaft Position Sensor

A: REMOVAL

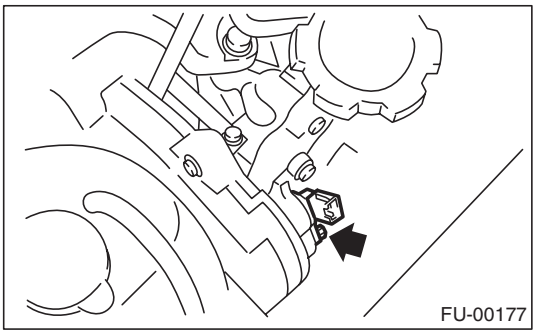
1) Disconnect the ground cable from battery.



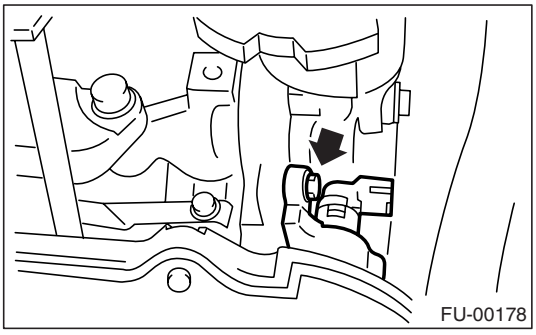
2) Disconnect the connector from camshaft position sensor.



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

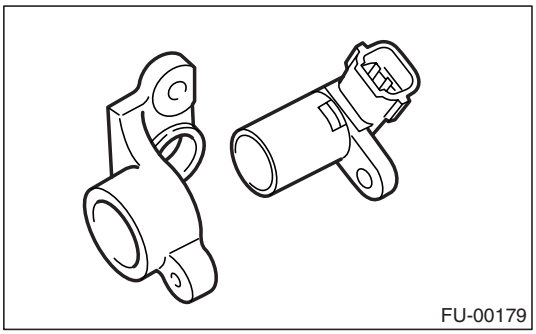


4) Remove the bolt which installs camshaft position sensor support to camshaft cap LH.



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

6) Remove the camshaft position sensor itself.



B: INSTALLATION

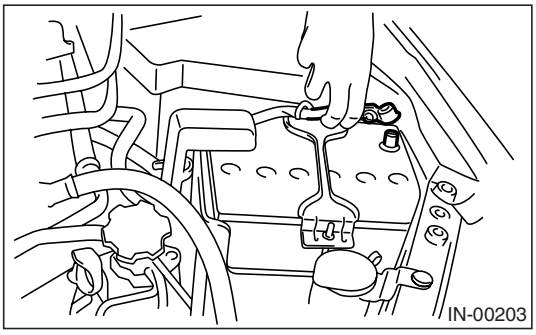
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

7. Knock Sensor

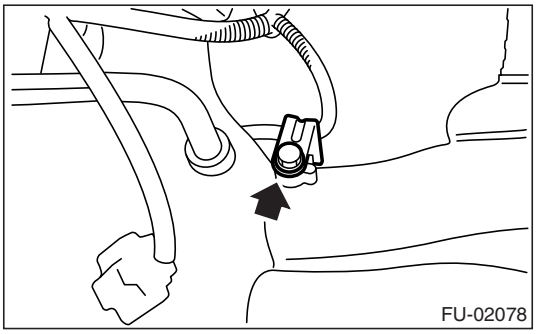
A: REMOVAL

1) Disconnect the ground cable from battery.

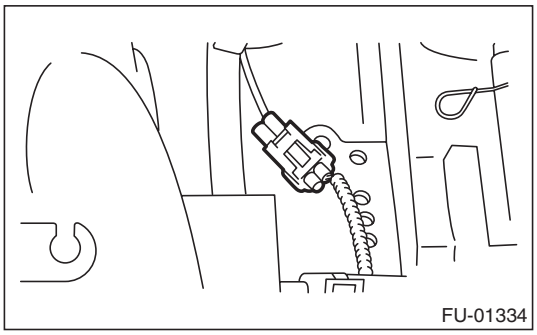


2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>

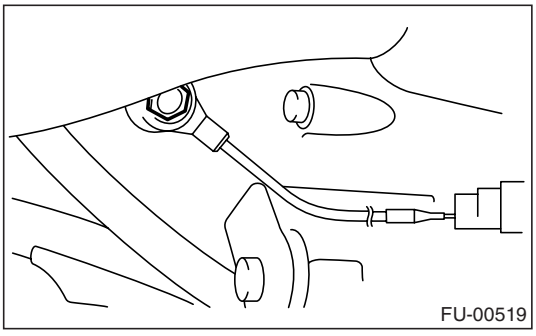
3) Remove the harness bracket from intake manifold.



4) Disconnect the knock sensor connector.



5) Remove the knock sensor from cylinder block.

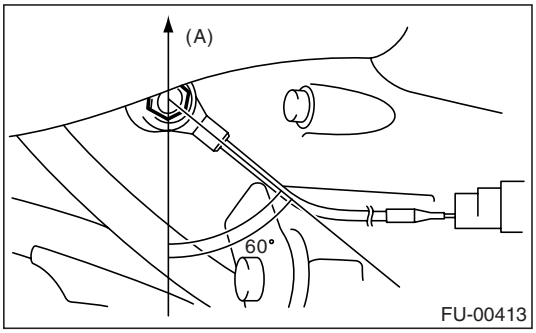


B: INSTALLATION

1) Install the knock sensor to cylinder block.

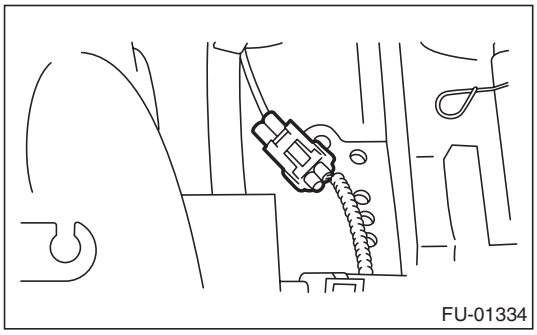
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to the engine rear.

Tightening torque:
24 N·m (2.4 kgf-m, 17.7 ft-lb)



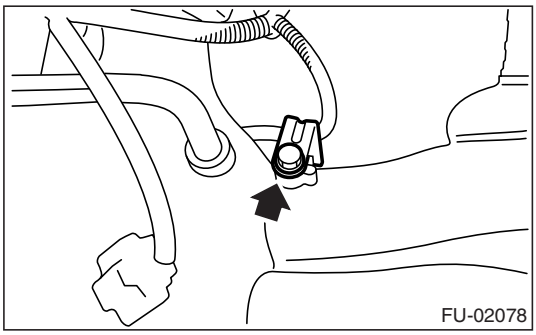
(A) Front side

2) Connect the knock sensor connector.



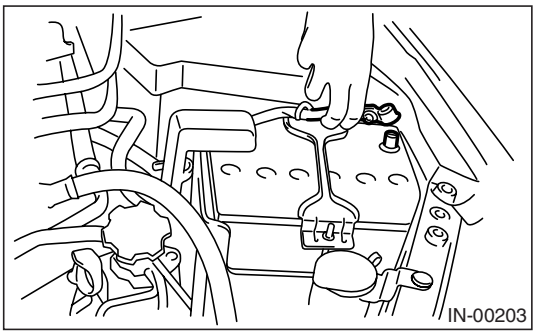
3) Install the harness bracket to intake manifold.

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



4) Install the air cleaner case.
<Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.>

5) Connect the ground cable to battery.



8. Throttle Position Sensor

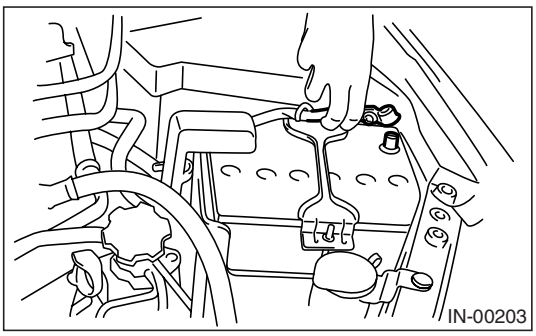
A: SPECIFICATION

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(H4SO 2.0)-10, REMOVAL, Throttle Body.> <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>

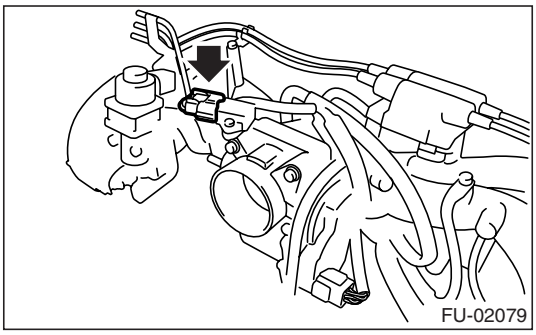
9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from manifold absolute pressure sensor.



3) Remove the manifold absolute pressure sensor from throttle body.

B: INSTALLATION

Install in the reverse order of removal.

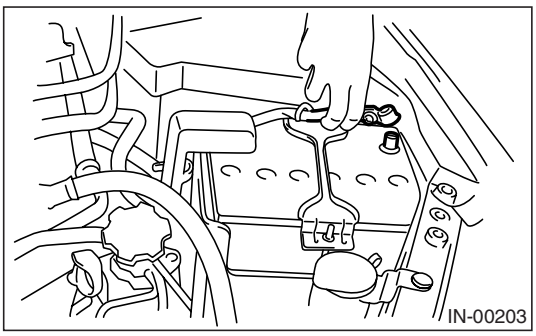
NOTE:
Use a new O-ring.

Tightening torque:
2 N·m (0.2 kgf-m, 1.5 ft-lb)

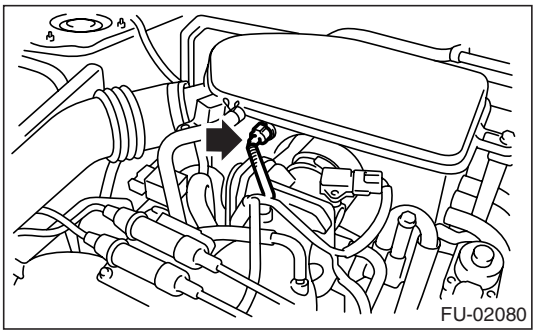
10.Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



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



B: INSTALLATION

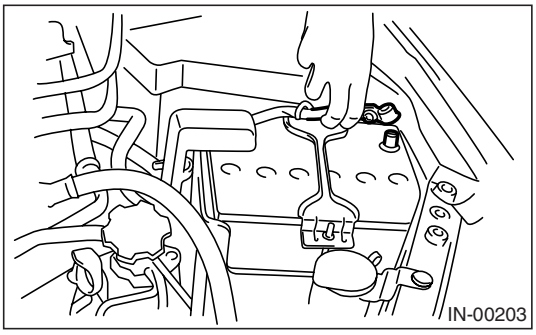
Install in the reverse order of removal.

11.EGR Valve

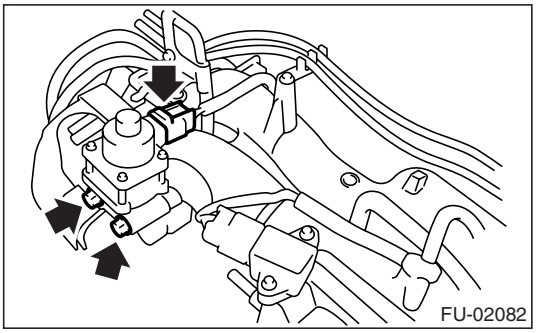
A: REMOVAL

NOTE:
EGR valve is equipped to EC, EK, K4 and ER model.

1) Disconnect the ground cable from battery.



2) Disconnect the connector from EGR valve.
3) Remove the EGR valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

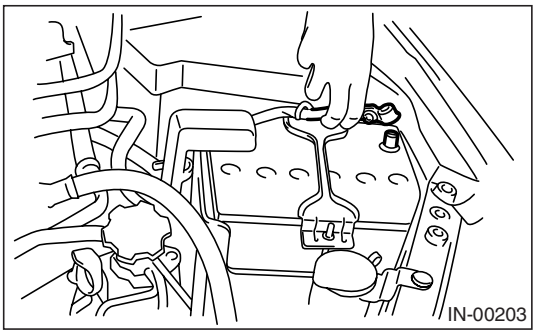
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

12.Fuel Injector

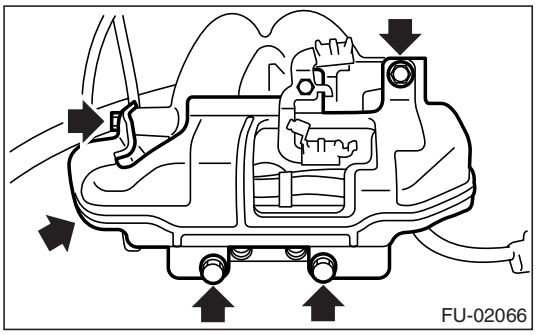
A: REMOVAL

1. RH SIDE

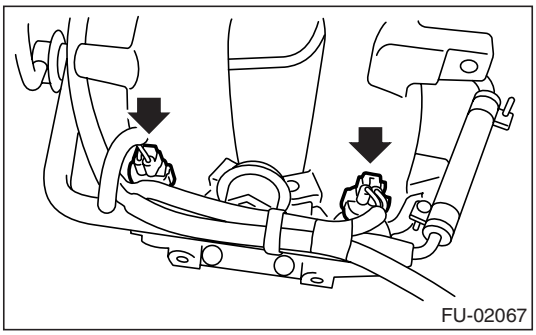
1) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.
3) Disconnect the ground cable from battery.



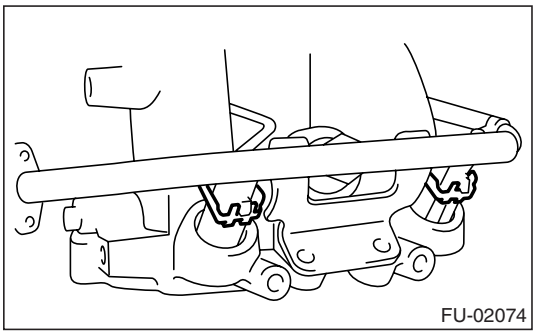
4) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).
6) Remove the fuel pipe protector RH.



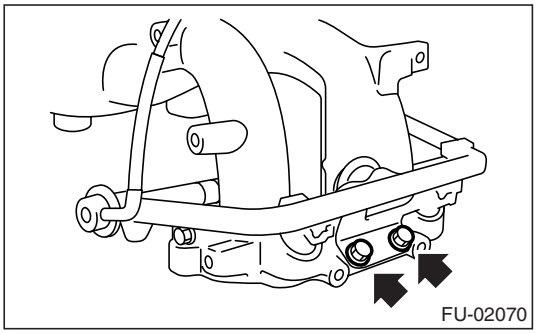
7) Disconnect the connector from fuel injector.

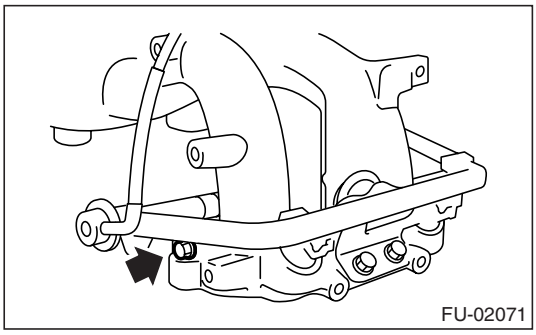


8) Remove the clip which secure fuel injector.



9) Remove the bolts which hold fuel injector pipe to intake manifold.



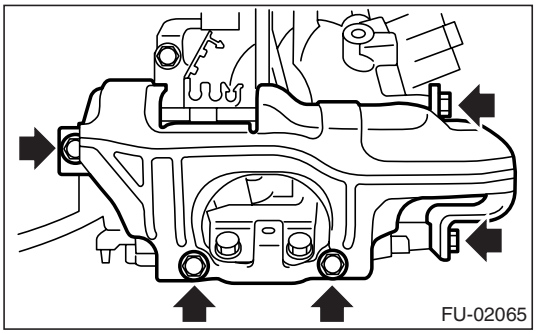


10) Remove the fuel injector while lifting up the fuel injector pipe.

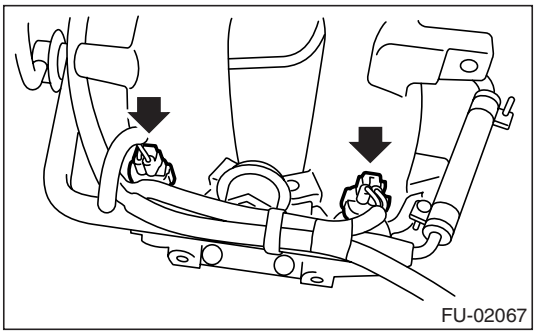
2. LH SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open fuel filler flap lid, and remove fuel filler cap.
3) Remove the battery.
4) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).

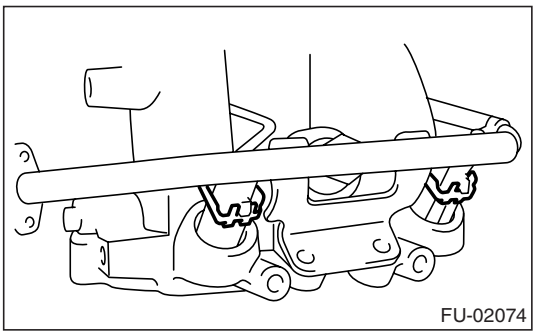
5) Remove the fuel pipe protector LH.



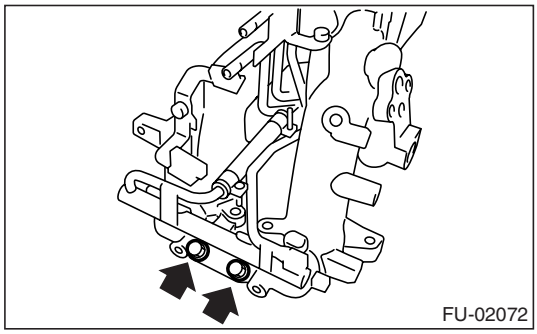
6) Disconnect the connector from fuel injector.

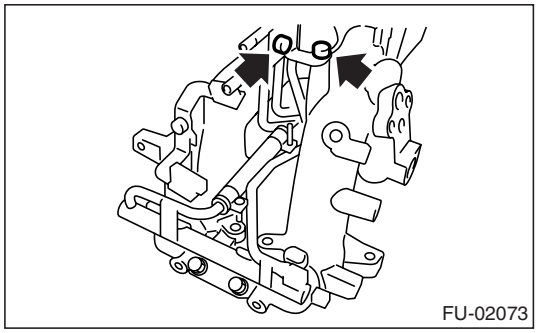


7) Remove the clip which secure fuel injector.



8) Remove the bolts which hold fuel injector pipe to intake manifold.





9) Remove the fuel injector while lifting up the fuel injector pipe.

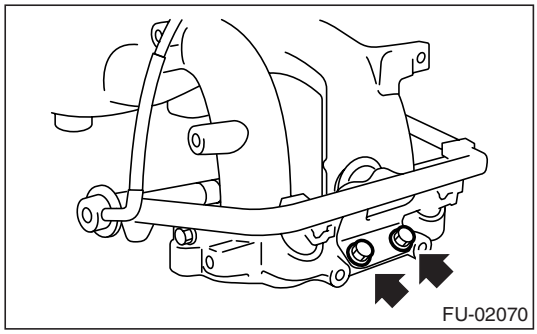
B: INSTALLATION

1. RH SIDE

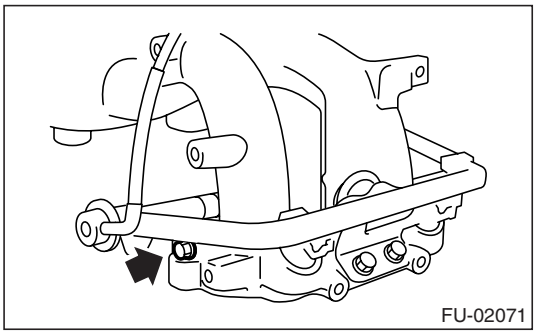
Install in the reverse order of removal.

NOTE:
Use a new O-ring.

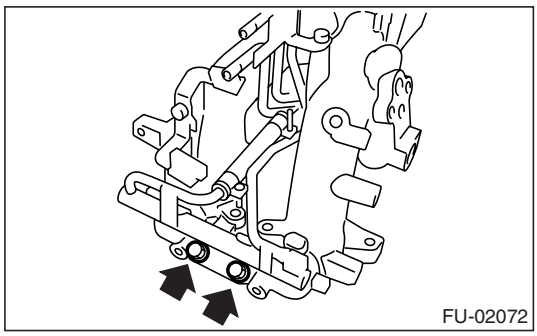
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



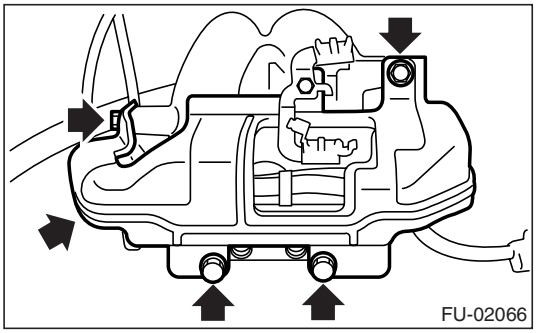
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



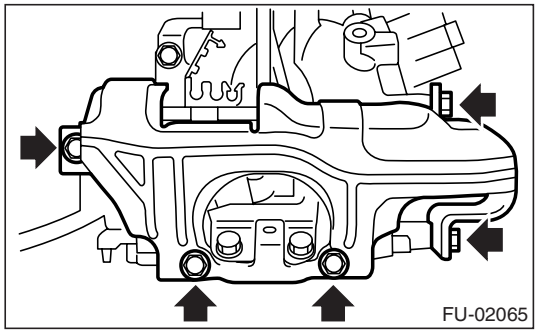
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

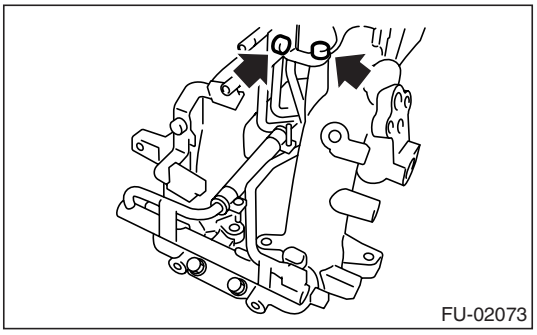


2. LH SIDE

Install in the reverse order of removal.

NOTE:
Use a new O-ring.

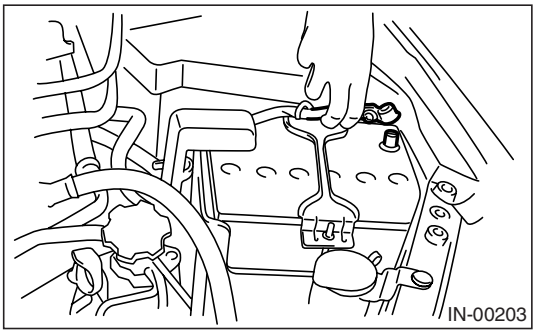
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



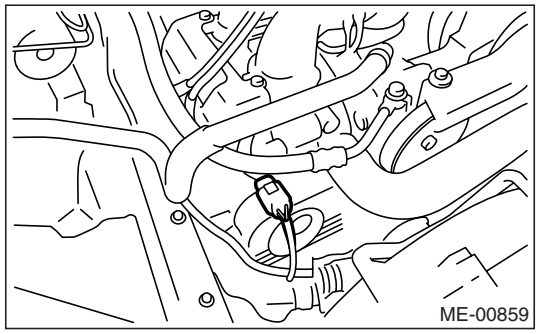
13.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

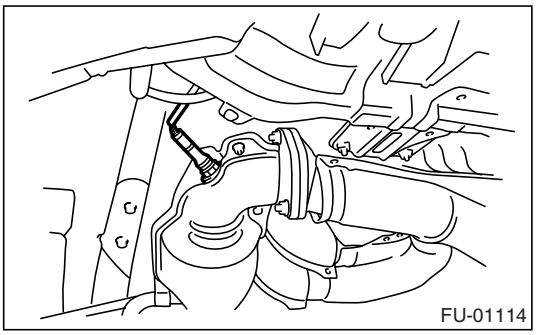


2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.>
3) Remove the connector of front oxygen (A/F) sensor.



4) Remove the clip which holds harness.
5) Lift-up the vehicle.
6) Remove the under cover.
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

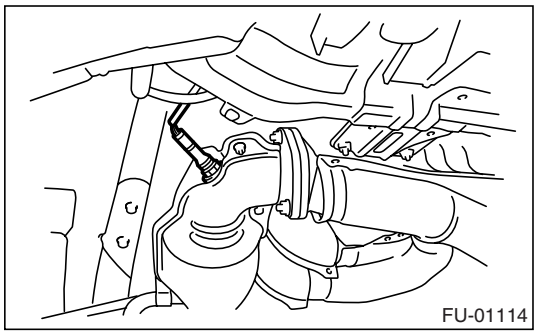
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

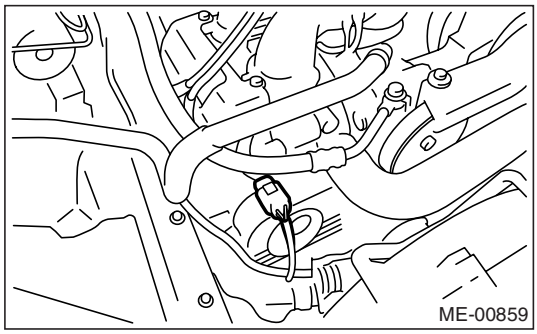
CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

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

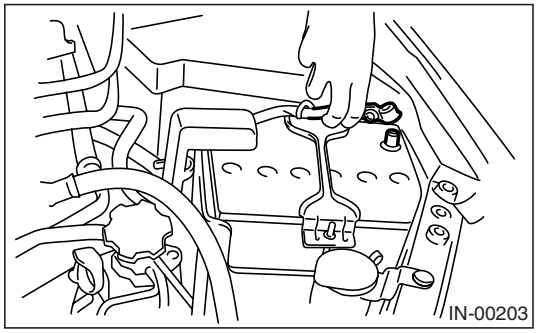
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Install the under cover.
4) Lower the vehicle.
5) Hold the harness with clip.
6) Connect the connector of front oxygen (A/F) sensor.



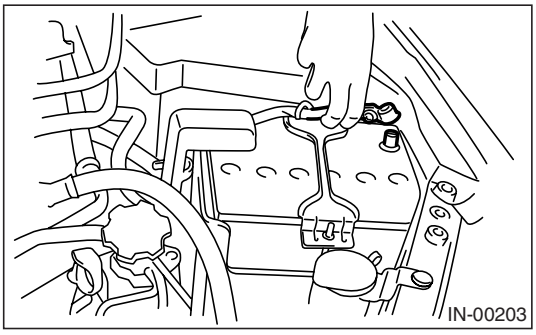
7) Install the air intake duct. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Duct.>
8) Connect the ground cable to battery.



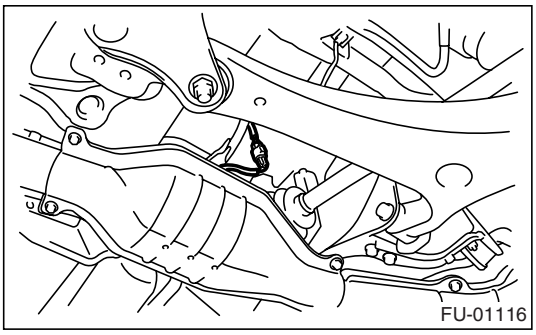
14. Rear Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

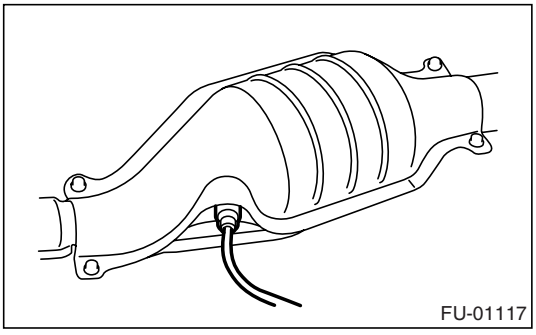


2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.



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

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



B: INSTALLATION

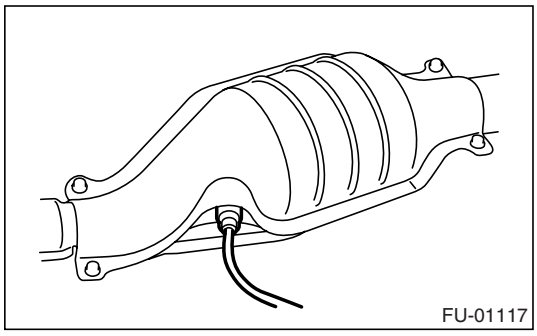
1) Before installing the rear oxygen sensor, apply anti-seize compound only to the threaded portion of the rear oxygen sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

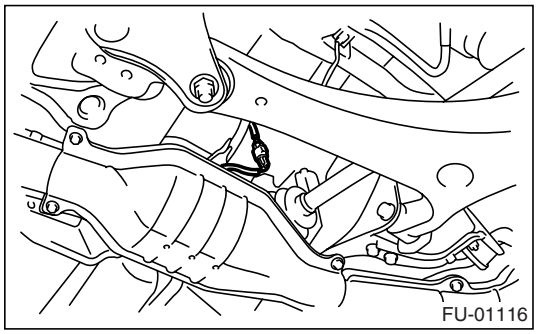
CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

2) Install the rear oxygen sensor.

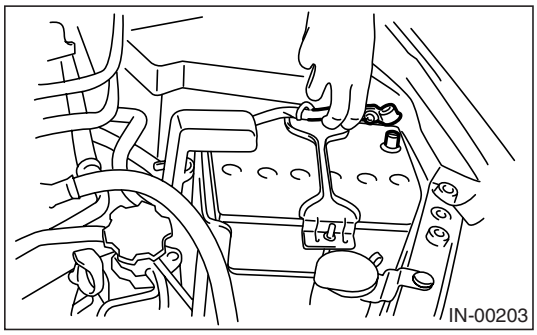
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Hold the harness with clip.
4) Connect the connector to rear oxygen sensor.



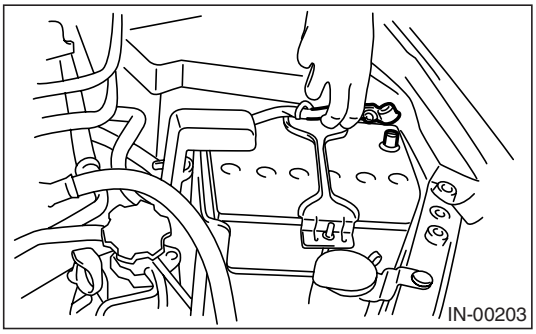
5) Lower the vehicle.
6) Connect the ground cable to battery.



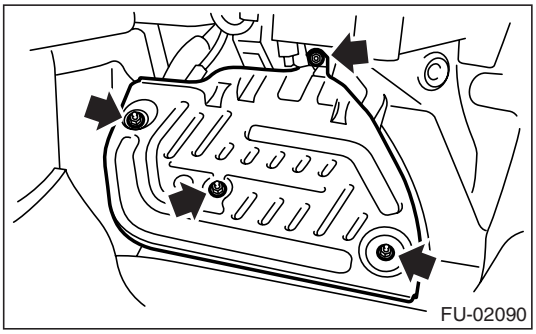
15. Engine Control Module (ECM)

A: REMOVAL

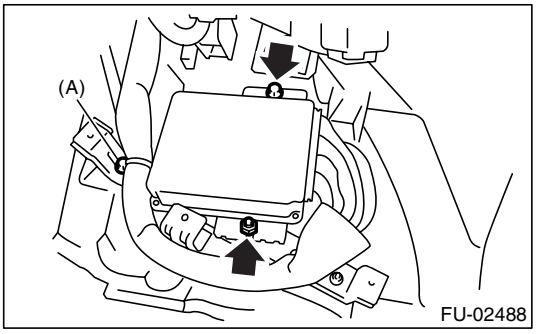
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger's side.
<Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of passenger's seat.
4) Remove the protect cover.



5) Remove the bolt and nut which hold the ECM to bracket.
6) Remove the clip (A) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

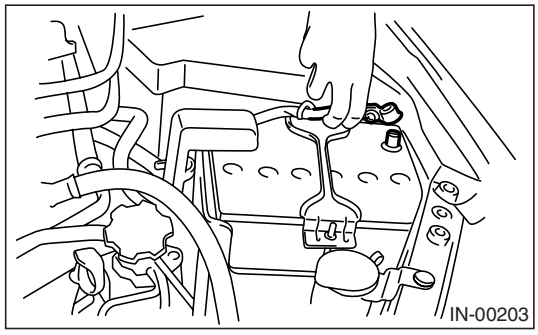
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

16.Main Relay

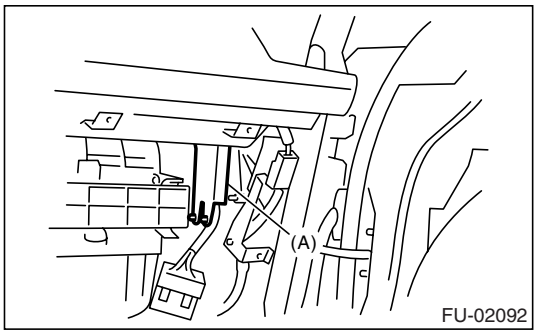
A: REMOVAL

1) Disconnect the ground cable from battery.

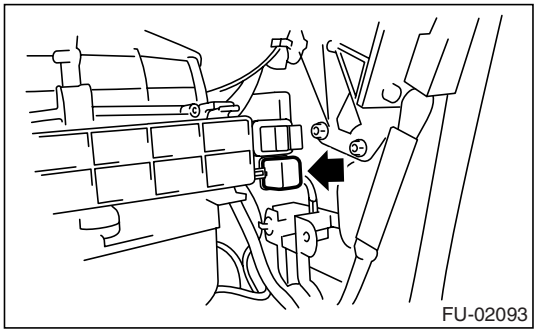


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



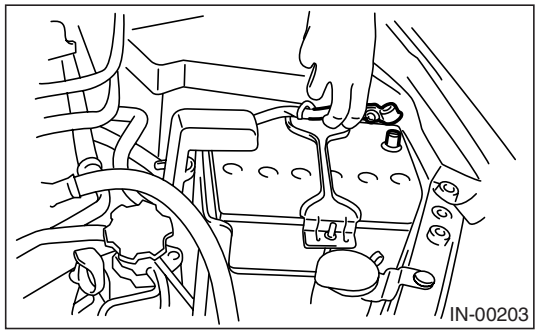
B: INSTALLATION

Install in the reverse order of removal.

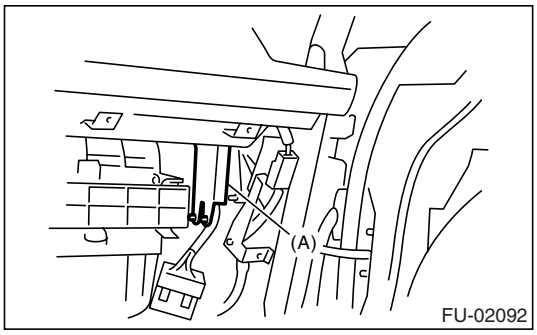
17.Fuel Pump Relay

A: REMOVAL

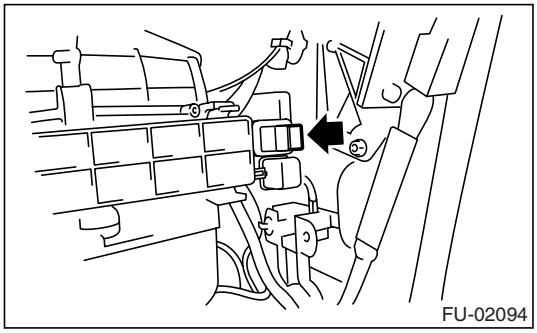
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



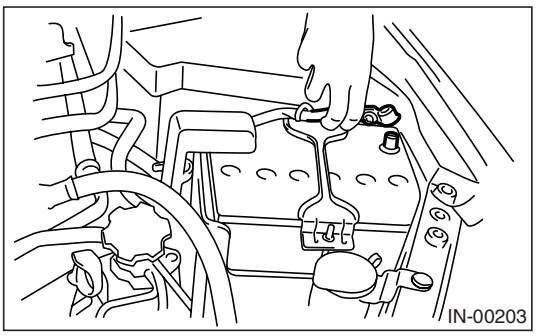
B: INSTALLATION

Install in the reverse order of removal.

18. Electronic Throttle Control Relay

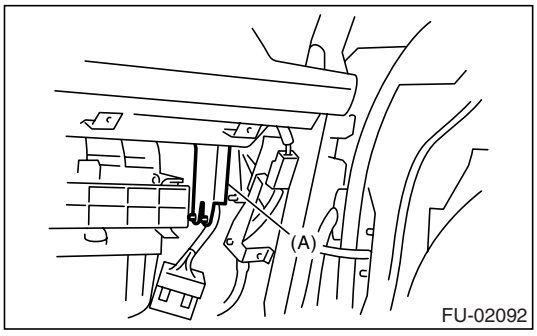
A: REMOVAL

1) Disconnect the ground cable from battery.

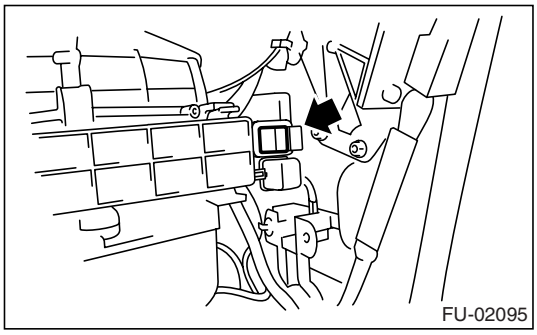


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from electronic throttle control relay.



B: INSTALLATION

Install in the reverse order of removal.

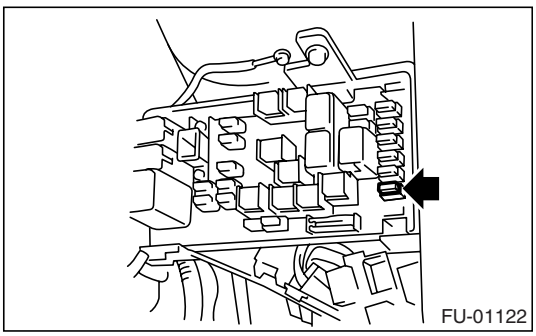
19. Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

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

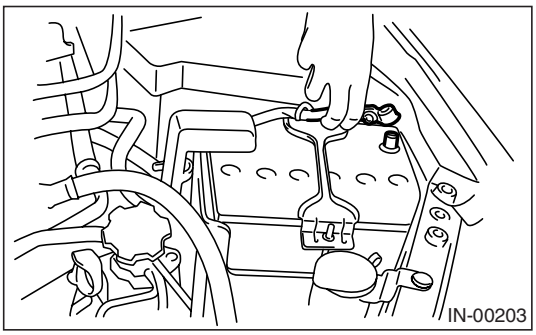


2) Start the engine and run until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

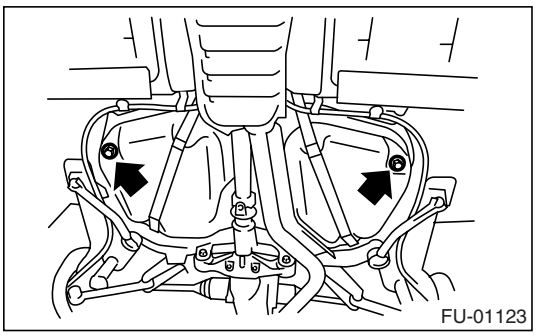
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Lift-up the vehicle.
2) Disconnect the ground cable from battery.



3) Open fuel filler flap lid, and remove fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

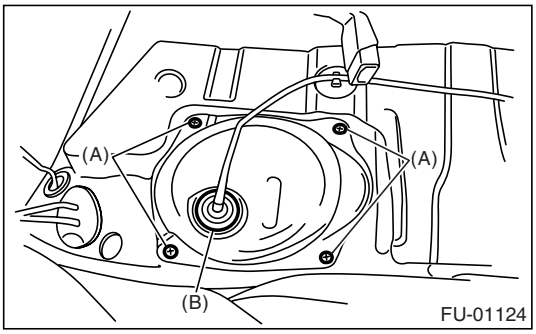
Tightening torque:
Nut
9 N·m (0.9 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

20. Fuel Tank

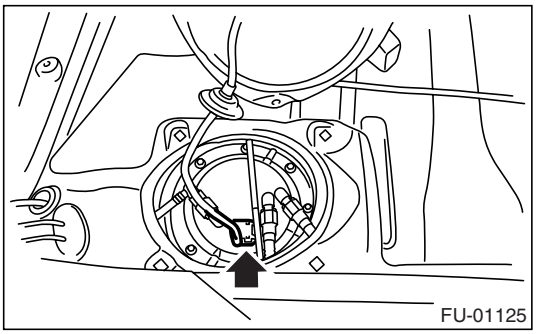
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

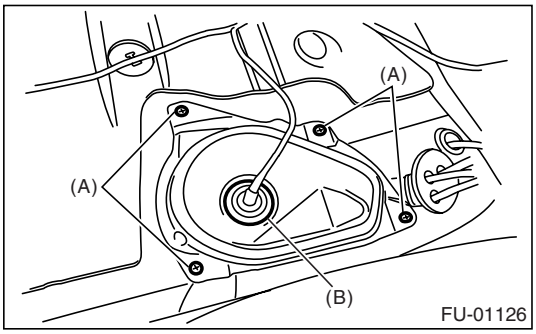
1) Lift-up the vehicle.
2) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from fuel tank.
<Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Remove the service hole cover of fuel pump.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



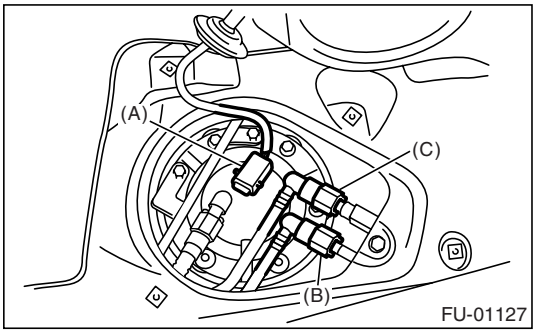
6) Disconnect the connector from fuel pump.



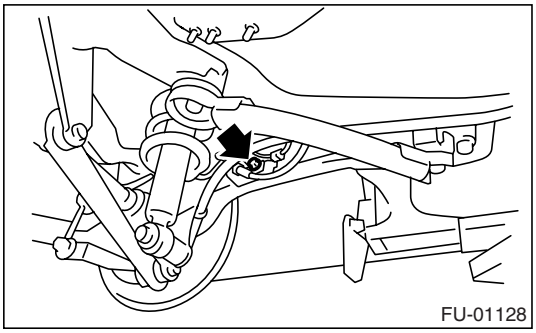
7) Remove the service hole cover of fuel sub level sensor.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



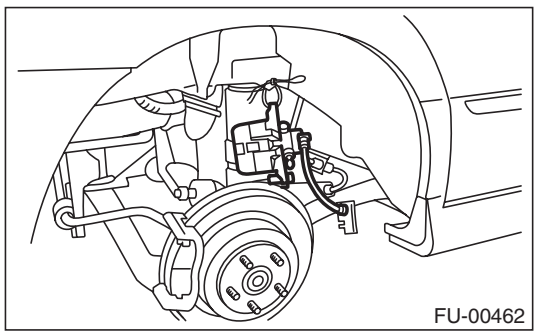
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector of the fuel delivery (B) and return hose (C). <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



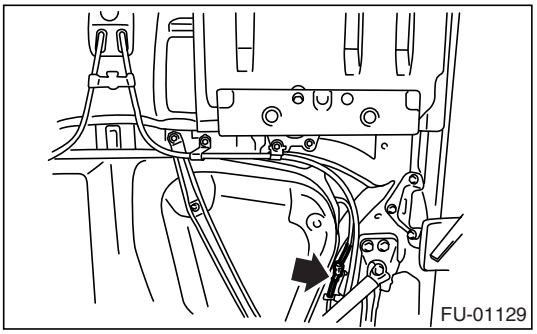
10) Lift-up the vehicle.
11) Remove the rear wheels.
12) Remove the bolts which secure the rear brake hose installation bracket.



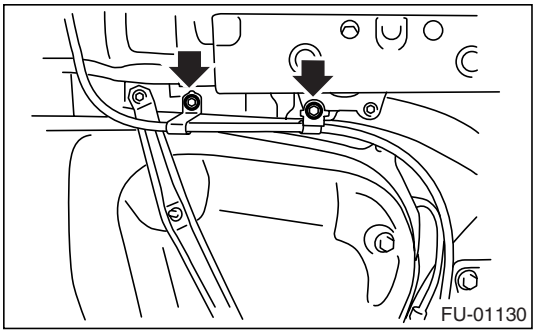
13) Remove the rear brake caliper and tie it to the vehicle body side.

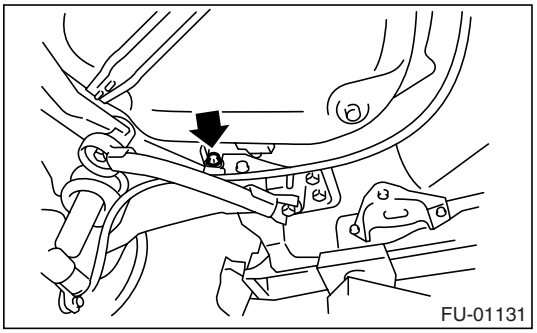


14) Remove the parking brake cable from parking brake assembly. <Ref. to PB-6, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
15) Remove the rear exhaust pipe.
<Ref. to EX(H4SO 2.0)-10, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install the parking brake cable clamp.

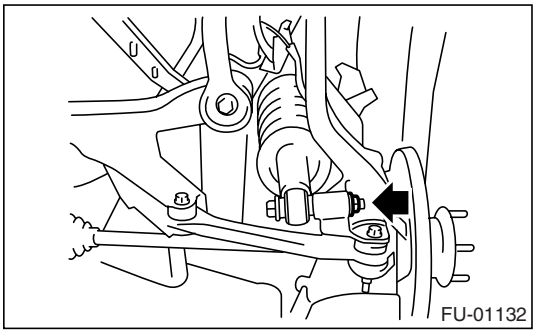




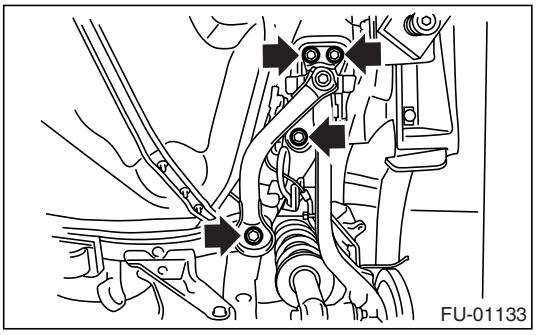
20) Remove the rear suspension assembly.

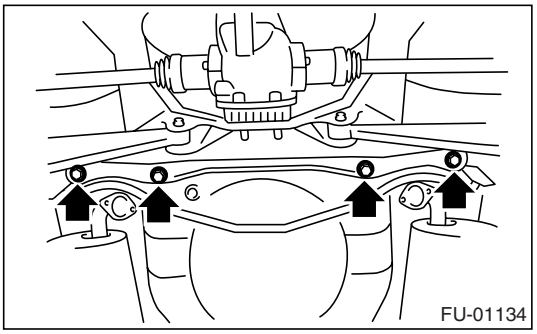
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs the rear shock absorber to rear suspension arm.



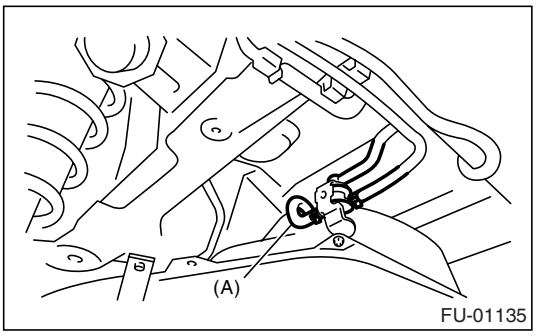
(3) Remove the bolts which secure the rear suspension assembly to body.



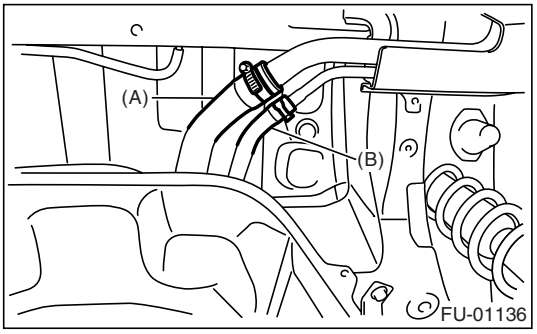


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

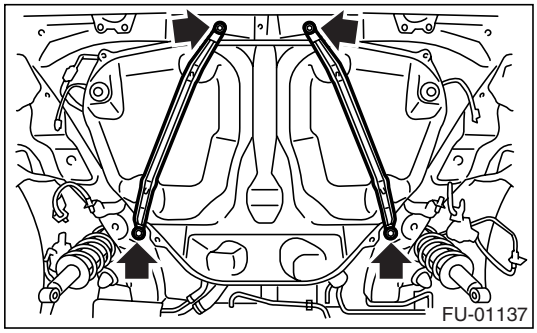


22) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands, and dismount the fuel tank from vehicle.

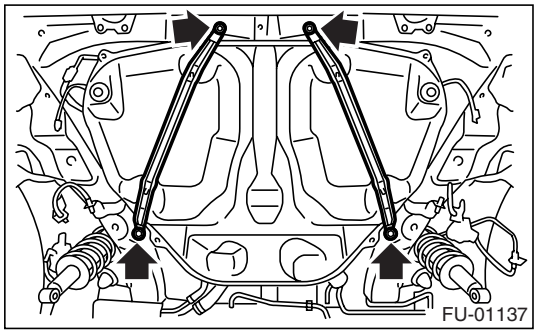
CAUTION:
A helper is required to perform this work.



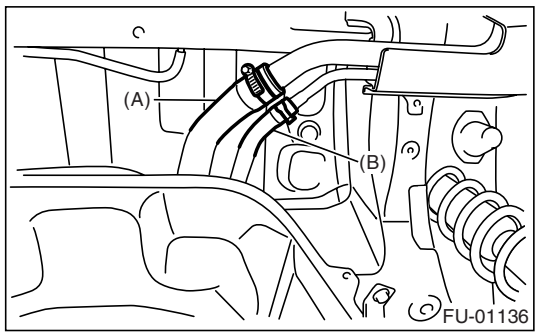
B: INSTALLATION

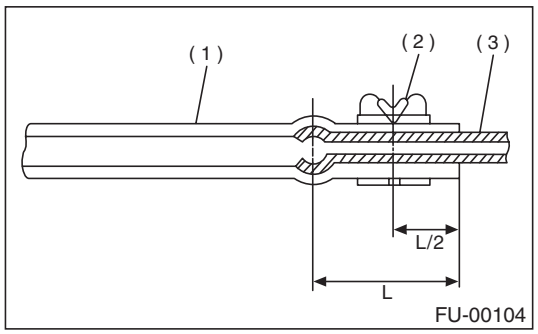
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

CAUTION:
A helper is required to perform this work.



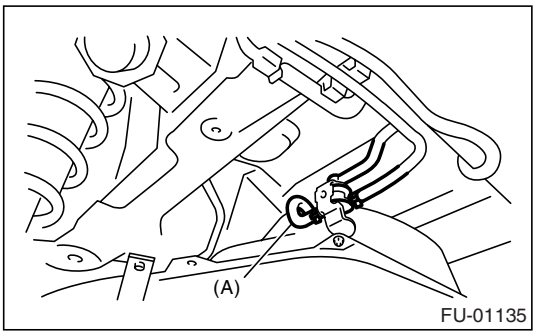
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipe

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolts of fuel tank band.

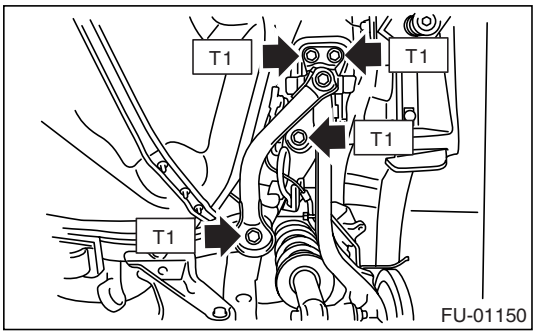
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

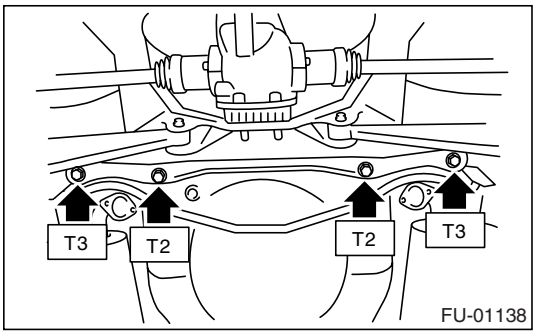
5) Install the rear suspension assembly.

CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Support the rear suspension assembly, and then tighten the bolts which secure the rear suspension assembly to body.

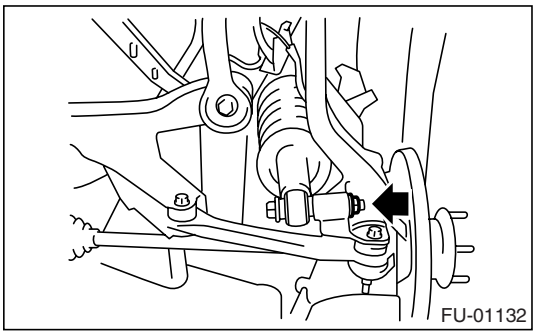
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.6 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





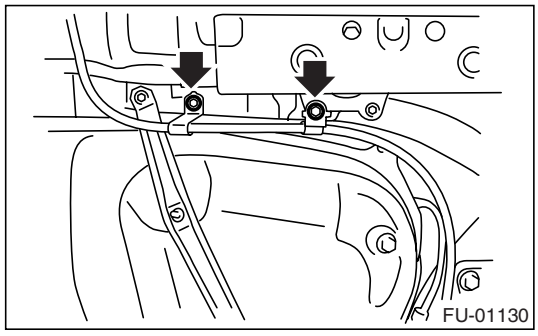
(3) Tighten the bolts which install the rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

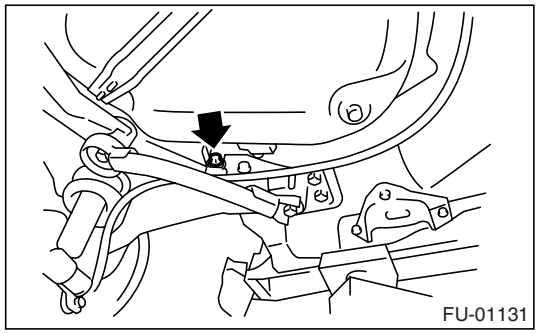


6) Tighten the bolts which install the parking brake cable clamp.

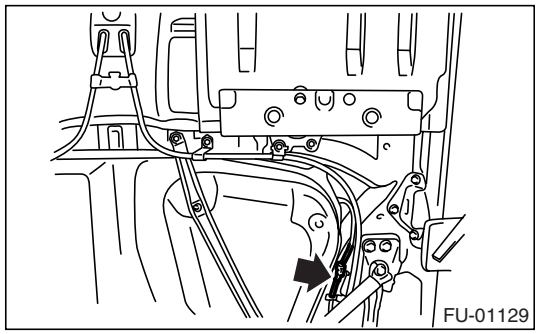
Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)


FU-01130

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

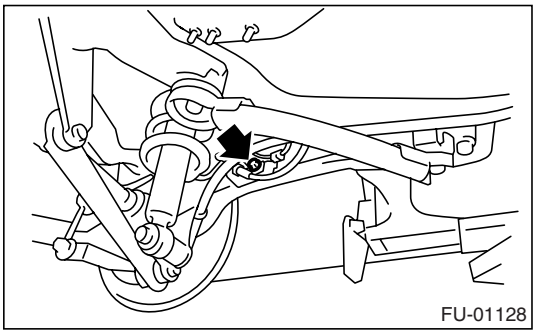

FU-01131

7) Connect the connector to rear ABS wheel speed sensor.


FU-01129

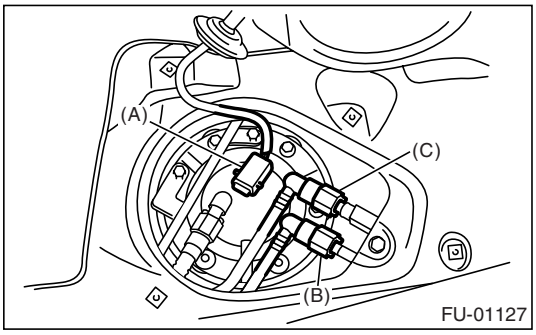
8) Install the heat shield cover.
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe. <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-7, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolt which secures rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)


FU-01128

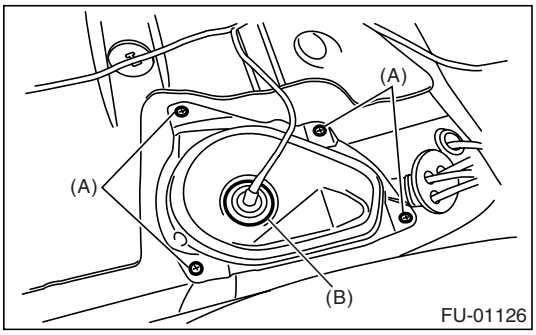
15) Install the rear wheels.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector to the fuel delivery (B) and return hose (C). <Ref. to FU(H4SO 2.0)-54, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

NOTE:
Be careful not to misconnect the delivery side and return side.



FU-01127

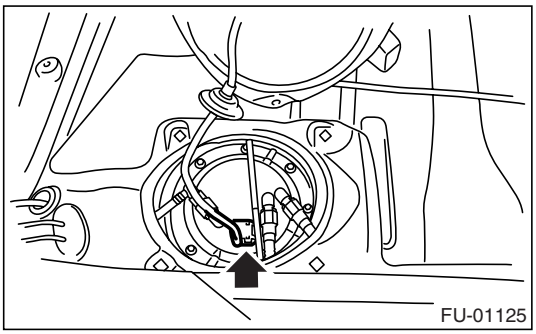
19) Install the service hole cover of fuel sub level sensor.



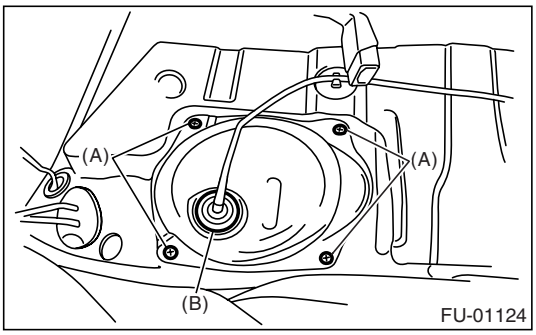
FU-01126

(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

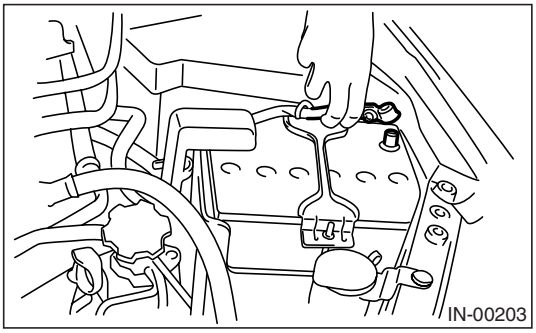
1) Check that the fuel tank is not holed, cracked or otherwise damaged.
2) Make sure that the fuel pipe and fuel hose are not cracked and those connections are tight.

21.Fuel Filler Pipe

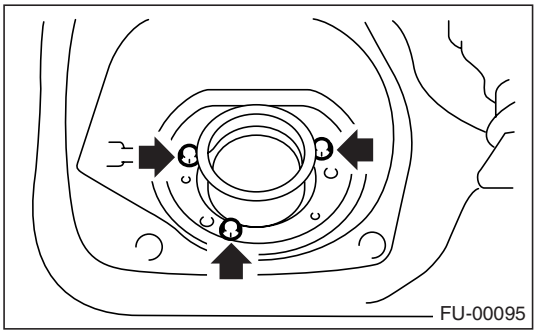
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

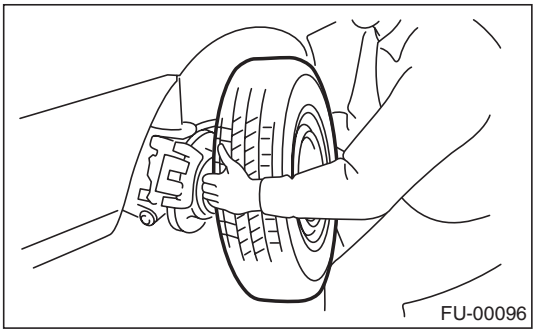
1) Disconnect the ground cable from battery.



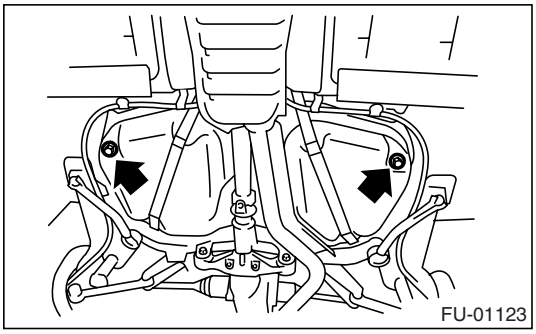
2) Open the fuel filler flap lid, and remove the filler cap.
3) Remove the screws which secure the packing.



4) Lift-up the vehicle.
5) Remove the rear wheel RH.



6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.

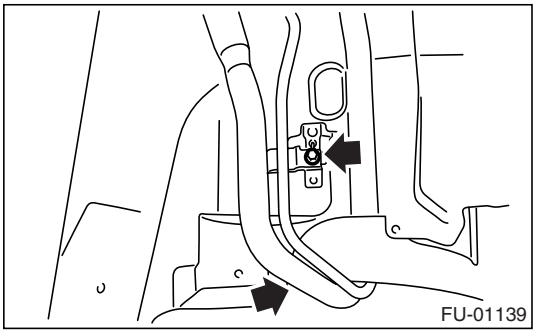


7) Tighten the fuel drain plug.

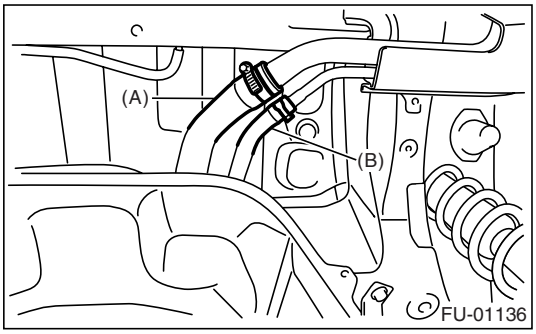
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
9) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
10) Remove the bolts which hold the fuel filler pipe bracket on the body.



11) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

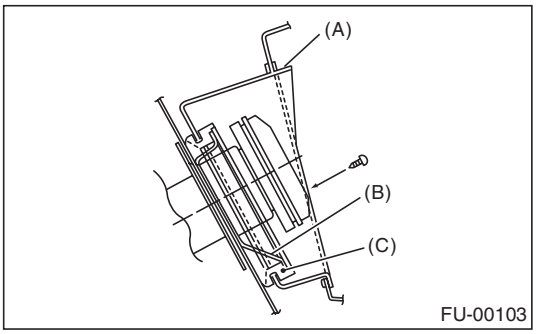


12) Remove the fuel filler pipe to under side of the vehicle.

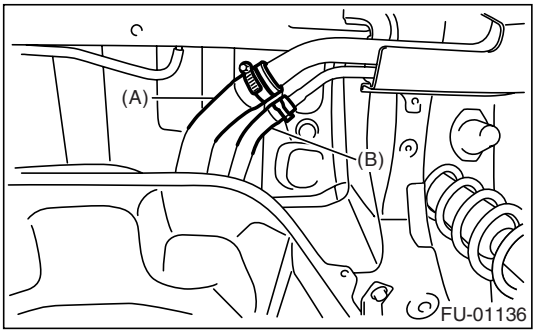
B: INSTALLATION

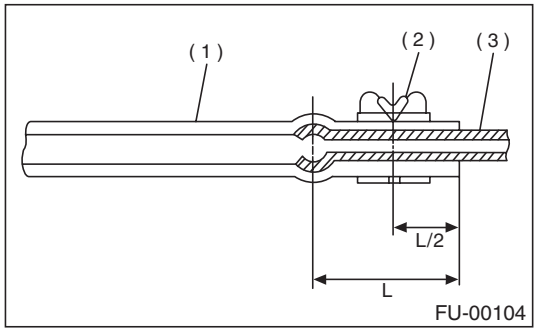
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.

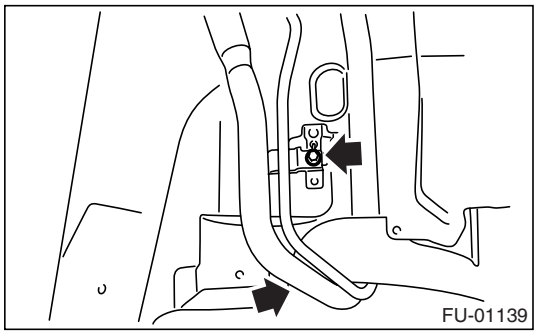




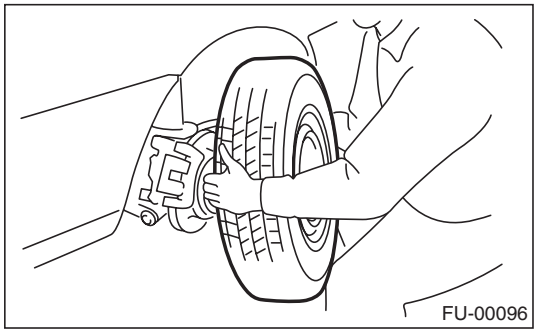
(1) Hose
(2) Clip or clamp
(3) Pipe

5) Tighten the bolts which hold the fuel filler pipe bracket on the body.

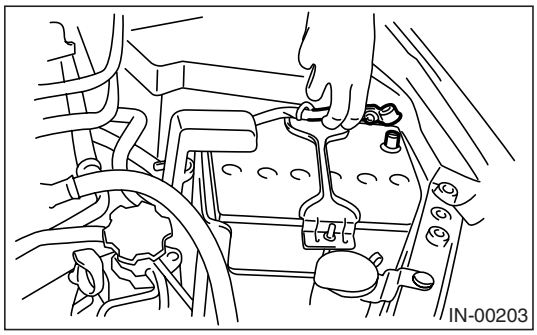
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Connect the ground cable to battery.



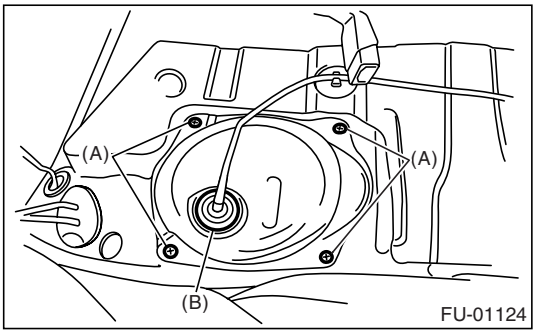
22. Fuel Pump

A: REMOVAL

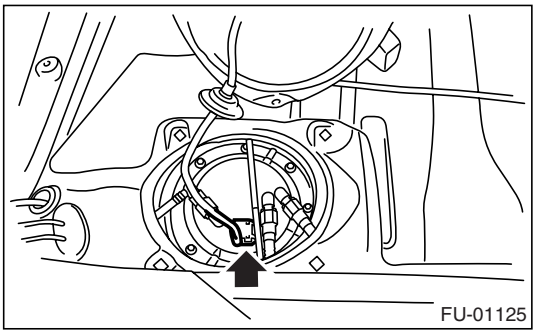
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

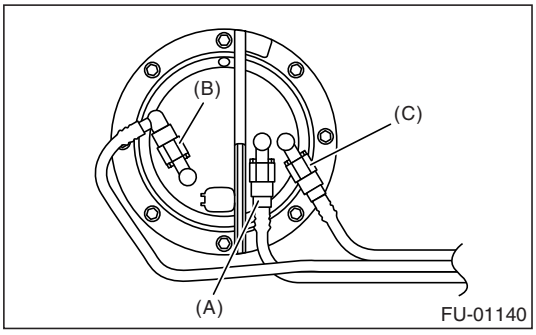
1) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
3) Remove the rear seat.
4) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



5) Disconnect the connector from fuel pump.



6) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
7) Remove the nuts which install the fuel pump assembly to fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

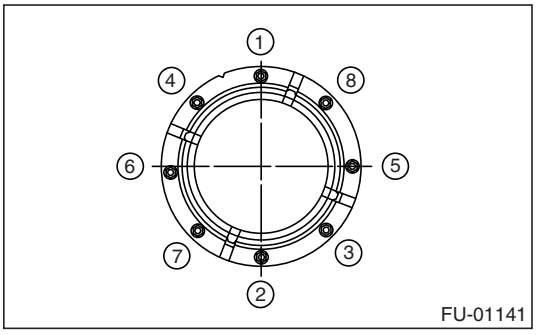
8) Remove the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in the order as shown in the figure.

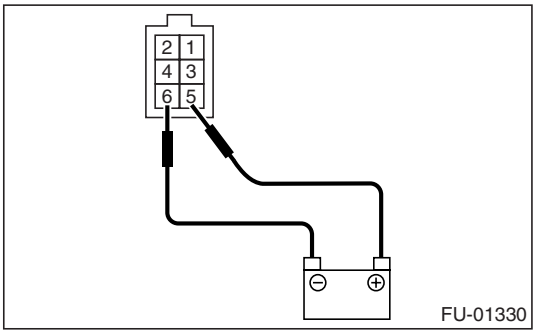
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.2 ft-lb)



C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump and apply the battery power supply to check whether the pump operates.

WARNING:
• Wipe off the fuel completely.
• Keep battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply ON and OFF on battery side.
• Do not run fuel pump for a long time under non-load condition.



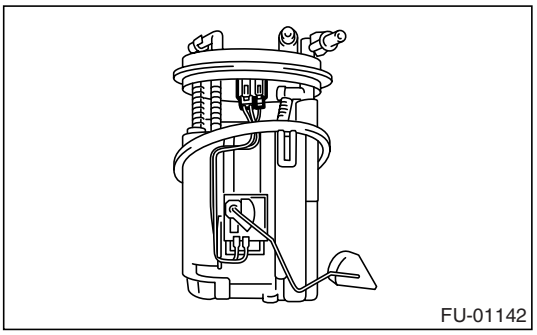
23.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4SO 2.0)-47, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

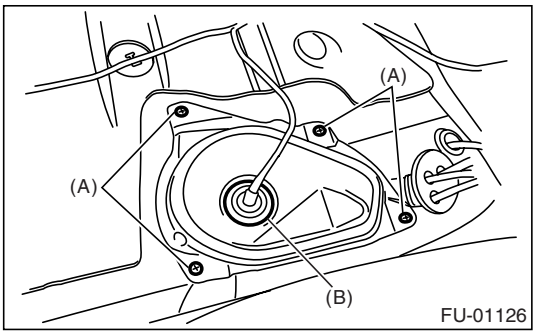
Install in the reverse order of removal.

24.Fuel Sub Level Sensor

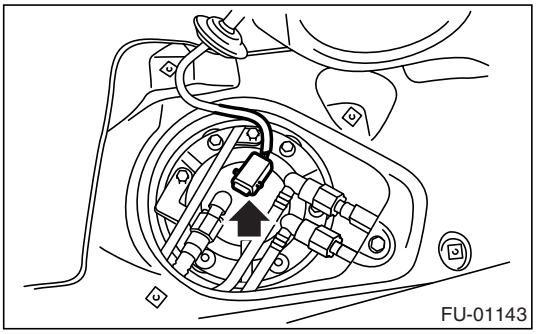
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

1) Drain fuel. <Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
2) Remove the rear seat.
3) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove the service hole cover.

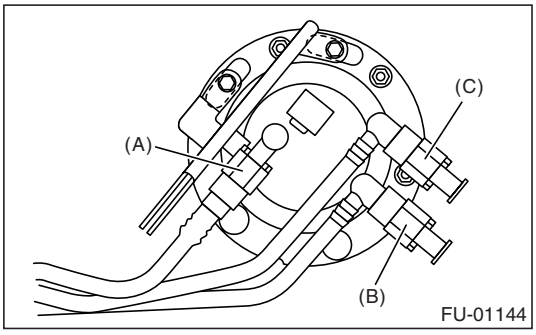


4) Disconnect the connector from fuel sub level sensor.



5) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

6) Remove the nuts and bolts which install the fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

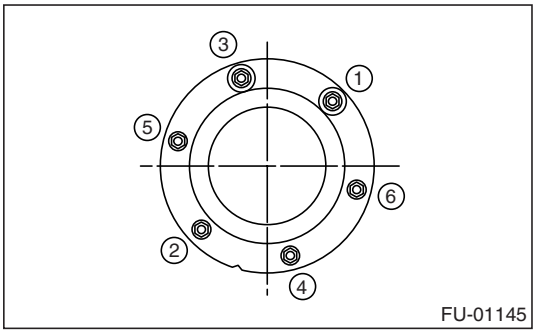
7) Remove the fuel sub level sensor.

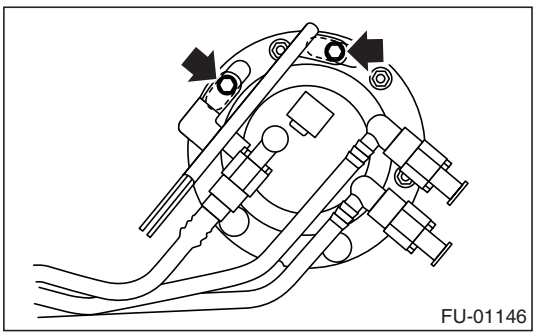
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.2 ft-lb)





25.Fuel Filter

A: SPECIFICATION

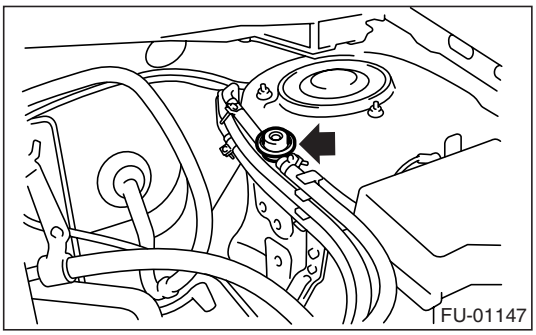
Fuel filter forms a single unit with fuel pump.
Refer to Fuel Pump for removal and installation procedures. <Ref. to FU(H4SO 2.0)-47, REMOVAL, Fuel Pump.>
<Ref. to FU(H4SO 2.0)-47, INSTALLATION, Fuel Pump.>

26.Fuel Damper Valve

A: REMOVAL

1. DELIVERY SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel delivery line.



2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for removal. <Ref. to FU(H4SO 2.0)-14, DISASSEMBLY, Intake Manifold.>

B: INSTALLATION

1. DELIVERY SIDE

Install in the reverse order of removal.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

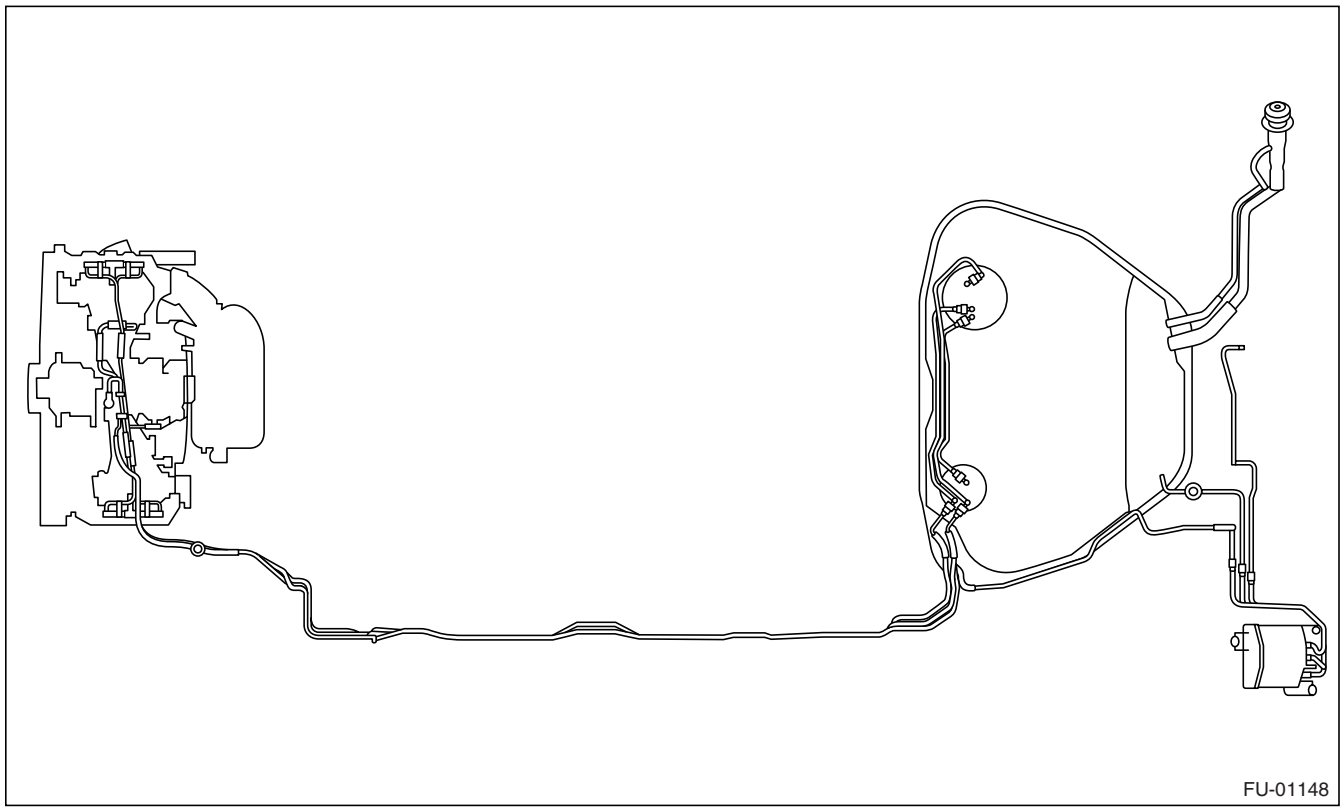
2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for installation. <Ref. to FU(H4SO 2.0)-16, ASSEMBLY, Intake Manifold.>

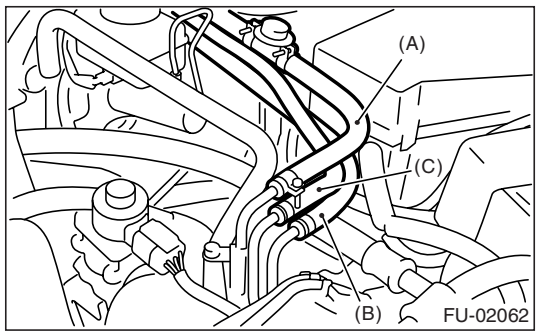
27.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Lift-up the vehicle.
2) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open fuel filler flap lid, and remove fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.


FU-01148

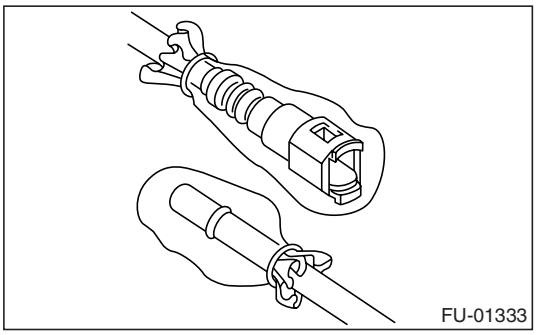
6) In the engine compartment, disconnect the fuel delivery hoses, return hoses, and evaporation hose.



FU-02062

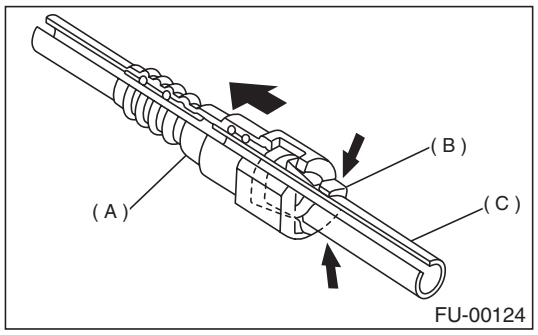
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

7) Lift-up the vehicle.
8) Remove the fuel tank. <Ref. to FU(H4SO 2.0)-39, REMOVAL, Fuel Tank.>
9) Separate the quick connector on fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.


FU-01333

(3) Hold the connector (A) and push retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

CAUTION:
Replace new retainer.

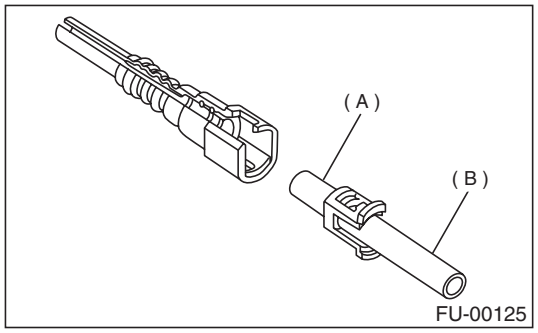


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

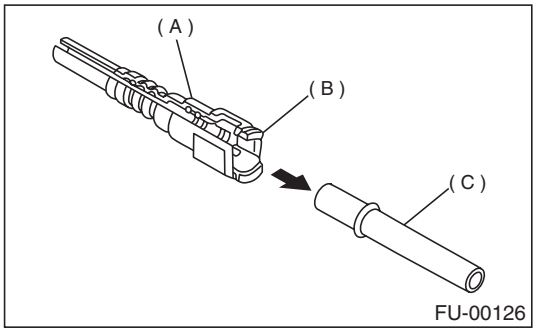
1) Connect the quick connector of fuel line.

CAUTION:
• Replace new retainer.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



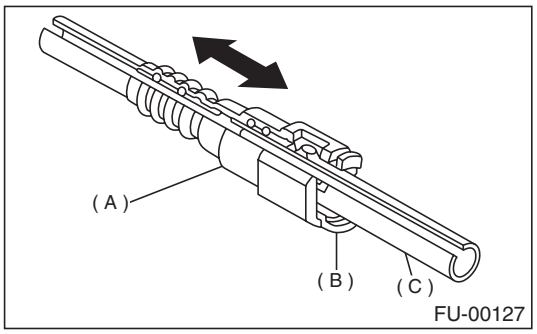
(A) Seal surface
(B) Pipe

(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.



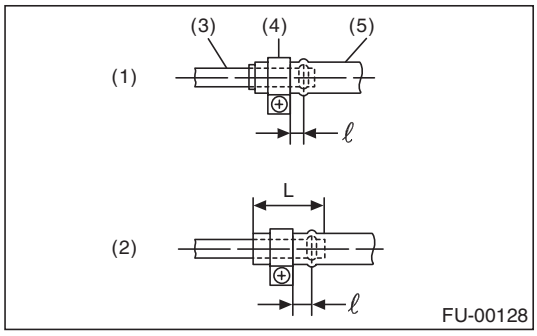
(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose and fuel return hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount to be inserted is specified.
Type B: When the amount to be inserted is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

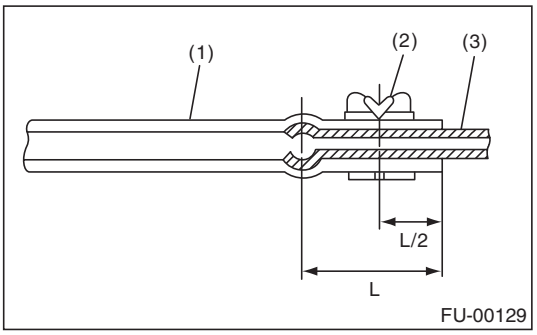
L: 22.5±2.5 mm (0.886±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) Connect the evaporation hose to the pipe with an overlap of 15 to 20 mm (0.59 to 0.79 in).
L = 17.5±2.5 mm (0.689±0.098 in)



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

28.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	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.
2)	Decline of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air mixed in the fuel system	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator	Replace.
2. Leakage or blow out fuel		
1)	Loosened joints of the fuel pipe	Retighten.
2)	Cracked fuel pipe, hose, and fuel tank	Replace.
3)	Defective welding part on the fuel tank	Replace.
4)	Defective drain packing of the fuel tank	Replace.
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube, and fuel filler pipe	Retighten.
2)	Defective packing air tightness on the fuel saucer	Correct or replace the packing.
3)	Defective fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unused for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent each time the fuel is reduced to half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use 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(H4SO 2.0)

		Page
1.	General Description	2
2.	Front Catalytic Converter	3
3.	Rear Catalytic Converter	4
4.	EGR Valve	5
5.	Canister	6
6.	Purge Control Solenoid Valve	7
7.	Two-way Valve	9
8.	PCV Valve	10

1. General Description

A: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

The front and rear catalytic converters are integrated into center exhaust pipe as one unit; therefore, refer to “Center Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converters are integrated into center exhaust pipe as one unit; therefore, refer to “Center Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

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

3. Rear Catalytic Converter

A: REMOVAL

The front and rear catalytic converters are integrated into center exhaust pipe as one unit; therefore, refer to “Center Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converters are integrated into center exhaust pipe as one unit; therefore, refer to “Center Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

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

4. EGR Valve

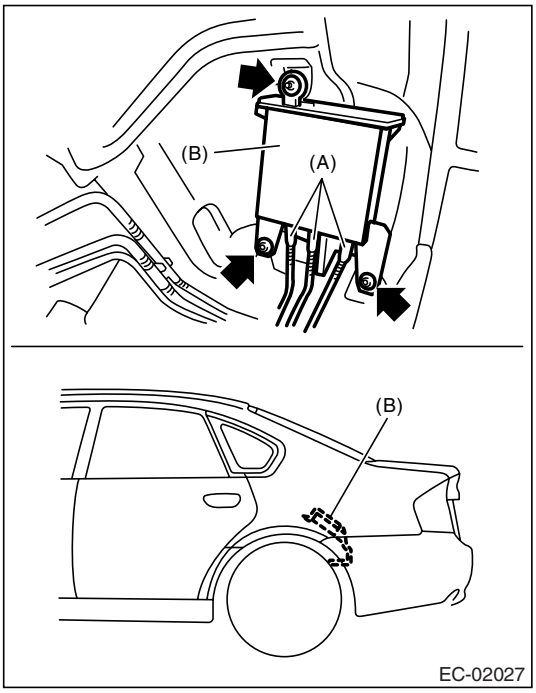
A: SPECIFICATION

Refer to “EGR valve” for removal and installation procedure. <Ref. to FU(H4SO 2.0)-28, EGR Valve.> or <Ref. to FU(H4SO 2.5)-31, EGR Valve.>

5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the rear wheel LH.
3) Remove the rear mud guard LH.
4) Remove the protector. (Sedan model)
5) Disconnect the quick connector (A).
6) Remove the canister (B) from body.

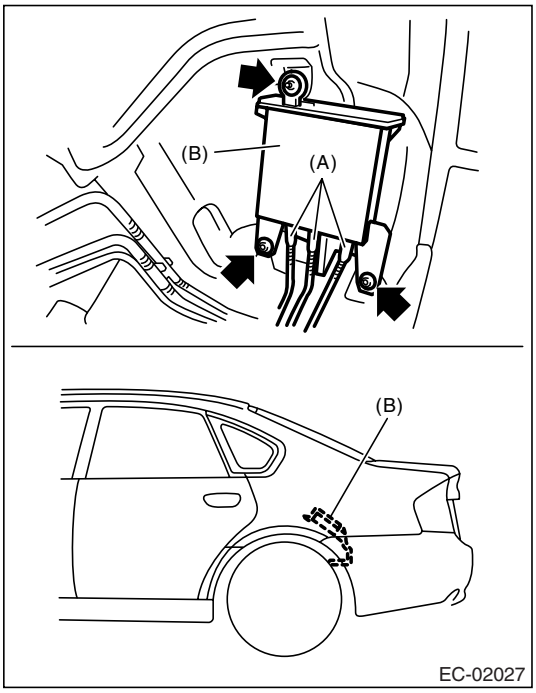


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure there are no damage or dust on the connection of quick connector. If necessary, clean the seal surface of pipe.

Tightening torque:
8.3 N·m (0.85 kgf-m, 6.1 ft-lb)



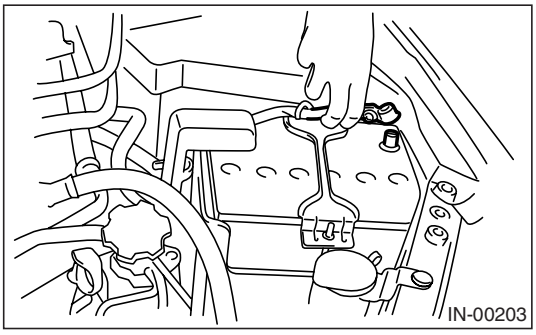
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

6. Purge Control Solenoid Valve

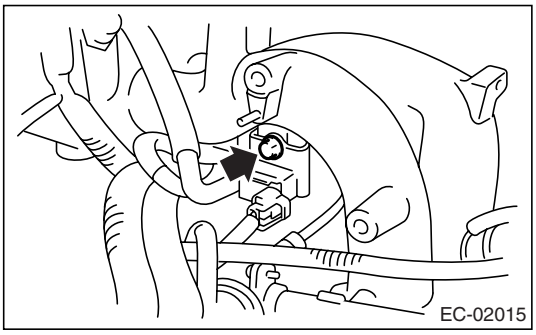
A: REMOVAL

1) Disconnect the ground cable from battery.

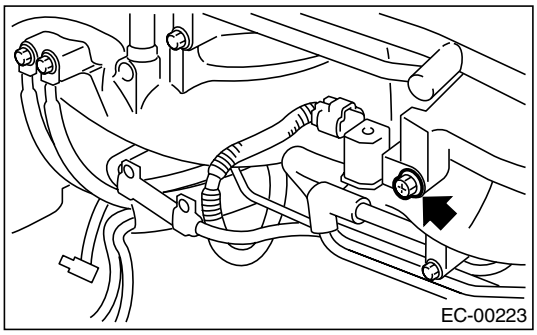


2) Disconnect the connector and hoses of purge control solenoid valve, and then remove the purge control solenoid valve.

- 2.0 L model



- 2.5 L model

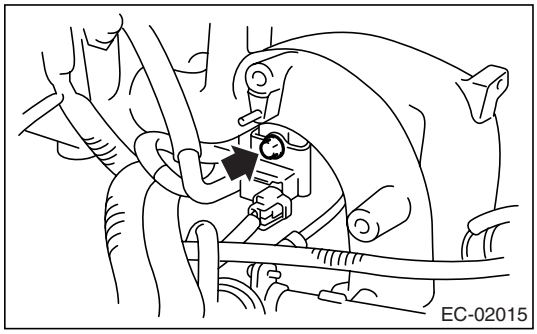


B: INSTALLATION

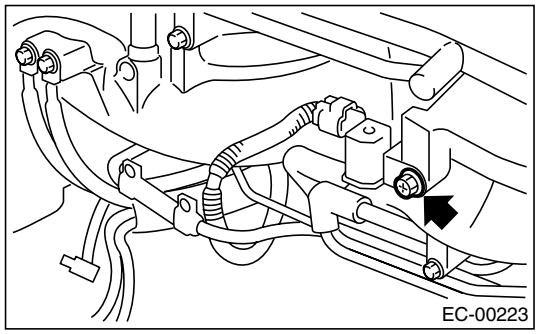
Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

- 2.0 L model

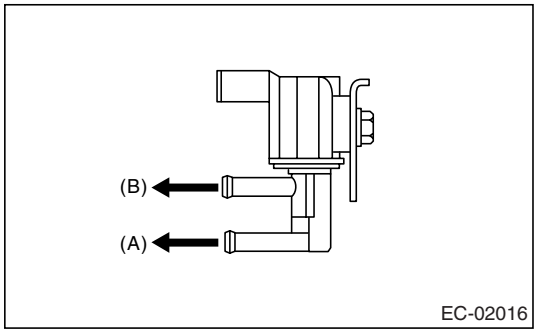


- 2.5 L model



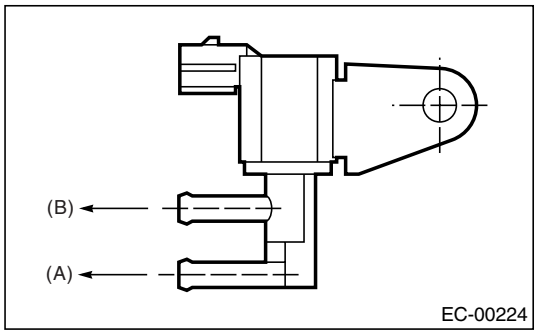
NOTE:
Connect the evaporation hose as shown in the following figure.

- 2.0 L model



(A) To fuel pipe (Evaporation line)
(B) To intake manifold

- 2.5 L model



(A) To fuel pipe (Evaporation line)
(B) To intake manifold

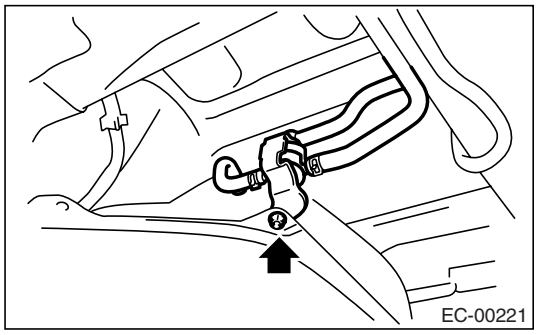
C: INSPECTION

Make sure that the hoses are not cracked or loose.

7. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Disconnect the evaporation hoses from two-way valve.
3) Remove the two-way valve as a unit with bracket from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

C: INSPECTION

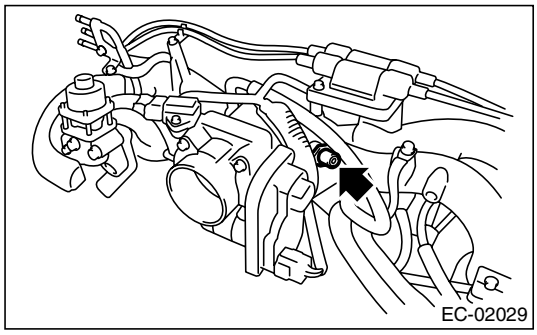
Make sure that the hoses are not cracked or loose.

8. PCV Valve

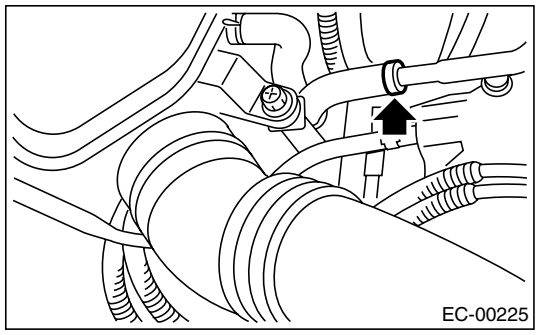
A: REMOVAL

Disconnect the PCV hose and remove the PCV valve.

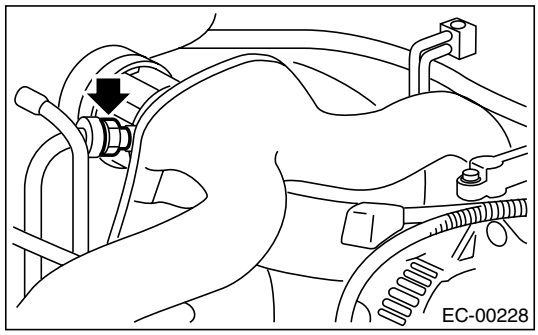
- 2.0 L model



- 2.5 L EC, EK, EH, ER, K4 model



- 2.5 L KA, KS model



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the bolt threads of PCV valve. (2.0 L model and 2.5 L KA, KS model)

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)

INTAKE (INDUCTION)

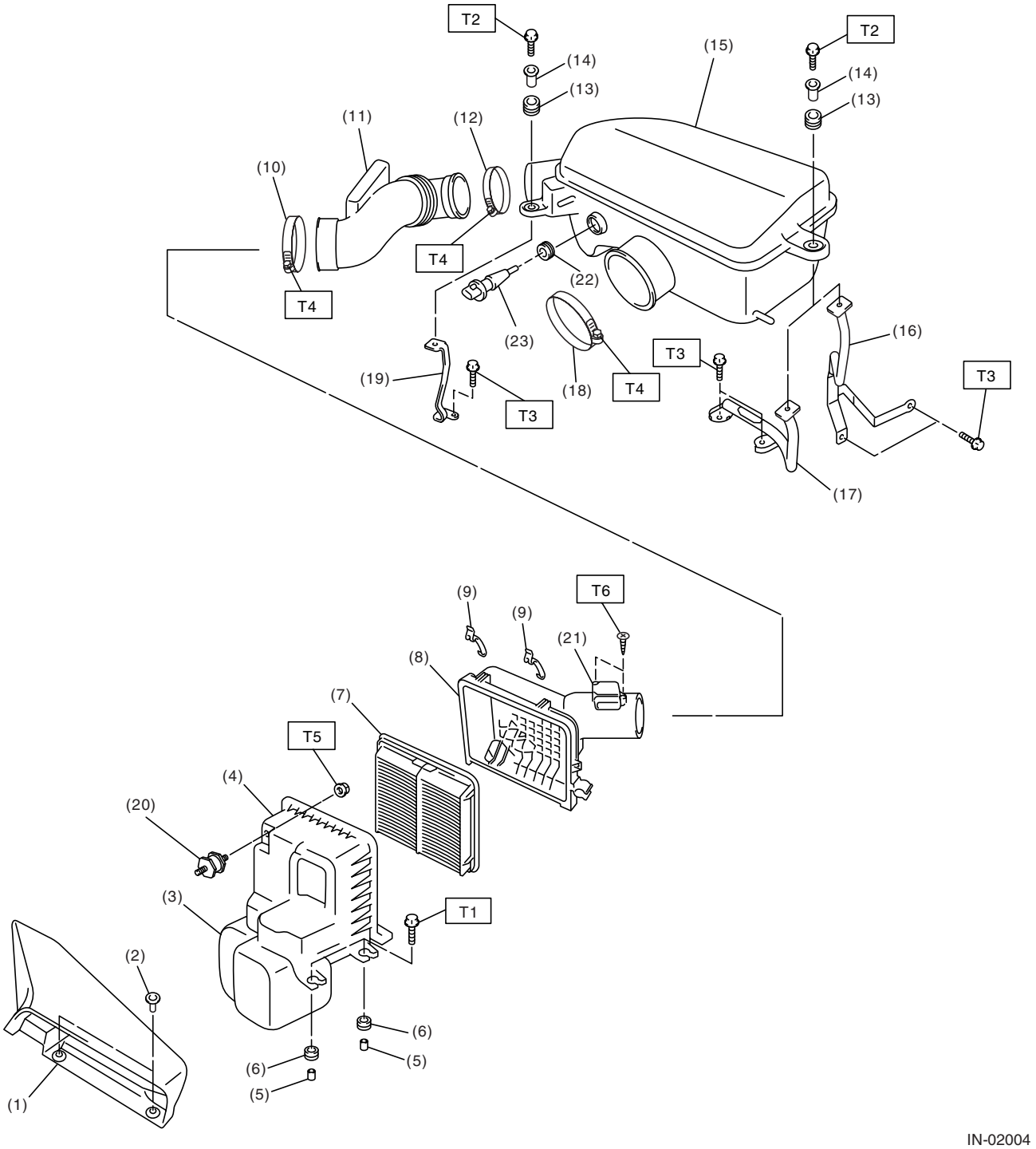
IN(H4SO 2.0)

Page

1. General Description 2
2. Air Cleaner Element 4
3. Air Cleaner Case 5
4. Air Intake Chamber 7
5. Air Intake Duct 8
6. Resonator Chamber 9

1. General Description

A: COMPONENT



IN-02004

(1) Air intake duct
(2) Clip
(3) Resonator chamber
(4) Air cleaner case (front)
(5) Spacer
(6) Cushion
(7) Air cleaner element
(8) Air cleaner case (rear)
(9) Clip
(10) Clamp
(11) Intake duct
(12) Clamp
(13) Cushion
(14) Spacer
(15) Air intake chamber
(16) Stay LH (MT model)
(17) Stay LH (AT model)
(18) Clamp
(19) Stay RH
(20) Cushion
(21) Mass air flow and intake air temperature sensor (2.5 L EC, EK, K4, EH, ER model)
(22) Bushing (2.0 L model and 2.5 L KA, KS model)
(23) Intake air temperature sensor (2.0 L model and 2.5 L KA, KS model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.4)
T2: 6.5 (0.66, 4.8)
T3: 16 (1.6, 11.8)
T4: 3 (0.3, 2.2)
T5: 7.5 (0.76, 5.5)
T6: 1 (0.1, 0.7)

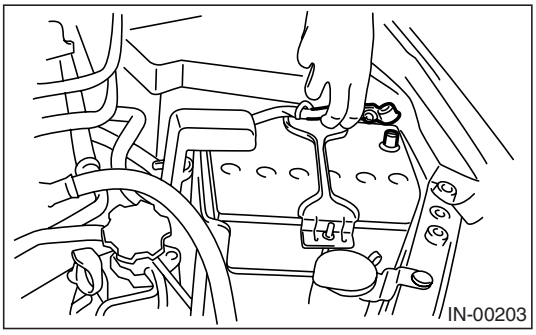
B: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

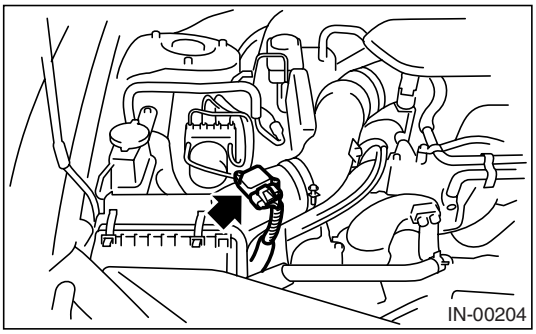
2. Air Cleaner Element

A: REMOVAL

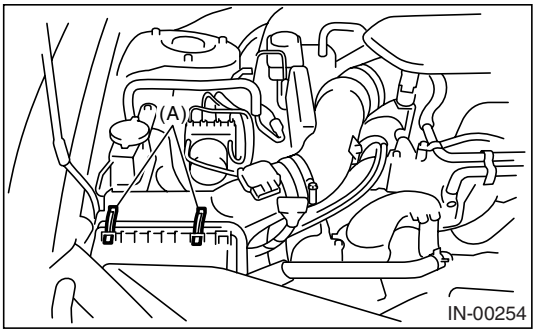
1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor. (2.5 L EC, EK, K4, EH, ER model)



3) Remove the clip (A) securing upper side of air cleaner case.



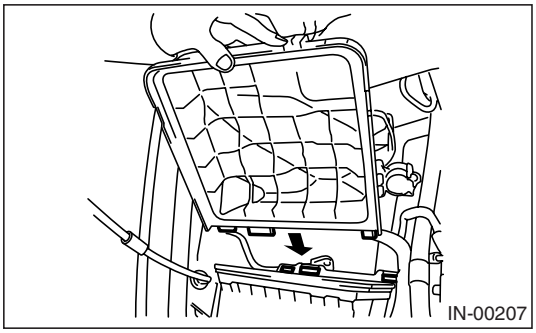
4) Pull the air cleaner case (rear) backward of the vehicle, and remove the air cleaner element.

NOTE:
Be careful that the power steering hose is secured to the under side of air cleaner case (rear).

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Fasten with a clip after inserting the lower tab of the case.



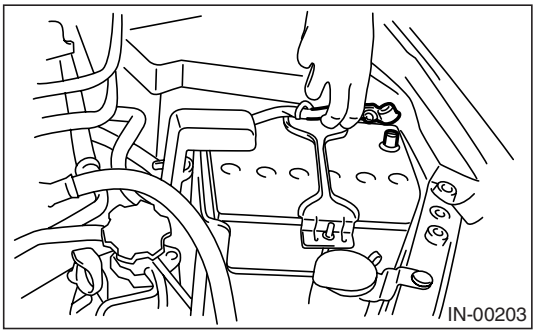
C: INSPECTION

Replace if excessively damaged or dirty.

3. Air Cleaner Case

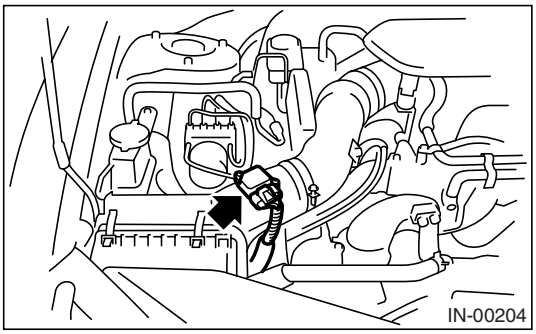
A: REMOVAL

1) Disconnect the ground cable from battery.



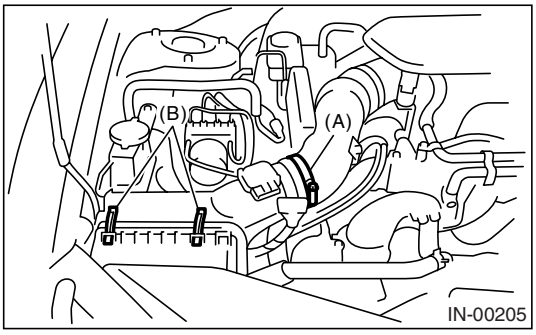
2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.>

3) Disconnect the connector from mass air flow and intake air temperature sensor. (2.5 L EC, EK, K4, EH, ER model)

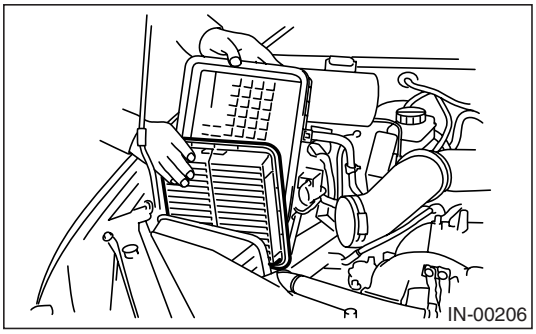


4) Loosen the clamps (A) which connect air cleaner case to intake duct.

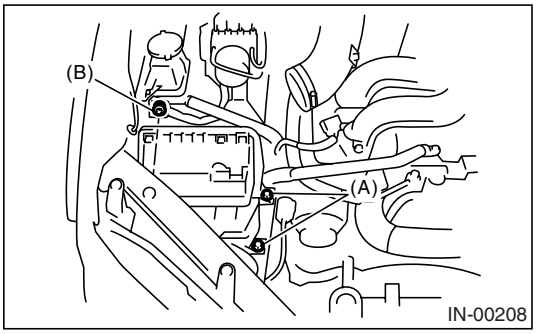
5) Remove the clip (B) securing upper side of air cleaner case.



6) Remove the air cleaner case (rear) and air cleaner element.



7) Remove the bolts (A) and nut (B) which secure air cleaner case to body.

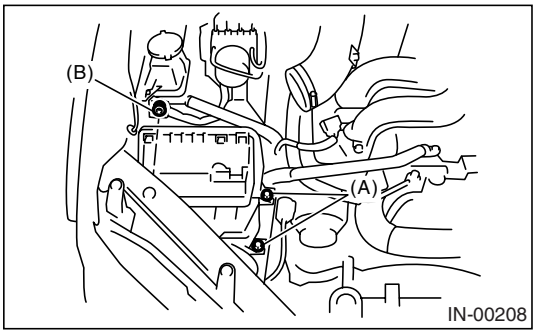


8) Remove the air cleaner case (front).

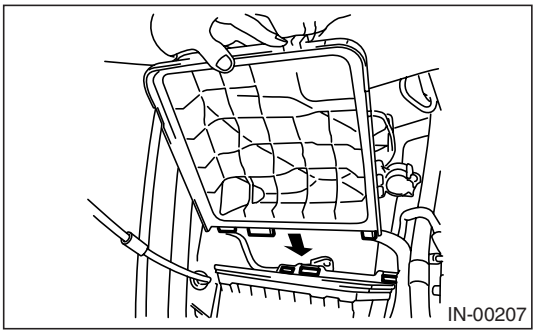
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Bolt (A)
6 N·m (0.6 kgf-m, 4.4 ft-lb)
Nut (B)
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



NOTE:
Fasten with a clip after inserting the lower tab of the case.



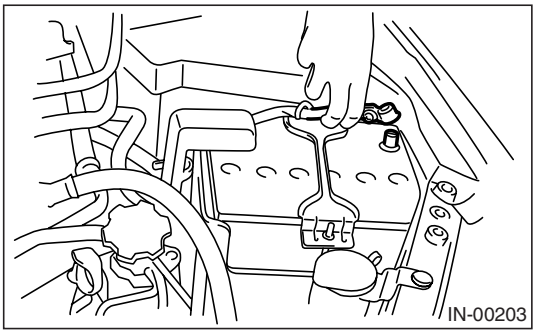
C: INSPECTION

Check for cracks or loose connections.

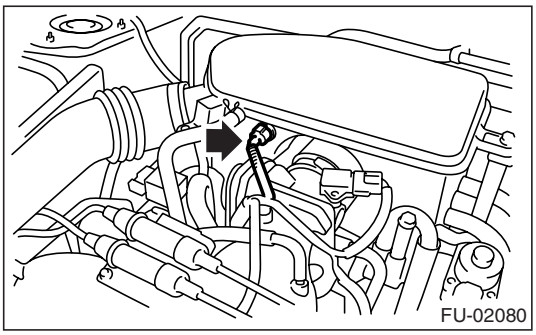
4. Air Intake Chamber

A: REMOVAL

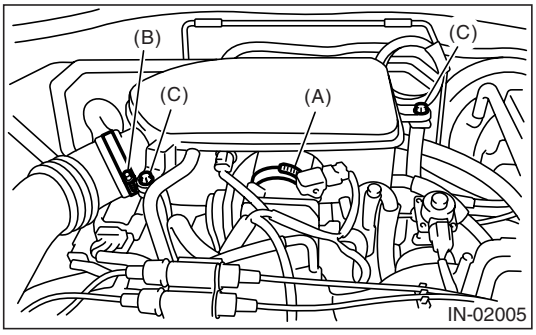
1) Disconnect the ground cable from battery. (2.0 L model and 2.5 L KA, KS model)



2) Disconnect the connector from intake air temperature sensor. (2.0 L model and 2.5 L KA, KS model)



3) Loosen the clamp (A) which connects air intake chamber to throttle body.
4) Loosen the clamp (B) which connects intake duct to air intake chamber.
5) Remove the bolt (C) which secures air intake chamber to the stay.

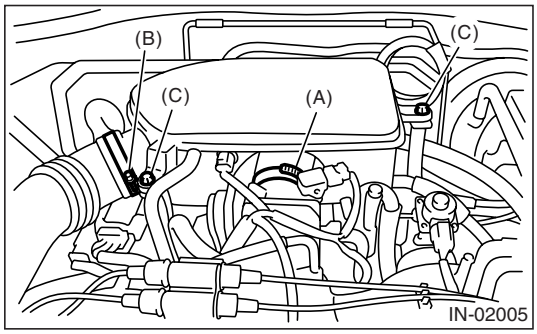


6) Disconnect the blow-by hose at three points, and remove the air intake chamber.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Clamp (A), (B)
3 N·m (0.3 kgf-m, 2.2 ft-lb)
Bolt (C)
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



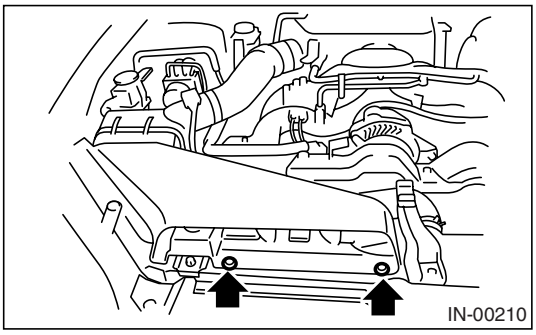
C: INSPECTION

1) Check for cracks or loose connections.
2) Check that no foreign objects are mixed in air intake chamber.

5. Air Intake Duct

A: REMOVAL

1) Remove the clip securing air intake duct to body front area.
2) Remove the air intake duct.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Check for cracks or loose connections.
2) Check that no foreign objects are mixed in air intake duct.

6. Resonator Chamber

A: REMOVAL

The resonator chamber and air cleaner case are integrated into one unit; therefore, refer to “Air Cleaner Case” for removal procedure. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>

B: INSTALLATION

The resonator chamber and air cleaner case are integrated into one unit; therefore, refer to “Air Cleaner Case” for installation procedure. <Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.>

C: INSPECTION

Check for cracks or loose connections.

MECHANICAL

ME(H4SO 2.0)

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1. General Description

A: SPECIFICATION

	Model			2.0 L	2.5 L
Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
	Valve system mechanism			Belt driven, single over-head camshaft, 4 valve/cylinder	
	Bore × Stroke mm (in)			92 × 75 (3.62 × 2.95)	99.5 × 79.0 (3.917 × 3.110)
	Displacement cm^3 (cu in)			1,994 (121.67)	2,457 (150)
	Compression ratio			10.0	
	Compression pressure (at 350 rpm) kPa (kgf/cm^2, psi)			1,020 — 1,275 (10.4 — 13.0, 148 — 185)	
	Number of piston rings			Pressure ring: 2, Oil ring: 1	
	Intake valve timing		Open	BTDC 2°	BTDC 2°
			Close	ABDC 54°	ABDC 56°
	Exhaust valve timing		Open	BBDC 39°	BBDC 50°
			Close	ATDC 5°	ATDC 8°
	Valve clearance mm (in)		Intake	0.20±0.04 (0.0079±0.0016)	
			Exhaust	0.25±0.04 (0.0098±0.0016)	
	Idling speed [at neutral position on MT, or "P" or "N" range on AT] rpm			650±100 (No load) 800±100 (A/C ON)	
	Ignition order			1 → 3 → 2 → 4	
	Ignition timing BTDC/rpm			13°±10°/650	

NOTE:
US: undersize OS: oversize

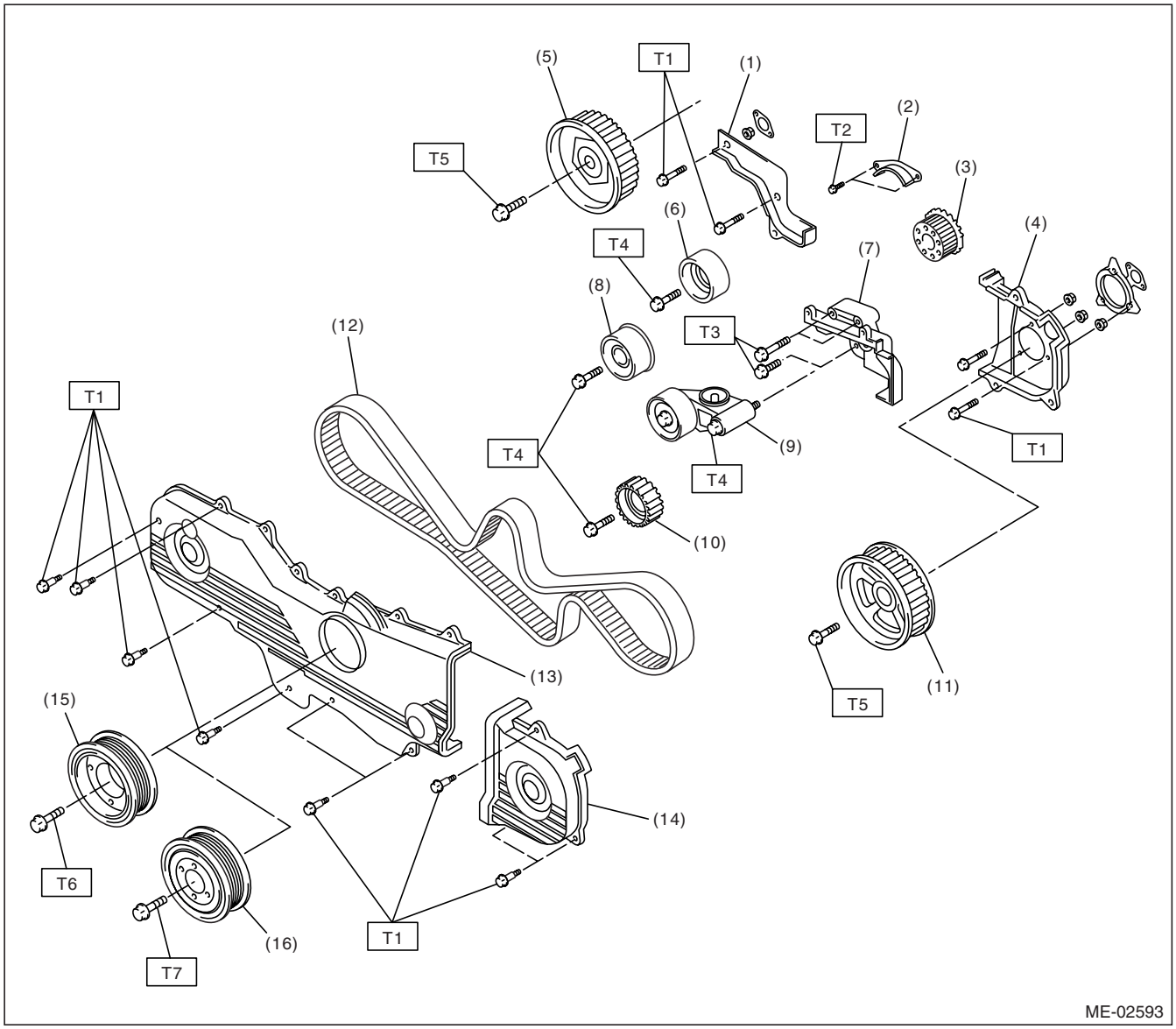
Belt tension adjuster	Protrusion of adjuster rod mm (in)				5.2 — 6.2 (0.205 — 0.244)
Belt tensioner	Spacer O.D. mm (in)				17.955 — 17.975 (0.7069 — 0.7077)
	Tensioner bushing I.D. mm (in)				18.00 — 18.08 (0.7087 — 0.7118)
	Clearance between spacer and bushing mm (in)			Standard	0.025 — 0.125 (0.0010 — 0.0049)
	Side clearance of spacer mm (in)			Standard	0.20 — 0.55 (0.0079 — 0.0217)
Valve rocker arm	Clearance between shaft and arm mm (in)			Standard	0.020 — 0.054 (0.0008 — 0.0021)
Camshaft	Bend limit mm (in)				0.020 (0.00079)
	Thrust clearance mm (in)			Standard	0.030 — 0.090 (0.0012 — 0.0035)
	Cam lobe height mm (in)	2.0 L	Intake	Standard	39.646 — 39.746 (1.5609 — 1.5648)
			Exhaust	Standard	39.351 — 39.451 (1.5493 — 1.5532)
		2.5 L	Intake	Standard	39.485 — 39.585 (1.5545 — 1.5585)
			Exhaust	Standard	39.904 — 40.004 (1.5710 — 1.5750)
	Camshaft journal O.D. mm (in)				31.928 — 31.945 (1.2570 — 1.2577)
	Camshaft journal hole I.D. mm (in)				32.000 — 32.018 (1.2598 — 1.2605)
	Oil clearance mm (in)			Standard	0.055 — 0.090 (0.0022 — 0.0035)
Cylinder head	Surface warpage limit (mating with cylinder block) mm (in)				0.03 (0.001)
	Grinding limit mm (in)				0.1 (0.004)
	Standard height mm (in)				97.5 (3.84)

Valve seat	Refacing angle				90°
	Contacting width mm (in)		Intake	Standard	0.8 — 1.4 (0.03 — 0.055)
			Exhaust	Standard	1.2 — 1.8 (0.047 — 0.071)
Valve guide	Inside diameter mm (in)				6.000 — 6.012 (0.2362 — 0.2367)
	Protrusion above head mm (in)			Intake	20.0 — 21.0 (0.787 — 0.827)
				Exhaust	16.5 — 17.5 (0.650 — 0.689)
Valve	Head edge thickness mm (in)		Intake	Standard	0.8 — 1.2 (0.03 — 0.047)
			Exhaust	Standard	1.0 — 1.4 (0.039 — 0.055)
	Stem outer diameter mm (in)			Intake	5.950 — 5.965 (0.2343 — 0.2348)
				Exhaust	5.945 — 5.960 (0.2341 — 0.2346)
	Valve stem gap mm (in)		Standard	Intake	0.035 — 0.062 (0.0014 — 0.0024)
				Exhaust	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)			Intake	120.6 (4.75)
				Exhaust	121.7 (4.79)
Valve spring	Free length mm (in)				54.30 (2.1378)
	Squareness				2.5°, 2.4 mm (0.094 in)
	Tension/spring height N (kgf, lbf)/mm (in)			Set	214 — 246 (22 — 25, 48 — 55)/45.0 (1.772)
				Lift	526 — 582 (54 — 59, 119 — 130)/34.7 (1.366)
Cylinder block	Surface warpage limit (mating with cylinder head) mm (in)				0.025 (0.00098)
	Grinding limit mm (in)				0.1 (0.004)
	Standard height mm (in)				201.0 (7.91)
	Cylinder inner diameter mm (in)	2.0 L	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
				B	91.995 — 92.005 (3.6218 — 3.6222)
		2.5 L	Standard	A	99.505 — 99.515 (3.9175 — 3.9179)
				B	99.495 — 99.505 (3.9171 — 3.9175)
	Cylindricality mm (in)			Standard	0.015 (0.0006)
	Out-of-roundness mm (in)			Standard	0.010 (0.0004)
	Piston clearance mm (in)			Standard	−0.010 — 0.010 (−0.00039 — 0.00039)
Piston	Outer diameter mm (in)	2.0 L	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
				B	91.995 — 92.005 (3.6219 — 3.6222)
			0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6325)
			0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)
		2.5 L	Standard	A	99.505 — 99.515 (3.9175 — 3.9179)
				B	99.495 — 99.505 (3.9171 — 3.9175)
			0.25 (0.0098) OS		99.745 — 99.765 (3.9270 — 3.9278)
			0.50 (0.0197) OS		99.995 — 100.015 (3.9368 — 3.9376)
	Piston pin specified diameter mm (in)				23.000 — 23.006 (0.9055 — 0.9057)
Piston pin	Outer diameter mm (in)				22.994 — 23.000 (0.9053 — 0.9055)
	Standard clearance between piston and piston pin mm (in)				0.004 — 0.008 (0.0002 — 0.0003)
	Degree of fit				Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Ring closed gap mm (in)		Top ring		Standard 0.20 — 0.35 (0.0079 — 0.0138)
			Second ring	2.0 L	Standard 0.40 — 0.50 (0.0157 — 0.0197)
				2.5 L	Standard 0.37 — 0.52 (0.0146 — 0.0205)
			Oil ring		Standard 0.20 — 0.50 (0.0079 — 0.0197)
	Ring groove gap mm (in)		Top ring		Standard 0.040 — 0.080 (0.0016 — 0.0031)
			Second ring		Standard 0.030 — 0.070 (0.0012 — 0.0028)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length mm (in)				Limit 0.10 (0.0039)
	Thrust clearance mm (in)				Standard 0.070 — 0.330 (0.0028 — 0.0130)

Bearing of large end	Oil clearance mm (in)		Standard	0.016 — 0.044 (0.00063 — 0.0017)
	Bearing size (Thickness at center) mm (in)		Standard	1.492 — 1.501 (0.0587 — 0.0591)
			0.03 (0.0012) US	1.510 — 1.513 (0.0594 — 0.0596)
			0.05 (0.0020) US	1.520 — 1.523 (0.0598 — 0.0600)
			0.25 (0.0098) US	1.620 — 1.623 (0.0638 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)		Standard	0 — 0.022 (0 — 0.0009)
Crankshaft	Bend limit mm (in)			0.035 (0.0014)
	Crank pin	Out-of-roundness mm (in)	2.0 L	0.005 (0.0002)
			2.5 L	0.003 (0.0001)
		Cylindricality mm (in)	2.0 L	0.006 (0.0002)
			2.5 L	0.004 (0.0002)
		Grinding limit (dia.) mm (in)		To 51.750 (2.0374)
	Crank journal	Out-of-roundness mm (in)		0.005 (0.0002)
		Cylindricality mm (in)		0.006 (0.0002)
		Grinding limit (dia.) mm (in)		To 59.750 (2.3524)
	Crank pin outer diameter mm (in)		Standard	51.984 — 52.000 (2.0466 — 2.0472)
			0.03 (0.0012) US	51.954 — 51.970 (2.0454 — 2.0461)
			0.05 (0.0020) US	51.934 — 51.950 (2.0446 — 2.0453)
			0.25 (0.0098) US	51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter mm (in)		Standard	59.992 — 60.008 (2.3619 — 2.3625)
			0.03 (0.0012) US	59.962 — 59.978 (2.3607 — 2.3613)
			0.05 (0.0020) US	59.942 — 59.958 (2.3599 — 2.3605)
			0.25 (0.0098) US	59.742 — 59.758 (2.3520 — 2.3527)
	Thrust clearance mm (in)		Standard	0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance mm (in)		Standard	0.010 — 0.030 (0.0004 — 0.0012)
Main bearing	Main bearing mm (in)	#1, #3	Standard	1.998 — 2.011 (0.0787 — 0.0792)
			0.03 (0.0012) US	2.017 — 2.020 (0.0794 — 0.0795)
			0.05 (0.0020) US	2.027 — 2.030 (0.0798 — 0.0799)
			0.25 (0.0098) US	2.127 — 2.130 (0.0837 — 0.0839)
		#2, #4, #5	Standard	2.000 — 2.013 (0.0787 — 0.0793)
			0.03 (0.0012) US	2.019 — 2.022 (0.0795 — 0.0796)
			0.05 (0.0020) US	2.029 — 2.032 (0.0799 — 0.0800)
			0.25 (0.0098) US	2.129 — 2.132 (0.0838 — 0.0839)

B: COMPONENT

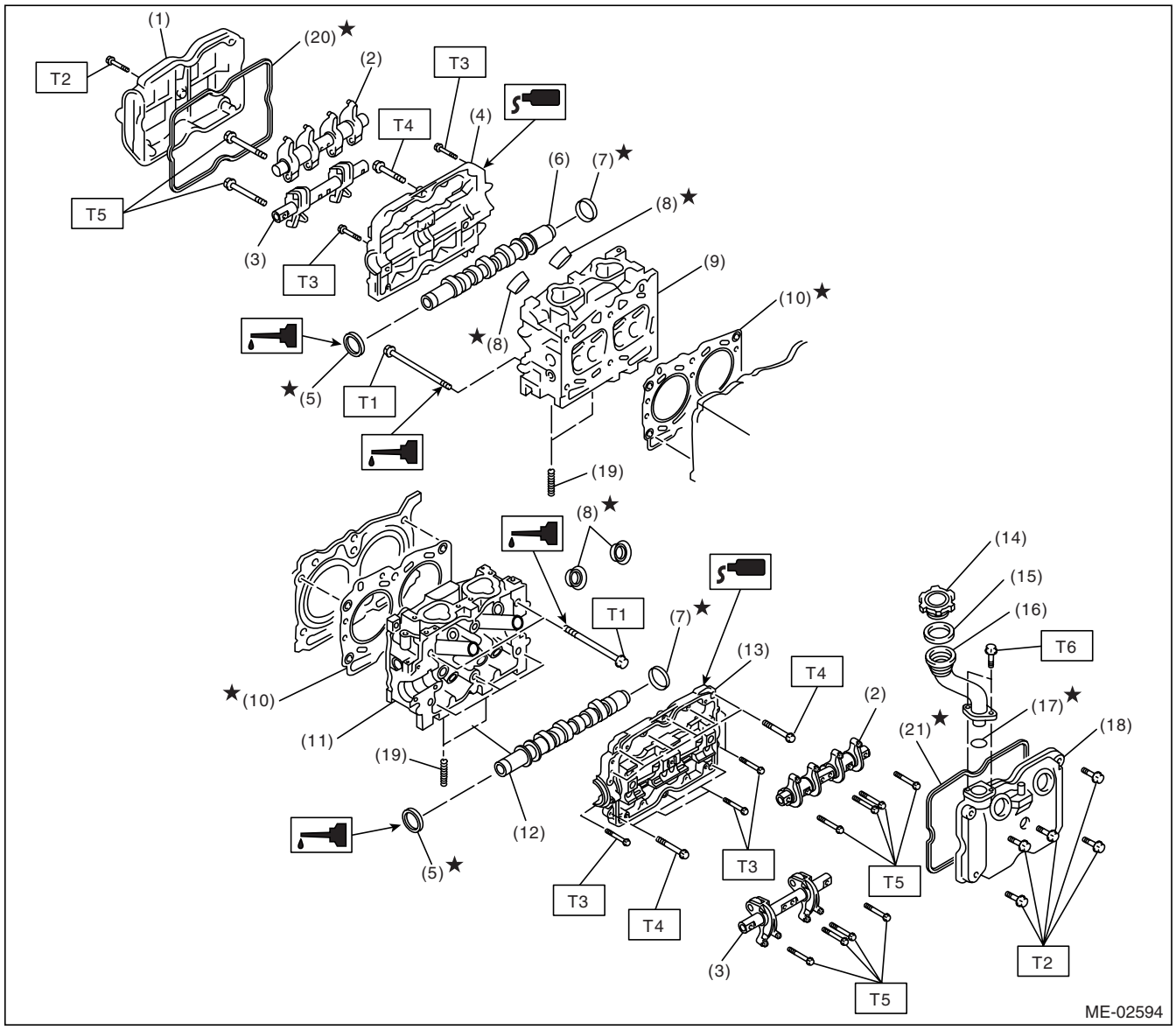
1. TIMING BELT



(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide (MT model)
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Cam sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Cam sprocket No. 2
(12) Timing belt
(13) Front timing belt cover
(14) Timing belt cover (LH)
(15) Crank pulley (2.0 L model)
(16) Crank pulley (2.5 L model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 10 (1.0, 7.4)
T3: 24.5 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 78 (8.0, 57.9)
T6: <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
T7: <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>

2. CYLINDER HEAD AND CAMSHAFT

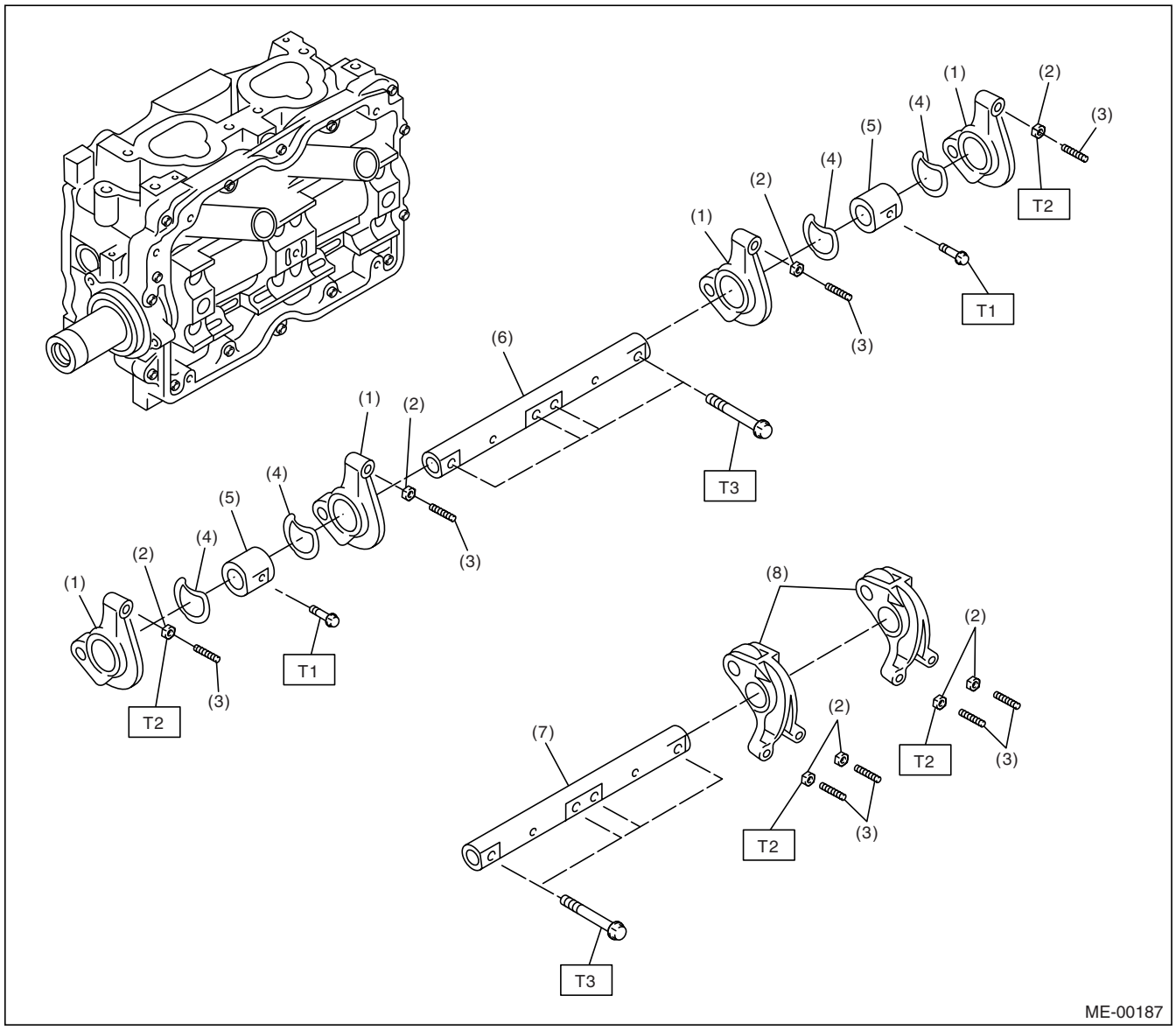


(1) Rocker cover (RH)
(2) Intake valve rocker ASSY
(3) Exhaust valve rocker ASSY
(4) Camshaft cap (RH)
(5) Oil seal
(6) Camshaft (RH)
(7) Plug
(8) Spark plug pipe gasket
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Camshaft (LH)
(13) Camshaft cap (LH)
(14) Oil filler cap
(15) Gasket
(16) Oil filler duct
(17) O-ring
(18) Rocker cover (LH)
(19) Stud bolt
(20) Rocker cover gasket (RH)
(21) Rocker cover gasket (LH)

Tightening torque: N·m (kgf-m, ft-lb)

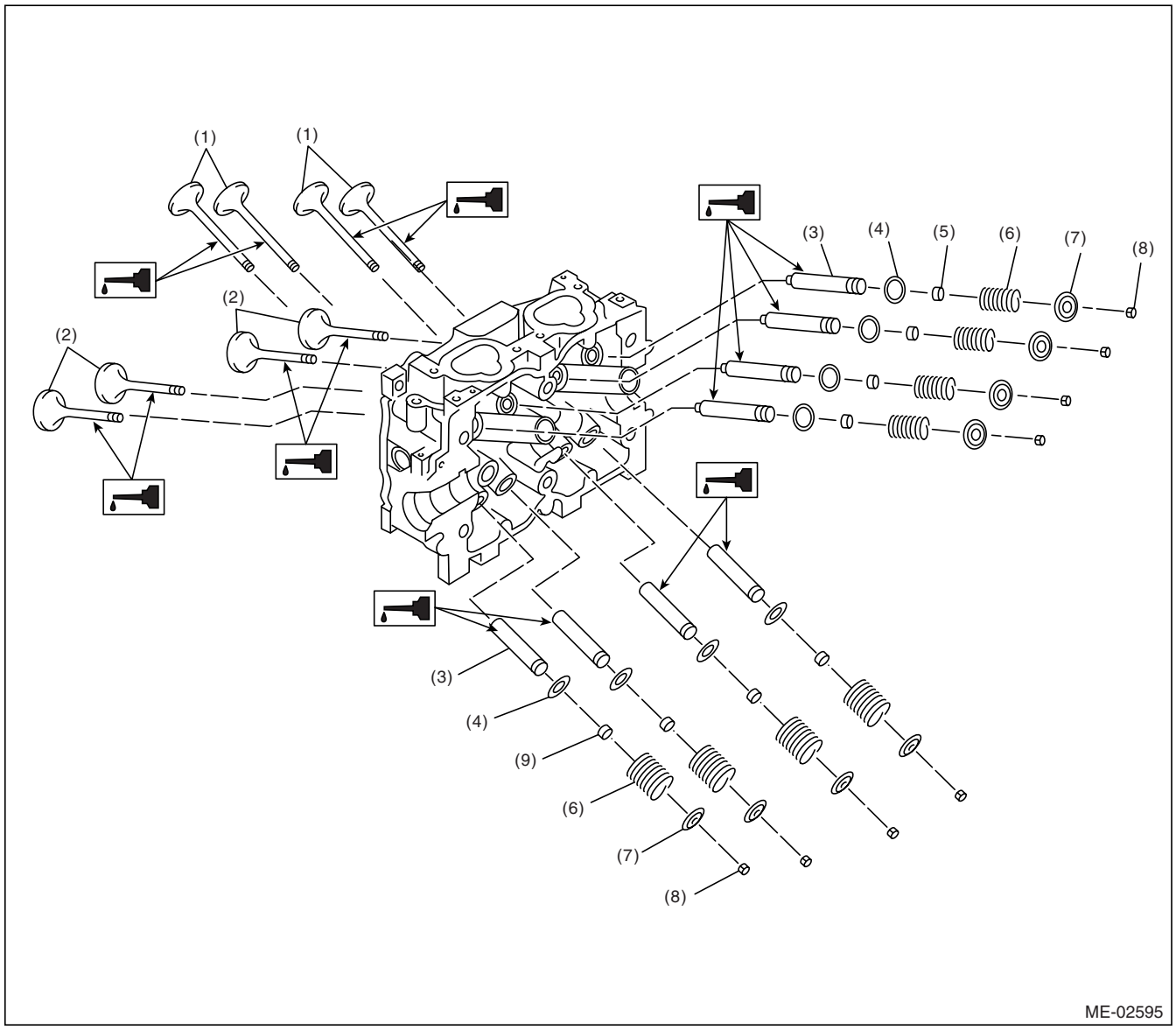
T1: <Ref. to ME(H4SO 2.0)-57, INSTALLATION, Cylinder Head.>
T2: 5 (0.5, 3.7)
T3: 9.75 (1.0, 7.2)
T4: 18 (1.8, 13.3)
T5: 25 (2.5, 18.4)
T6: 6.4 (0.65, 4.7)

3. VALVE ROCKER ASSEMBLY



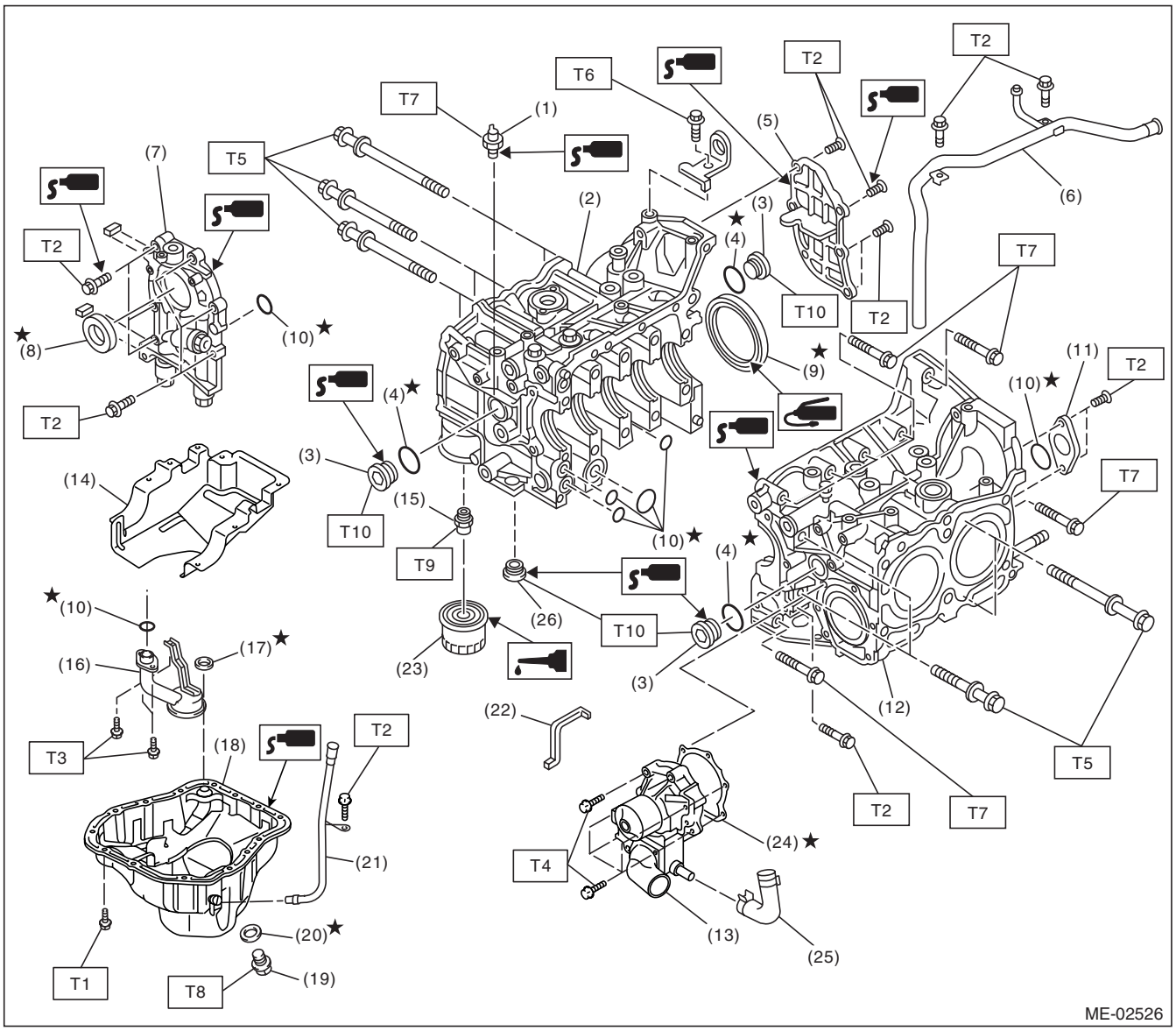
(1)	Intake valve rocker arm	(5)	Rocker shaft support	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Valve rocker nut	(6)	Intake rocker shaft	***T1: 5 (0.5, 3.7)***
(3)	Valve rocker adjuster screw	(7)	Exhaust rocker shaft	***T2: 9.75 (1.0, 7.2)***
(4)	Spring	(8)	Exhaust valve rocker arm	***T3: 25 (2.5, 18.4)***

4. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Valve guide
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Exhaust valve oil seal

5. CYLINDER BLOCK

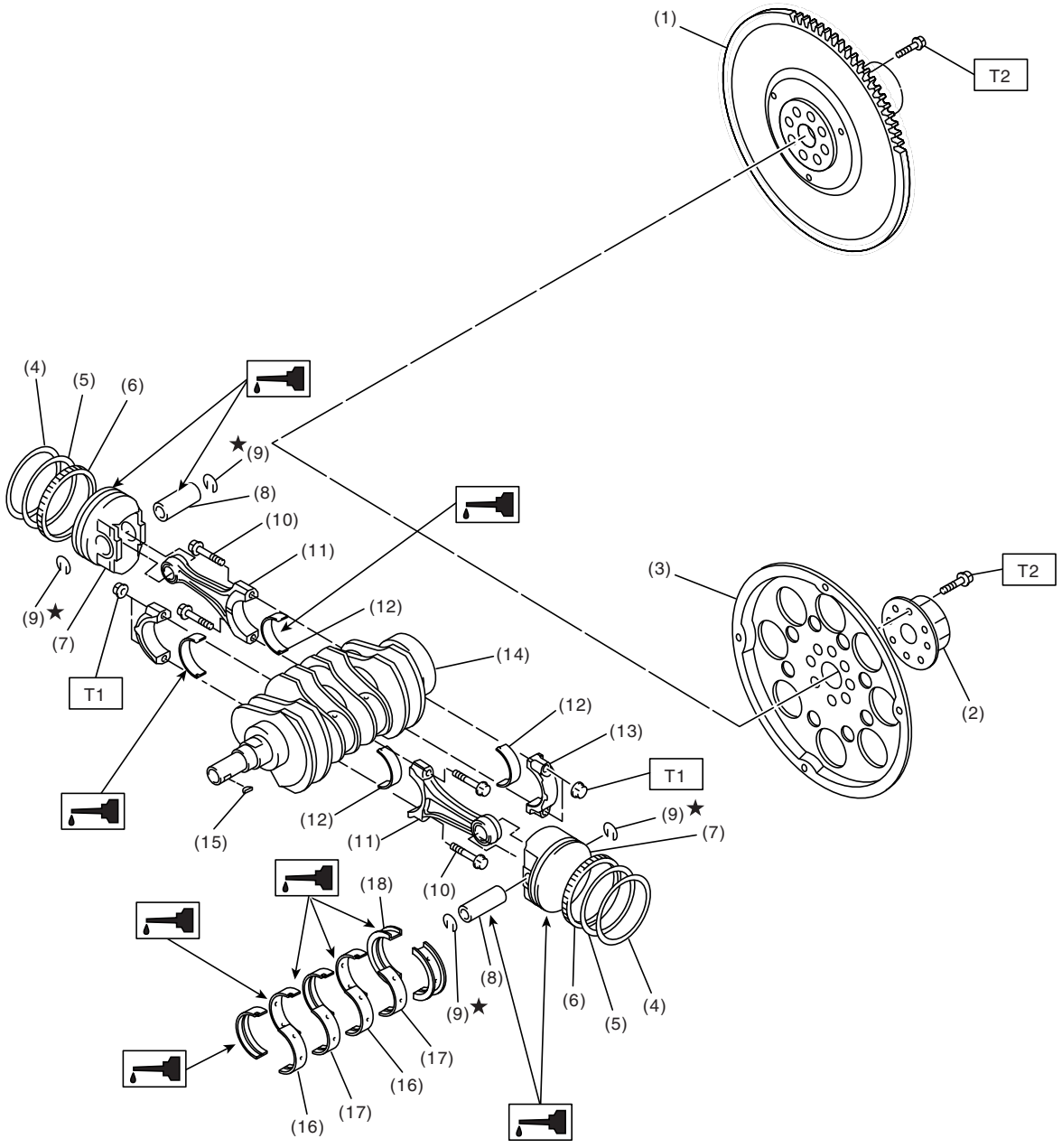


(1)	Oil pressure switch	(14)	Baffle plate
(2)	Cylinder block (RH)	(15)	Oil filter connector
(3)	Service hole plug	(16)	Oil strainer
(4)	Gasket	(17)	Gasket
(5)	Oil separator cover	(18)	Oil pan
(6)	Water by-pass pipe	(19)	Drain plug
(7)	Oil pump	(20)	Metal gasket
(8)	Front oil seal	(21)	Oil level gauge guide
(9)	Rear oil seal	(22)	Water pump sealing
(10)	O-ring	(23)	Oil filter
(11)	Service hole cover	(24)	Gasket
(12)	Cylinder block (LH)	(25)	Water pump hose
(13)	Water pump	(26)	Seal

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.7)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.4)
T4: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T5: <Ref. to ME(H4SO 2.0)-69, INSTALLATION, Cylinder Block.>
T6: 16 (1.6, 11.8)
T7: 25 (2.5, 18.4)
T8: 44 (4.5, 33)
T9: 45 (4.6, 33.3)
T10: 70 (7.1, 51.6)

6. CRANKSHAFT AND PISTON

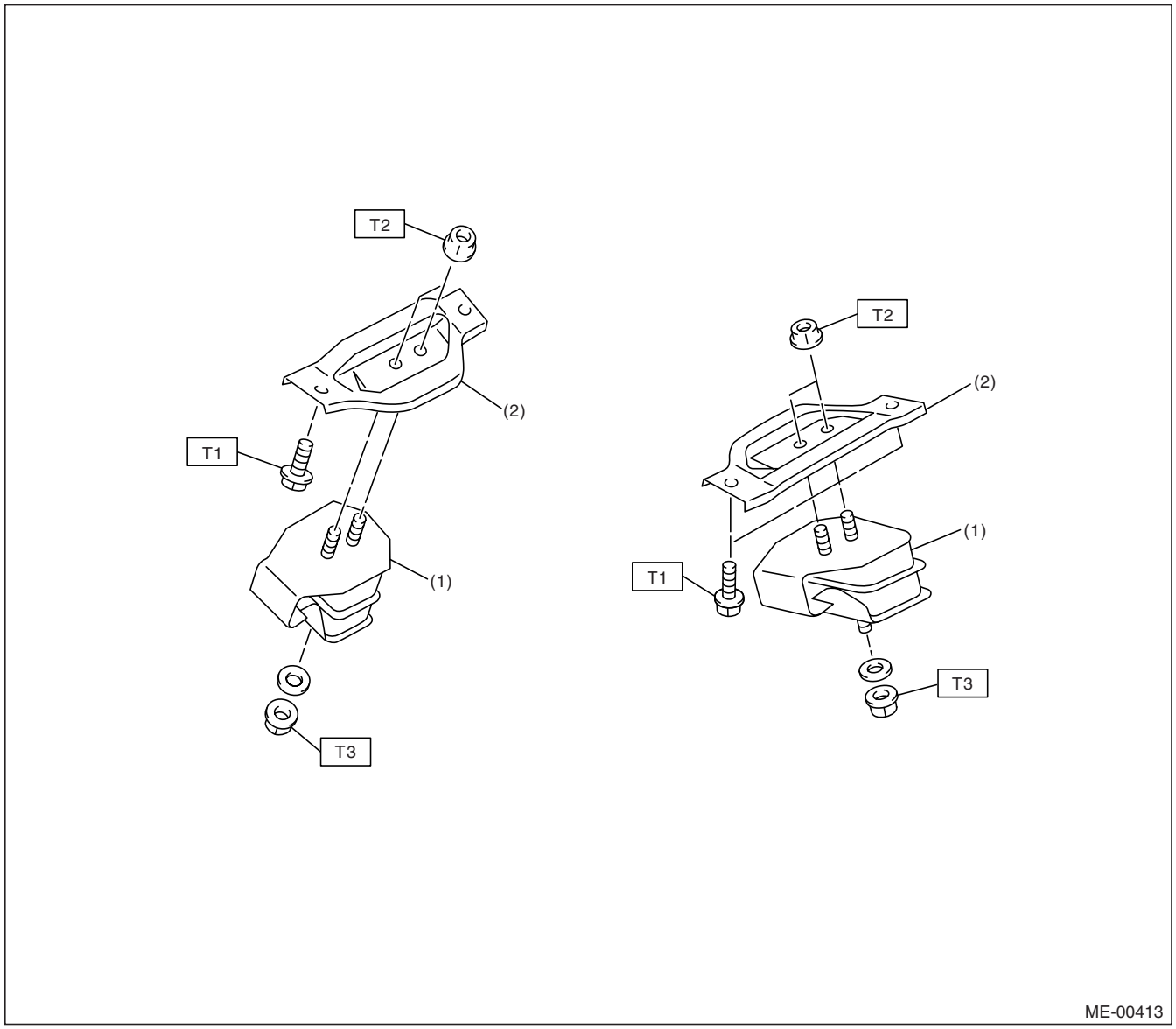


ME-02403

(1)	Flywheel (MT model)	(8)	Piston pin	(15)	Woodruff key
(2)	Reinforcement (AT model)	(9)	Snap ring	(16)	Crankshaft bearing #1, #3
(3)	Drive plate (AT model)	(10)	Connecting rod bolt	(17)	Crankshaft bearing #2, #4
(4)	Top ring	(11)	Connecting rod	(18)	Crankshaft bearing #5
(5)	Second ring	(12)	Connecting rod bearing	***Tightening torque: N·m (kgf-m, ft-lb)***	
(6)	Oil ring	(13)	Connecting rod cap	***T1: 45 (4.6, 33.3)***	
(7)	Piston	(14)	Crankshaft	***T2: 72 (7.3, 52.8)***	

7. ENGINE MOUNTING

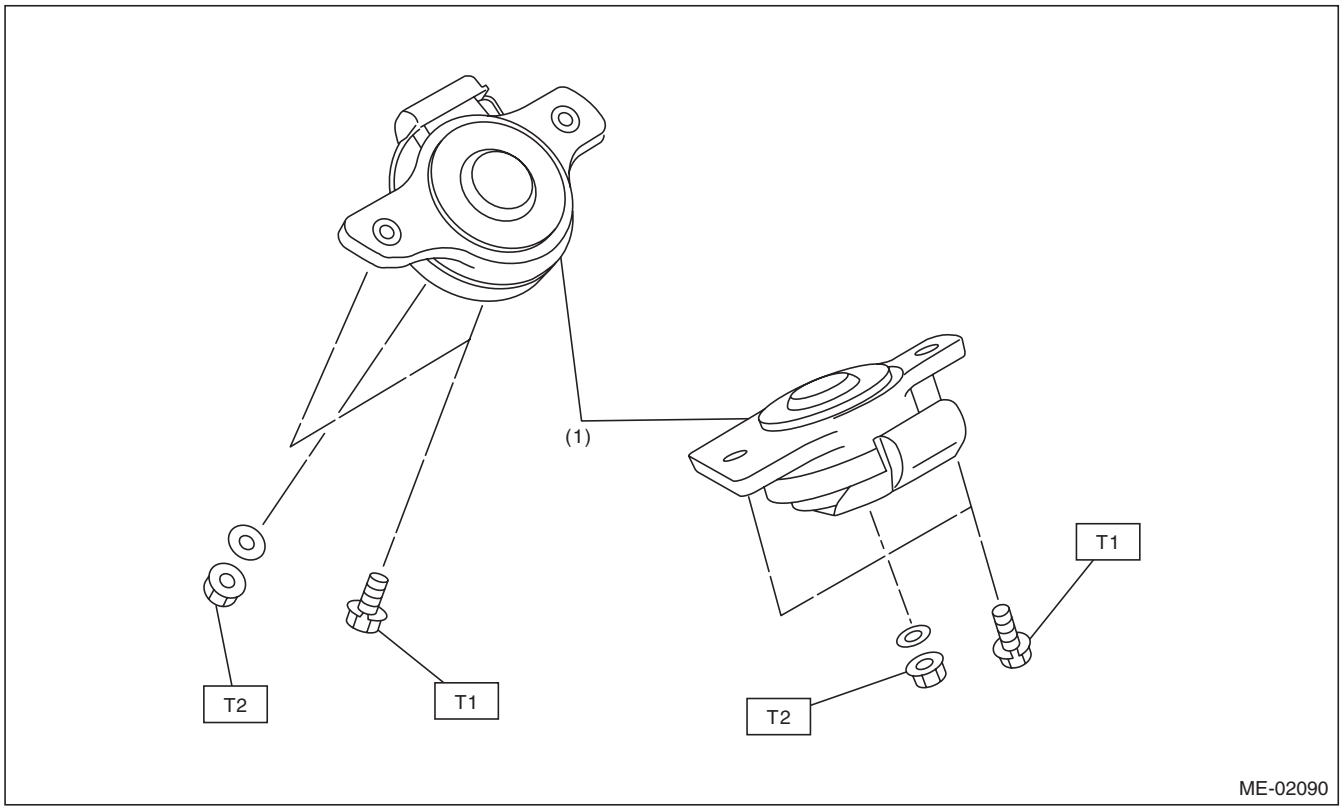
- 2.0 L model



(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.3, 31)
T3: 85 (8.7, 62.7)

• 2.5 L model



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 62.7)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools, or not to stain seats and windows with coolant or oil. Place a cover over fender, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOL

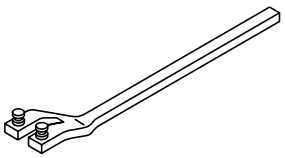
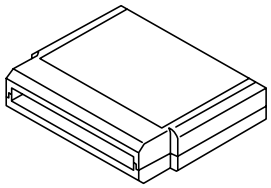
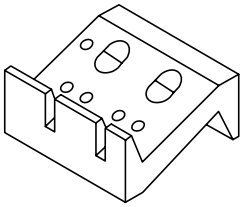
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. (LH side) • CAM SPROCKET WRENCH (499207100) can also be used.
 ST18482AA000	18482AA000 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST-498267800	498267800	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.

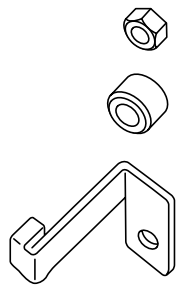
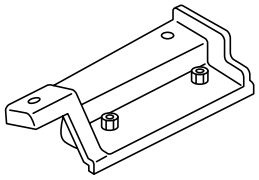
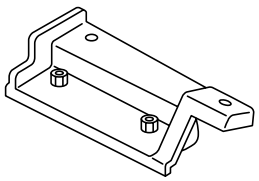
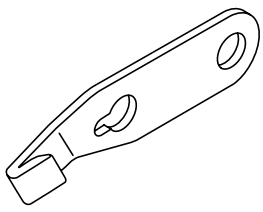
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817100).
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817100).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening/tightening crank pulley bolt.

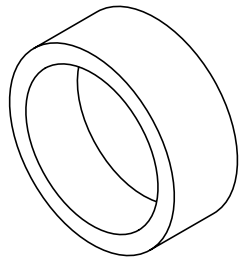
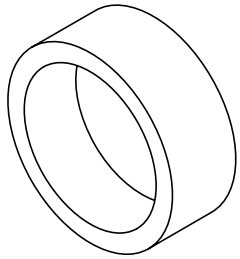
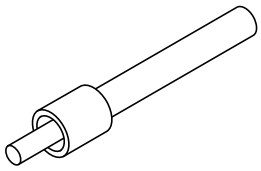
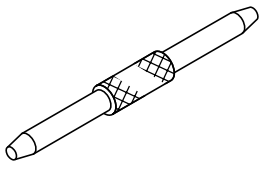
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder. (2.0 L model)
 ST-498747300	498747300	PISTON GUIDE	Used for installing piston in cylinder. (2.5 L model)
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.

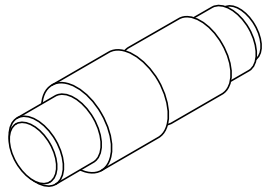
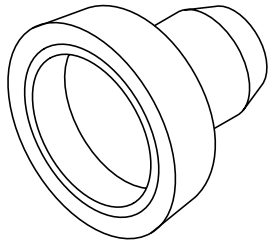
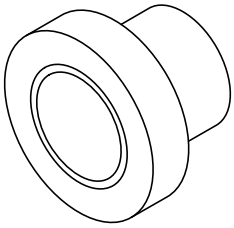
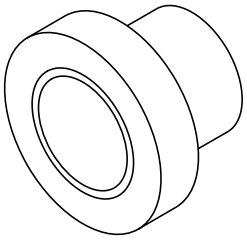
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499587500	499587500	OIL SEAL INSTALLER	• Used for installing camshaft oil seal. • Used with OIL SEAL GUIDE (499597000).
 ST-499587700	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.

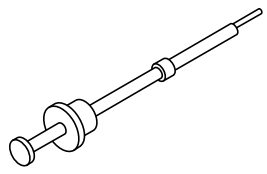
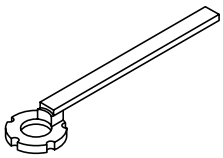
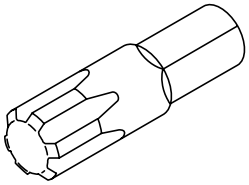
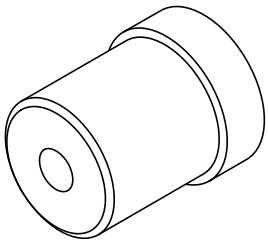
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499207400	499207400	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket. (RH side)
 ST-499497000	499497000	TORX PLUS®	Used for removing and installing camshaft cap.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

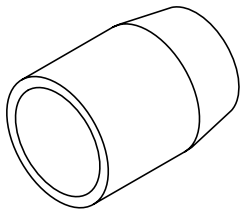
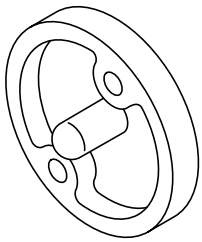
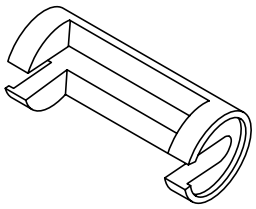
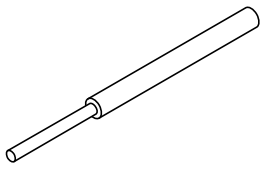
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499597000	499597000	OIL SEAL GUIDE	• Used for installing camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER (499587500).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.

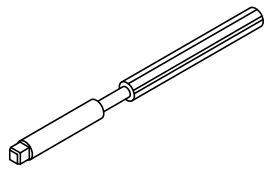
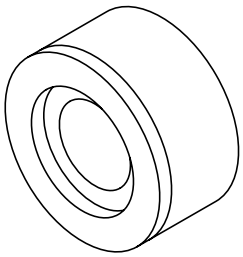
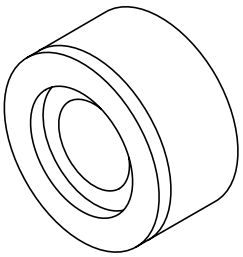
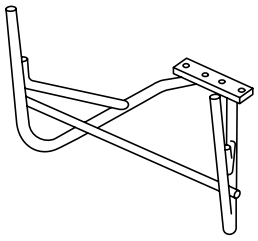
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 ST-499767700	499767700	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Intake side)
 ST-499767800	499767800	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Exhaust side)
 ST-499817100	499817100	ENGINE STAND	• Used for disassembling and assembling engine. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).

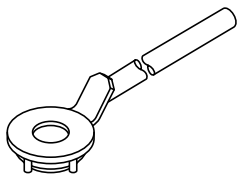
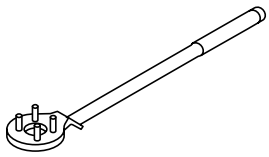
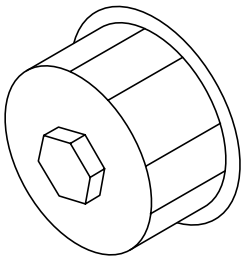
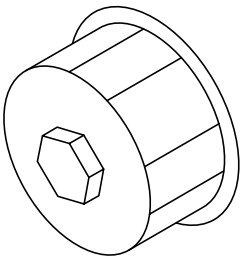
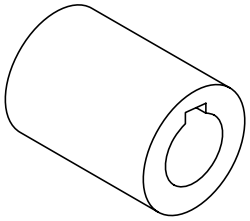
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.5 L model)
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.
Tachometer (Secondary pick-up type)	Used for measuring idle speed.
Timing light	Used for measuring ignition timing.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing belt
- Valve rocker assembly
- Camshaft
- Cylinder head

2. Compression

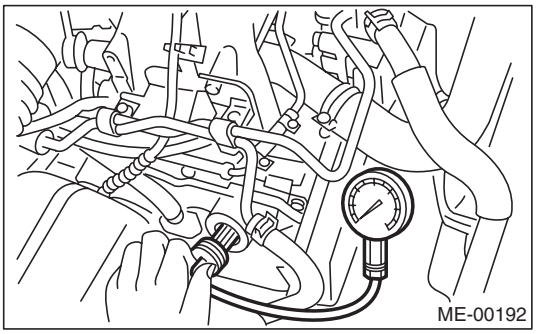
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H4SO 2.0)-5, REMOVAL, Spark Plug.>
5) Fully open the throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tightly against the spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the gauge needle is steady.



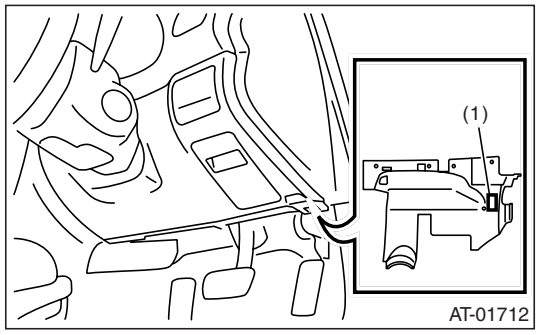
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully opened throttle):
Standard
1,020 — 1,275 kPa (10.4 — 13.0 kgf/cm^2, 148 — 185 psi)
Difference between cylinders
49 kPa (0.5 kgf/cm^2, 7 psi) or less

3. Idle Speed

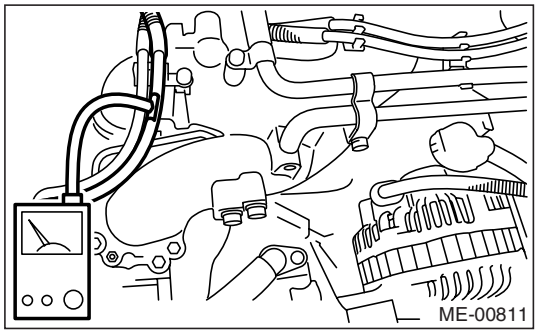
A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) When using Subaru Select Monitor, refer to the following. <Ref. to ME(H4SO 2.0)-13, SPECIAL TOOL, PREPARATION TOOL, General Description.>
   (1) Insert the cartridge to Subaru Select Monitor.
   (2) Connect the Subaru Select Monitor to data link connector.



(1) Data link connector

   (3) Turn the ignition switch to ON and the Subaru Select Monitor power switch to ON.
   (4) Select {Each System Check} in Main Menu.
   (5) Select {Engine} in Selection Menu.
   (6) Select {Current Data Display & Save} in Engine Control System Diagnosis.
   (7) Select {Data Display} in Data Display Menu.
   (8) Start the engine, and read the engine idle speed.
5) When using the tachometer (Secondary pick-up type):
   (1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
   (2) Start the engine, and read the engine idle speed.



NOTE:
This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.

6) Check the idle speed when no-loaded. (Headlight, heater fan, rear defroster, radiator fan, A/C, etc. are OFF.)

Idle speed [No load and gears in "N" or "P" range]:
650±100 rpm

7) Check the idle speed when loaded. (Turn the A/C switch to "ON" and operate the compressor for at least one minute before measurement.)

Idle speed [A/C "ON" and gears in "N" or "P" range]:
800±100 rpm

NOTE:
Idle speed cannot be adjusted manually, because idle speed is automatically adjusted. If the idle speed is out of specifications, refer to General Diagnostic Table under "Engine Control System". <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>

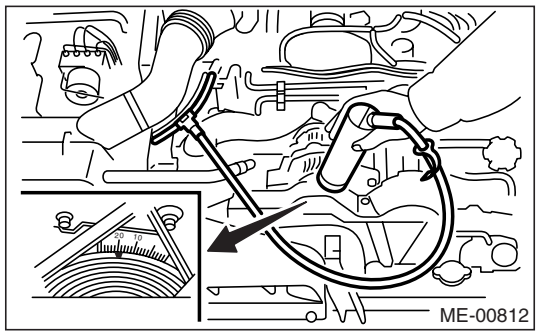
4. Ignition Timing

A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself at measurement.

1) Idle the engine.
2) To check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with the timing light.
3) Start the engine and check the ignition timing at the following idle speed.

Ignition timing [BTDC/rpm]:
13°±10°/650

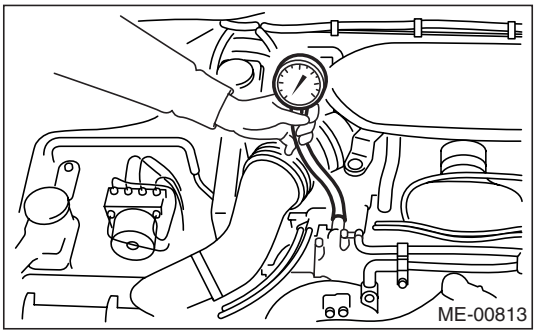


If the timing is not correct, check the ignition control system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Idle the engine.
2) Disconnect the brake vacuum hose from the intake manifold, and then install the vacuum gauge.
3) Keep the engine at idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed with the following procedures.



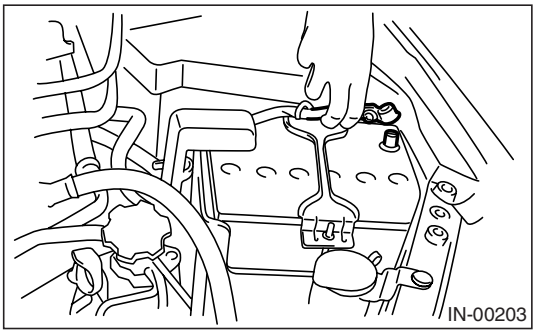
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 in-Hg)

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Air leakage around intake manifold gasket, disconnection or damage of vacuum hose
2. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
3. Needle drops suddenly and intermittently from normal position.	Valve anchoring
4. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve spring
5. Needle vibrates above and below normal position in narrow range.	Defective ignition system

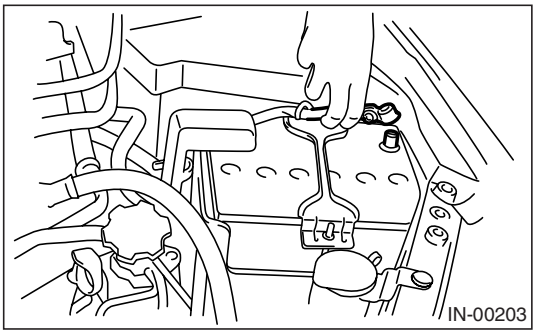
6. Engine Oil Pressure

A: INSPECTION

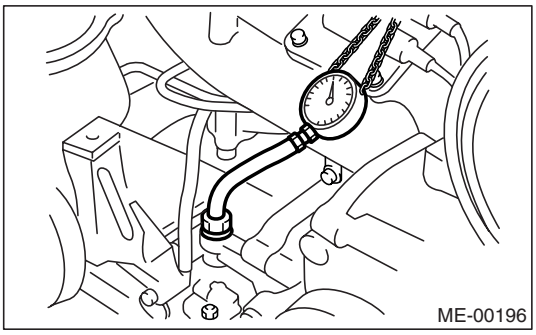
1) Disconnect the ground cable from battery.



2) Remove the generator from bracket. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
3) Disconnect the connector from pressure switch.
4) Remove the pressure switch from cylinder block. <Ref. to LU(H4SO 2.0)-18, REMOVAL, Oil Pressure Switch.>
5) Connect the oil pressure gauge hose to cylinder block.
6) Connect the ground cable to battery.



7) Start the engine, and measure the oil pressure.



Oil pressure:
Standard (at 600 rpm)
98 kPa (1.0 kgf/cm^2, 14 psi) or more
Standard (at 5,000 rpm)
294 kPa (3.0 kgf/cm^2, 43 psi) or more

CAUTION:
• If the oil pressure is out of standard, check oil pump, oil filter and lubrication line. <Ref. to LU(H4SO 2.0)-20, INSPECTION, Engine Lubrication System Trouble in General.>
• If the oil pressure warning light comes on though the oil pressure is within standard, replace the oil pressure switch. <Ref. to LU(H4SO 2.0)-20, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The standard is based on an engine oil temperature of 80°C (176°F).

8) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4SO 2.0)-18, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

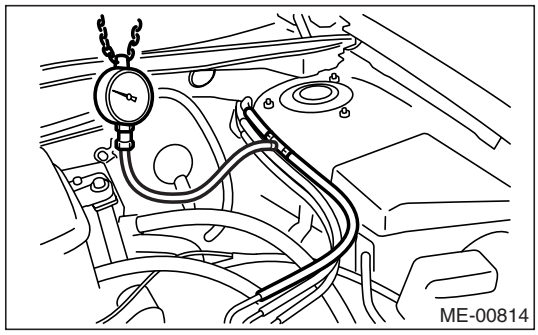
7. Fuel Pressure

A: INSPECTION

WARNING:
Before removing the fuel pressure gauge, release the fuel pressure.

NOTE:
When the fuel pressure is out of standard, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the fuel delivery hose from fuel damper, and connect a fuel pressure gauge.



4) Install the fuse of fuel pump to main fuse box.
5) Start the engine.
6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)

7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard: 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)

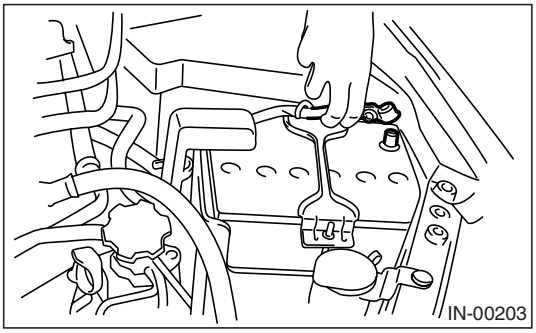
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard during high-altitude operations.

8. Valve Clearance

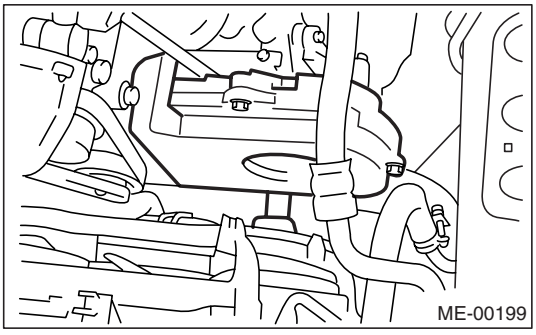
A: INSPECTION

Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Disconnect the ground cable from battery.

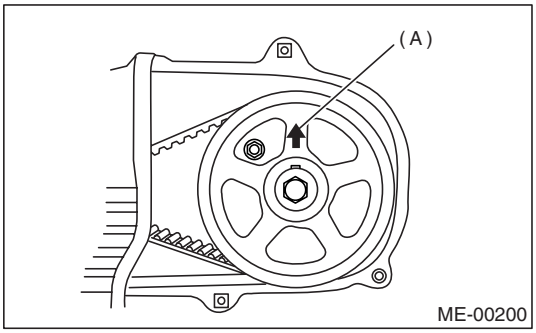


6) Remove the timing belt cover (LH).



7) When inspecting #1 and #3 cylinders:
   (1) Disconnect the spark plug cords from spark plugs RH side. <Ref. to IG(H4SO 2.0)-5, RH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (RH).
   (3) Remove the bolts, then remove the rocker cover (RH).
8) When inspecting #2 and #4 cylinders:
   (1) Disconnect the spark plug cords from spark plugs (LH side). <Ref. to IG(H4SO 2.0)-5, LH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (LH).
   (3) Remove the bolts, then remove the rocker cover (LH).
9) Set #1 cylinder piston to top dead center of compression stroke by rotating the crank pulley clockwise using socket wrench.

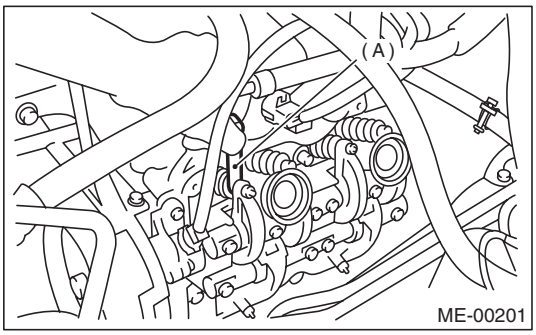
NOTE:
When the arrow mark (A) on cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.



10) Measure #1 cylinder valve clearance using thickness gauge.

CAUTION:
• Insert the thickness gauge (A) in as horizontally as possible with respect to the valve stem end face.
• Measure the exhaust valve clearances while lifting-up the vehicle.

Valve clearance (Standard):
Intake
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust
0.25±0.04 mm (0.0098±0.0016 in)



11) If necessary, adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>

12) Measure the valve clearance in #3, #2 and #4 cylinder in this order in the same measurement procedure as #1 cylinder.

NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before measuring valve clearances.
• By rotating the crank pulley clockwise every 180° from the state that #1 cylinder piston is on the top dead center of compression stroke, #3, #2 and #4 cylinder pistons come to the top dead center of compression stroke in this order.

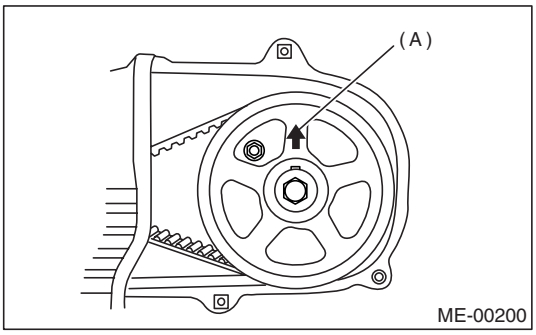
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Set #1 cylinder piston to top dead center of compression stroke by rotating the crank pulley clockwise using the socket wrench.

NOTE:
When the arrow mark (A) on cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.

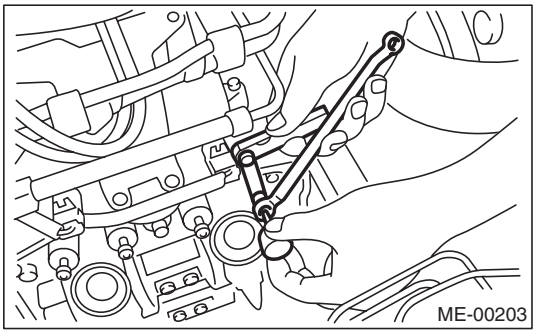


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place a suitable thickness gauge.
(3) While noting the valve clearance, tighten the valve rocker adjusting screw.
(4) When the specified valve clearance is obtained, tighten the valve rocker nut.

Tightening torque:
9.75 N·m (1.0 kgf-m, 7.2 ft-lb)

CAUTION:
• Insert the thickness gauge in as horizontally as possible with respect to the valve stem end face.
• Adjust the exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust
0.25±0.04 mm (0.0098±0.0016 in)



3) Adjust the valve clearance in #3, #2 and #4 cylinder in this order in the same adjustment procedure as #1 cylinder.

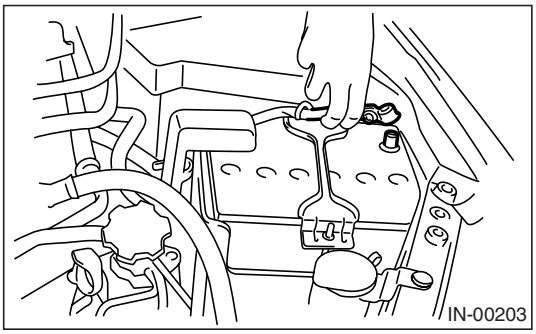
NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
• By rotating the crank pulley clockwise every 180° from the state that #1 cylinder piston is on the top dead center of compression stroke, #3, #2 and #4 cylinder pistons come to the top dead center of compression stroke in this order.

4) Ensure the valve clearances of each cylinder are within specifications. If necessary, readjust the valve clearances.

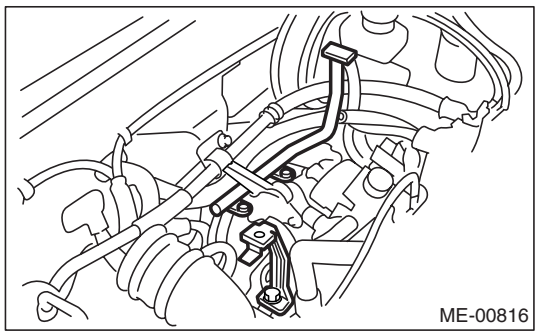
9. Engine Assembly

A: REMOVAL

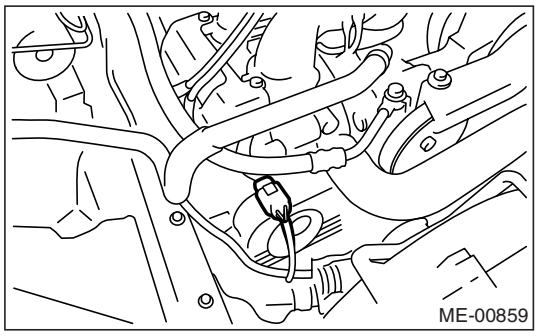
1) Set the vehicle on a lift.
2) Open the front hood fully and support it with front food stay.
3) Collect the refrigerant from A/C system. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
4) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> or <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
5) Remove the fuel filler cap.
6) Disconnect the ground cable from battery.



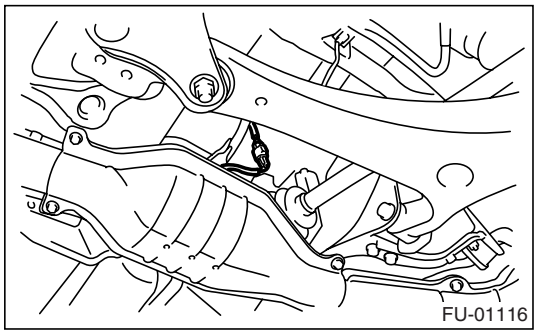
7) Remove the air intake duct, air cleaner case and air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
8) Remove the under cover.
9) Remove the radiator from vehicle. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
10) Disconnect the A/C pressure hoses from A/C compressor.
11) Remove the air intake chamber stay.



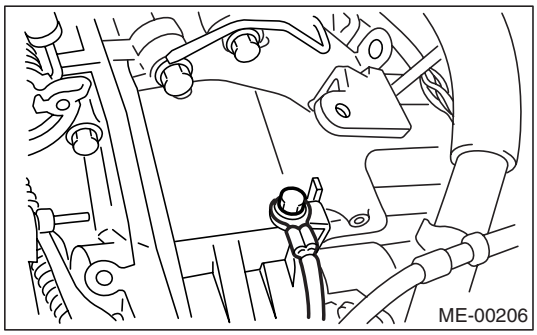
12) Disconnect the following connectors and cables.
(1) Front oxygen (A/F) sensor connector



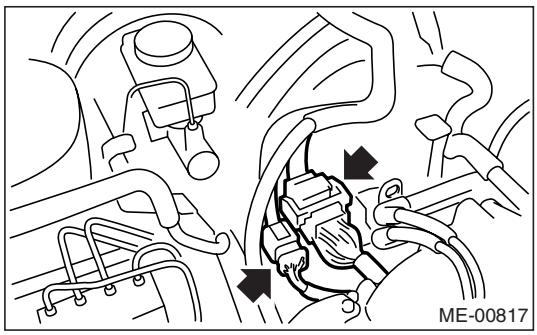
(2) Rear oxygen sensor connector



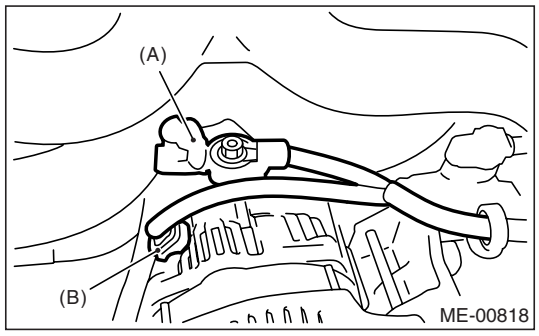
(3) Engine ground cable



(4) Engine harness connectors

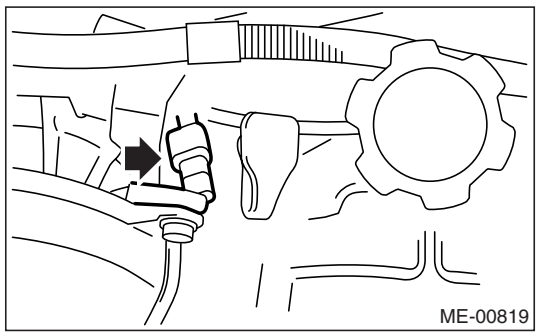


(5) Generator connector and terminal

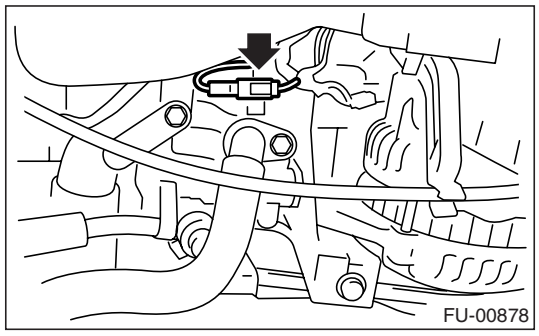


(A) Terminal
(B) Generator connector

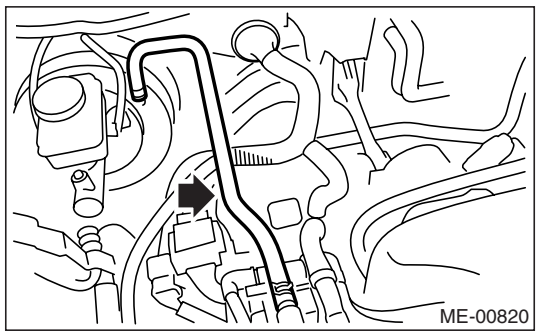
(6) A/C compressor connector



(7) Power steering switch connector

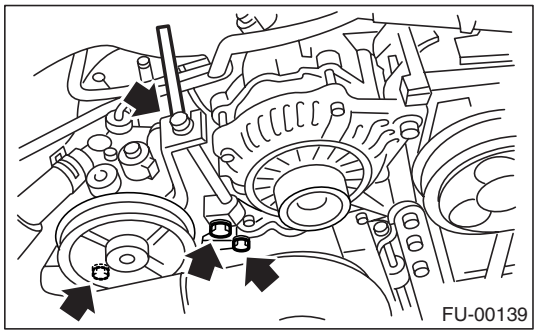


13) Disconnect the following hoses:
(1) Brake booster vacuum hose



(2) Heater inlet and outlet hoses

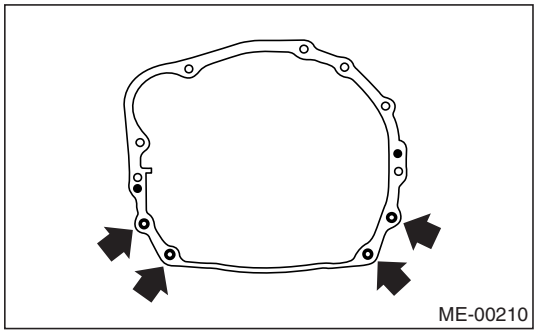
14) Remove the power steering pump.
(1) Loosen the lock bolt and slider bolt, and remove the front side belt. <Ref. to ME(H4SO 2.0)-37, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Remove the power steering pump.



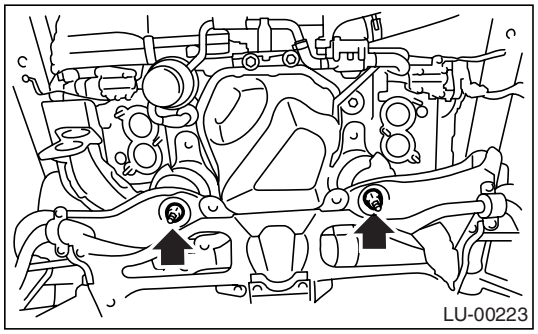
(3) Place the power steering pump onto right side wheel apron.

15) Remove the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-6, REMOVAL, Front Exhaust Pipe.>

16) Remove the bolts and nuts which hold lower side of transmission to engine.

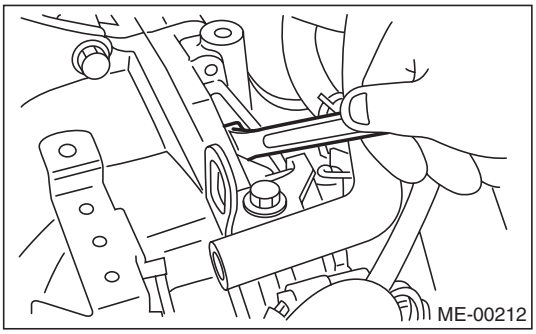


17) Remove the nuts which install front cushion rubber onto front crossmember.

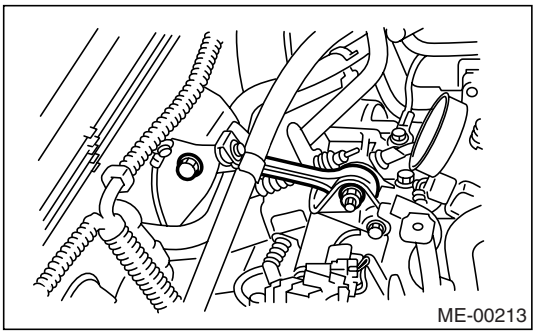


18) Separate the torque converter clutch from drive plate. (AT model)
(1) Lower the vehicle.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.

(4) Remove other bolts while rotating the crankshaft using socket wrench.

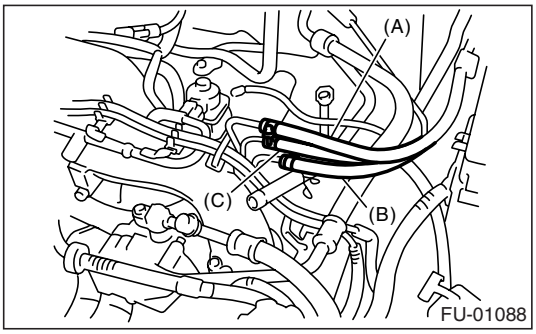


19) Remove the pitching stopper.

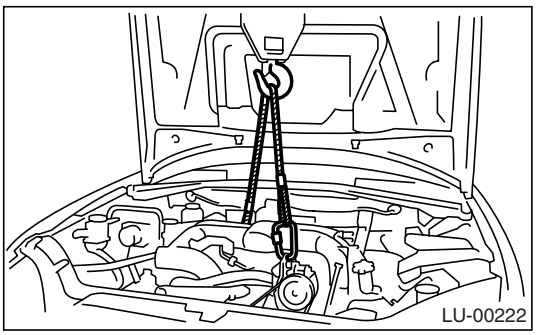


20) Disconnect the fuel delivery hose (A), return hose (B) and evaporation hose (C).

CAUTION:
• Collect fuel from the hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

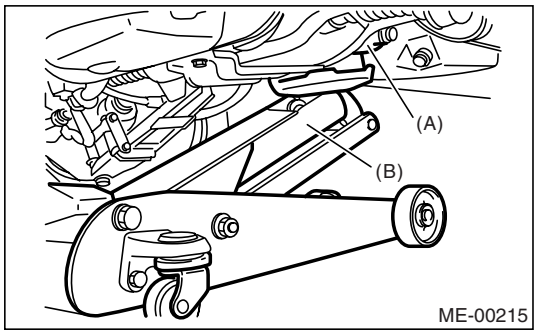


21) Support the engine with a lifting device and wire ropes.



22) Support the transmission with a garage jack.

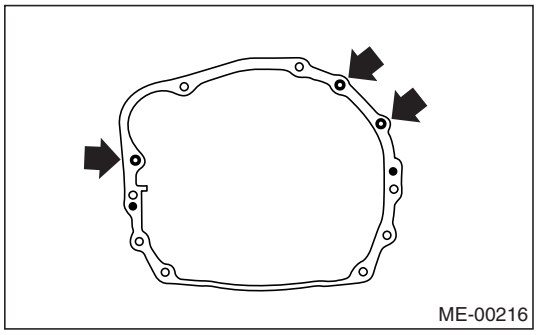
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.



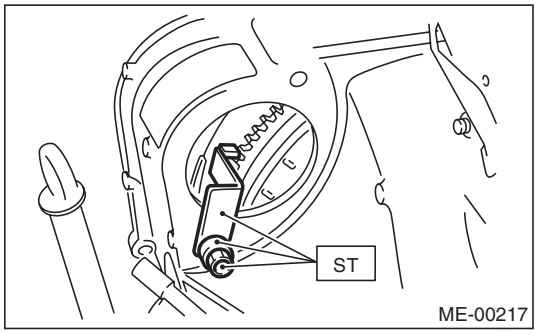
(A) Transmission
(B) Garage jack

CAUTION:
Before removing the engine away from transmission, check to be sure no work has been overlooked.

23) Separation of engine and transmission
(1) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
(2) Remove the bolts which hold upper side of transmission to engine.



24) Install the ST to converter case. (AT model)
ST 498277200 STOPPER SET



25) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

26) Remove the front cushion rubbers.

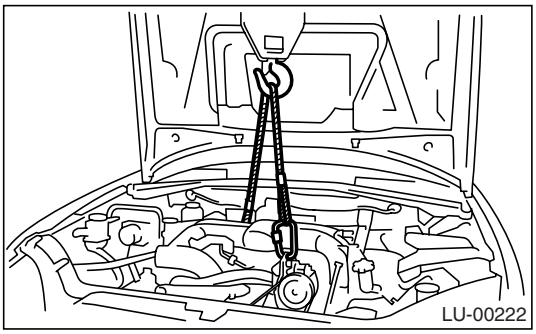
B: INSTALLATION

1) Install the front cushion rubbers.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

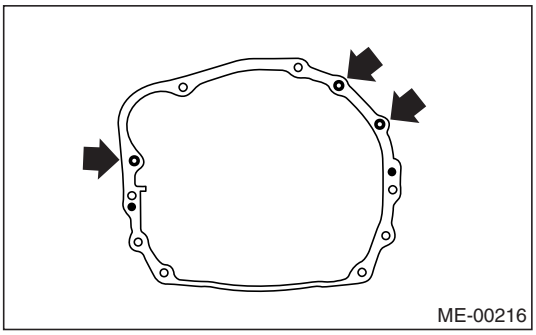
2) Position the engine in engine compartment and align it with transmission.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



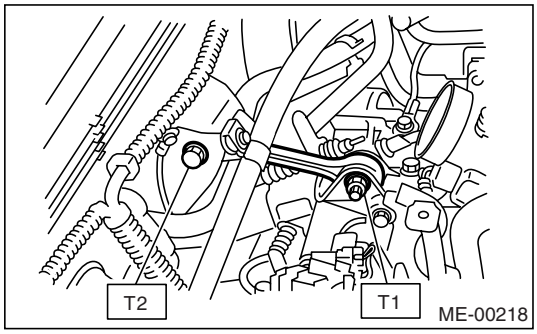
3) Apply a small amount of grease to the spline of main shaft. (MT model)
4) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



5) Remove the lifting device and wire ropes.
6) Remove the garage jack.
7) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



8) Remove the ST from converter case. (AT model)

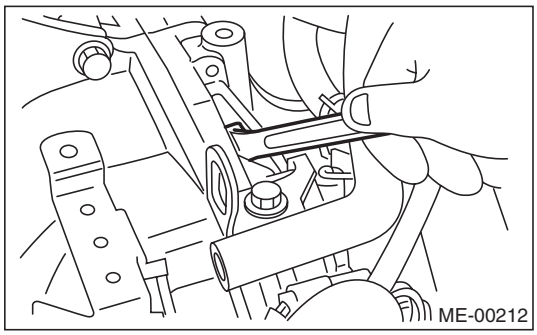
NOTE:
Be careful not to drop the ST into the converter case when removing the ST.

ST 498277200 STOPPER SET

9) Install the starter. <Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
10) Install the torque converter clutch to drive plate. (AT model)
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the crankshaft using socket wrench.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

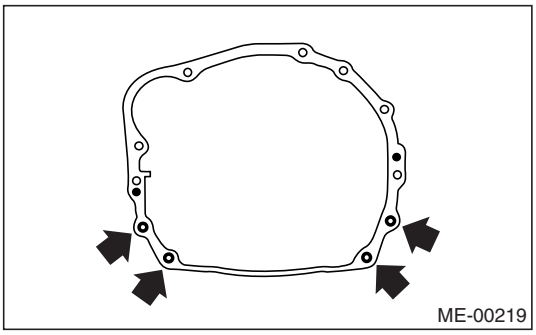


(3) Install the service hole plug to prevent foreign matters from being mixed.

11) Install the power steering pump.
<Ref. to PS-83, INSTALLATION, Oil Pump.>
12) Lift-up the vehicle.

13) Tighten the bolts and nuts which hold lower side of the transmission to engine.

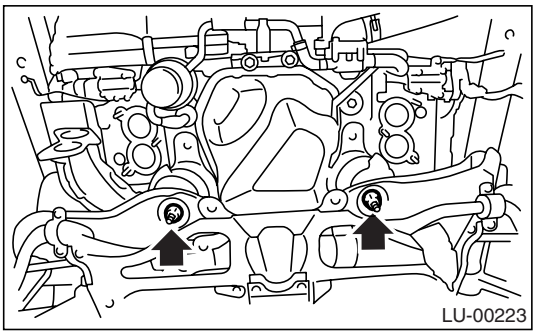
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



14) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

NOTE:
Make sure the front cushion rubber mounting bolts are securely installed.



15) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-7, INSTALLATION, Front Exhaust Pipe.>
16) Lower the vehicle.
17) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
18) Connect the following connectors:
(1) Front oxygen (A/F) sensor connector
(2) Rear oxygen sensor connector
(3) Engine ground cable

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)

(4) Engine harness connectors
(5) Generator connector and terminal
(6) A/C compressor connector

19) Install the air intake chamber stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

20) Install the A/C pressure hoses.
<Ref. to AC-39, INSTALLATION, Hose and Tube.>
21) Install the radiator to vehicle. <Ref. to CO(H4SO 2.0)-21, INSTALLATION, Radiator.>
22) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Intake Chamber.>
23) Install the under cover.
24) Install the battery in the vehicle and connect cables.
25) Fill engine coolant.
<Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
26) Check the ATF level and replenish it if necessary.
<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>
27) Charge the A/C system with refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
28) Remove the front hood stay, and close the front hood.
29) Take off the vehicle from a lift.

C: INSPECTION

1) Check the pipes and hoses are installed firmly.
2) Check the engine coolant and ATF are at specified levels.

10. Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4SO 2.0)-30, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting
35 N·m (3.6 kgf-m, 25.8 ft-lb)

C: INSPECTION

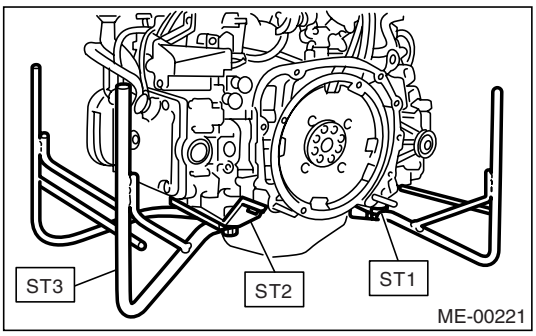
Make sure that no crack or other damages do not exist.

11.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817100	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. The procedure for overhauling of the engine will be completed when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

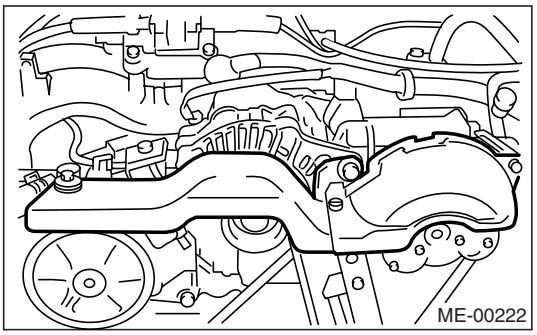
12.V-belt

A: REMOVAL

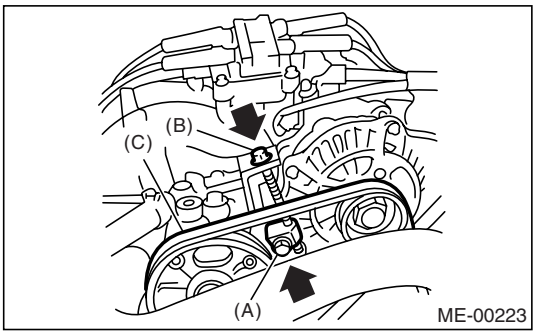
NOTE:
Perform the following procedures with the engine installed to the body.

1. FRONT SIDE BELT

1) Remove the V-belt covers.

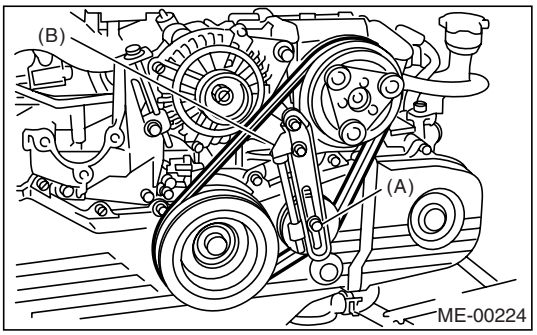


2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

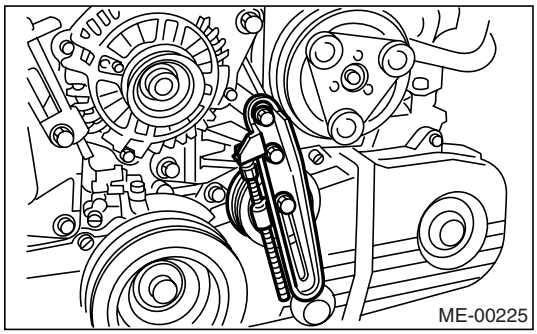


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the rear side belt.
4) Remove the belt tensioner.



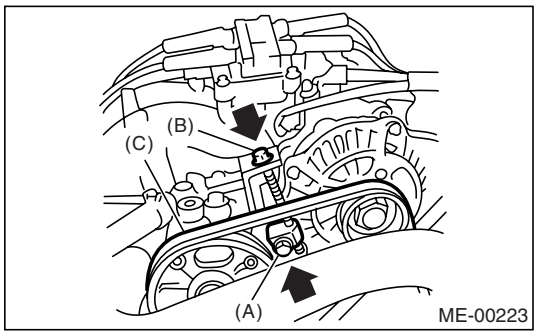
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install the V-belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4SO 2.0)-38, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

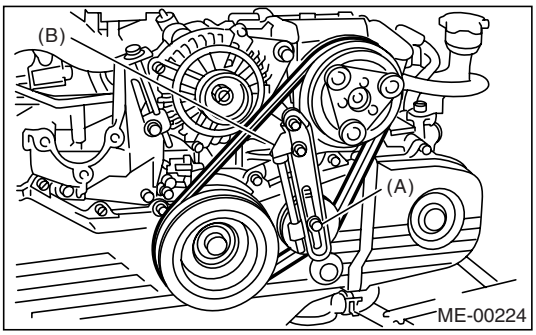
Tightening torque:
Lock bolt (A)
25 N·m (2.5 kgf-m, 18.4 ft-lb)
Slider bolt (B)
8 N·m (0.8 kgf-m, 5.8 ft-lb)



2. REAR SIDE BELT

1) Install the belt tensioner.
2) Install the V-belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4SO 2.0)-38, INSPECTION, V-belt.>
3) Tighten the lock nut (A).

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



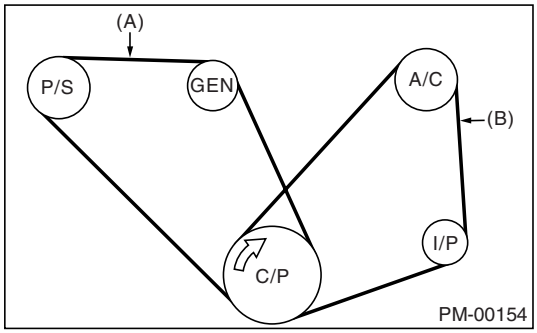
C: INSPECTION

1) Replace the belts, if crack, fraying or wear is found.
2) Remove the V-belt cover and reservoir tank. (with belt tension gauge)
3) Check the V-belt tension and adjust it if necessary by changing the generator installing position or idler pulley installing position.

Belt tension (with belt tension gauge):

Front side belt
When installing new parts
618 — 755 N (63 — 77 kgf, 139 — 170 lbf)
At inspection
490 — 640 N (50.0 — 65.3 kgf, 110.2 — 143.9 lbf)

Rear side belt
When installing new parts:
740 — 880 N (75.5 — 89.7 kgf, 166 — 198 lbf)
At inspection
350 — 450 N (35.7 — 45.9 kgf, 78.7 — 101.2 lbf)

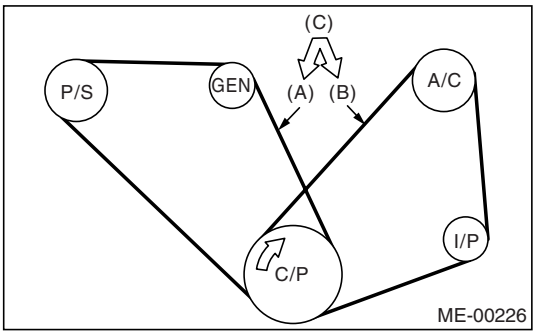


(A)	Front side belt
(B)	Rear side belt
C/P	Crank pulley
GEN	Generator
P/S	Power steering oil pump pulley
A/C	Air conditioning compressor pulley
I/P	Idler pulley

Belt tension (without belt tension gauge):

Front side belt
When installing new parts
7 — 9 mm (0.276 — 0.354 in)
At inspection
9 — 11 mm (0.354 — 0.433 in)

Rear side belt
When installing new parts
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection
9.0 — 10.0 mm (0.354 — 0.394 in)

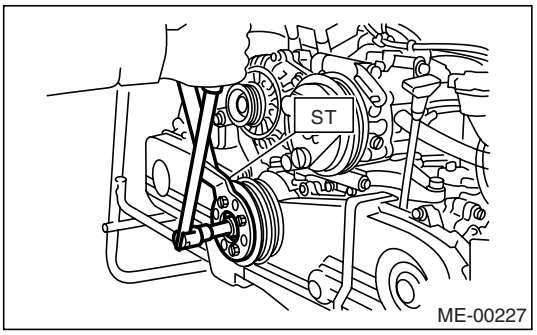


(A) Front side belt
(B) Rear side belt
(C) 98 N (10 kgf, 22 lbf)
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

13.Crank Pulley

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use the ST.
ST 499977400 CRANK PULLEY WRENCH (2.0 L model)
ST 499977100 CRANK PULLEY WRENCH (2.5 L model)



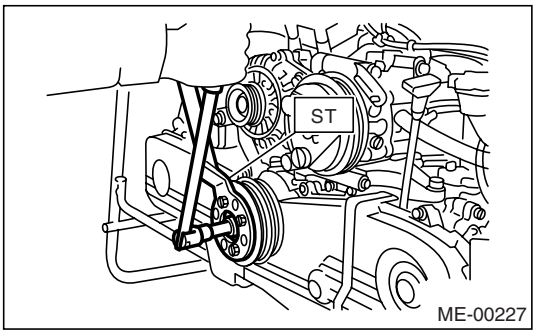
3) Remove the crank pulley.

B: INSTALLATION

1. 2.0 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use the ST.
ST 499977400 CRANK PULLEY WRENCH
(1) Clean the crankshaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of the crank pulley bolt is 45° or more. Perform the following procedures when less than 45°.

CAUTION:
If the tightening angle of crank pulley bolt is less than 45°, the bolt should be damaged. In this case, the bolt must be replaced.

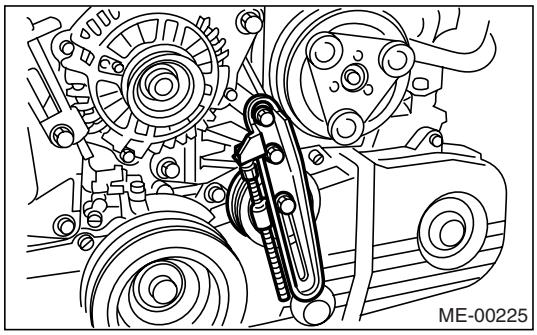
(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
Part No. 12369AA011

(2) Clean the crankshaft thread using compressed air.
(3) Apply engine oil to the crank pulley bolt seat and thread.
(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(5) Tighten the crank pulley bolts keeping them in an angle between 45 — 60°.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the belt tensioner.



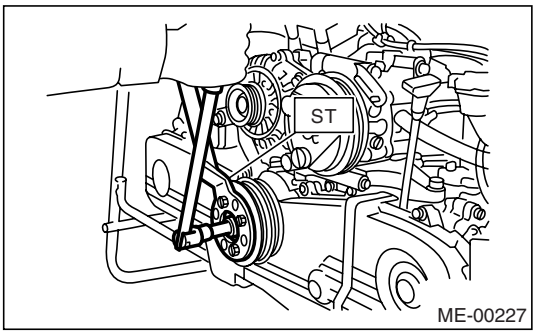
5) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

2. 2.5 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use the ST.
ST 499977100 CRANK PULLEY WRENCH
(1) Clean the crankshaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).

(4) Tighten the crank pulley bolts.

Tightening torque:
180 N·m (18.4 kgf-m, 132.8 ft-lb)



3) Confirm that the tightening angle of the crank pulley bolt is 65° or more. Perform the following procedures when less than 65°.

(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
Part No. 12369AA011

(2) Clean the crankshaft thread using compressed air.

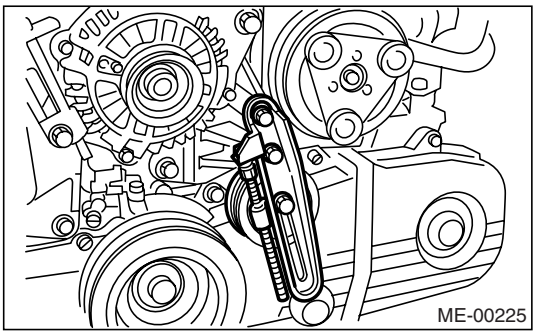
(3) Apply engine oil to the crank pulley bolt seat and thread.

(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).

(5) Tighten the crank pulley bolts keeping them in an angle between 65 — 75°.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the belt tensioner.



5) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: INSPECTION

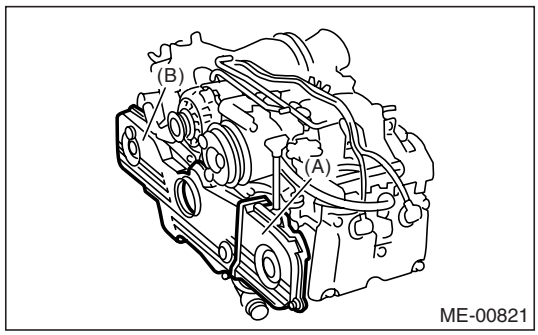
1) Make sure the V-belt is not worn or otherwise damaged.

2) Check the tension of the belt. <Ref. to ME(H4SO 2.0)-38, INSPECTION, V-belt.>

14.Timing Belt Cover

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH).
4) Remove the front timing belt cover.



(A) Timing belt cover (LH)
(B) Front timing belt cover

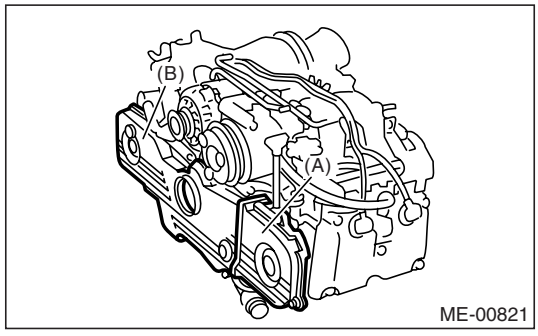
B: INSTALLATION

1) Install the front timing belt cover.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

2) Install the timing belt cover (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



(A) Timing belt cover (LH)
(B) Front timing belt cover

3) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
4) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: INSPECTION

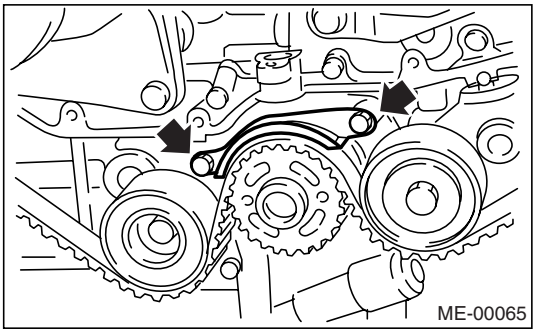
Check the cover for damage.

15.Timing Belt

A: REMOVAL

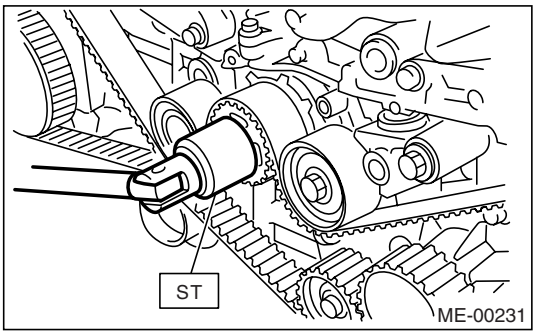
1. TIMING BELT

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt guide. (MT model)

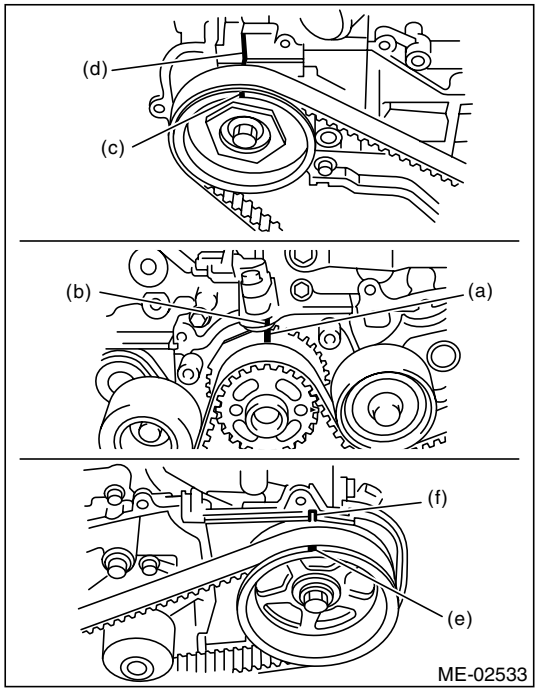

ME-00065

5) If the alignment mark (a) or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.
(1) Use the ST to turn crankshaft. Align the mark (a) of sprocket to the cylinder block notch (b), and then ensure the adjustments between right side cam sprocket mark (c) and cam cap and cylinder head matching surface (d), and between left side cam sprocket mark (e) and timing belt cover notch (f) are properly adjusted.

ST 499987500 CRANKSHAFT SOCKET

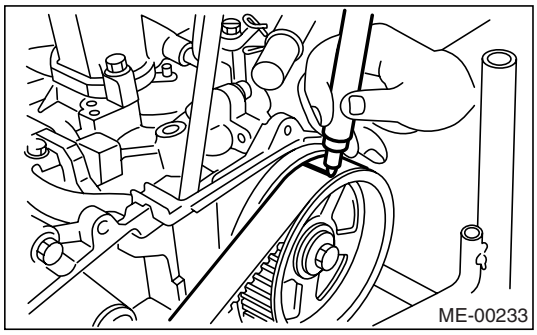


ME-00231

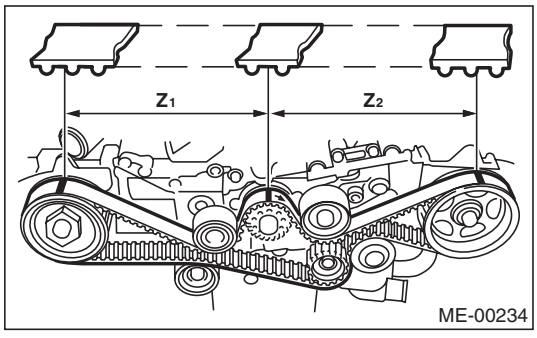


ME-02533

(2) Using white paint, put an alignment mark or an arrow mark on the timing belts in relation to the crank sprocket and cam sprocket.


ME-00233

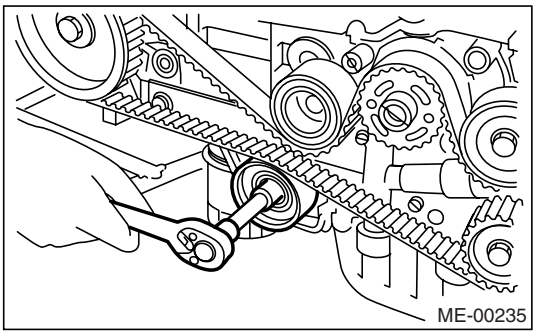
Specified data:
Z_1: 46.8 tooth length
Z_2: 43.7 tooth length



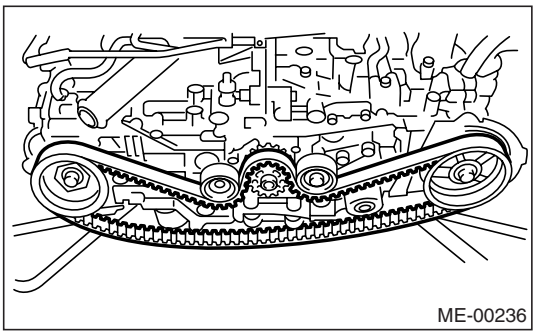
ME-00234

6) Remove the belt idler (No. 2).

7) Remove the belt idler No. 2.

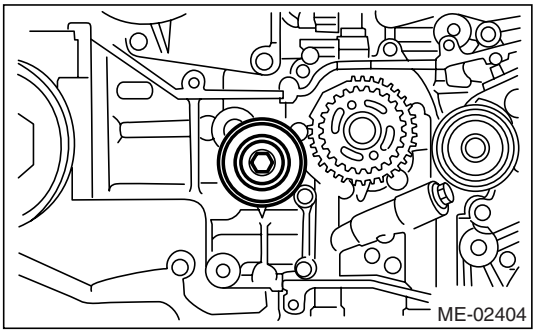


8) Remove the timing belt.

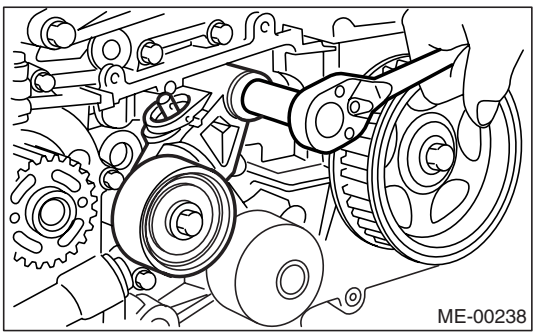


2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

1) Remove the belt idler (No. 1).



2) Remove the automatic belt tension adjuster assembly.



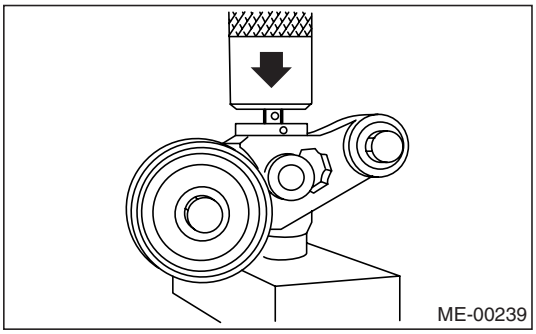
B: INSTALLATION

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

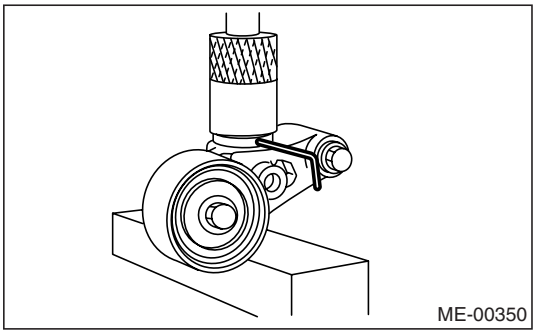
1) Preparation for installation of automatic belt tension adjuster assembly

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.
• Do not release the press pressure before stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kgf, 66 lbf) or more until the adjuster rod is aligned with the stopper pin hole in the cylinder.

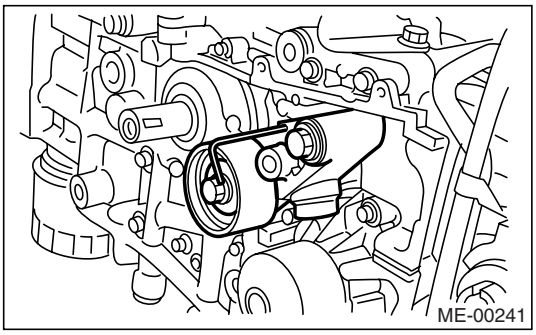


(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (nominal) dia. hex wrench inserted into the stopper pin hole in cylinder, secure the adjuster rod.



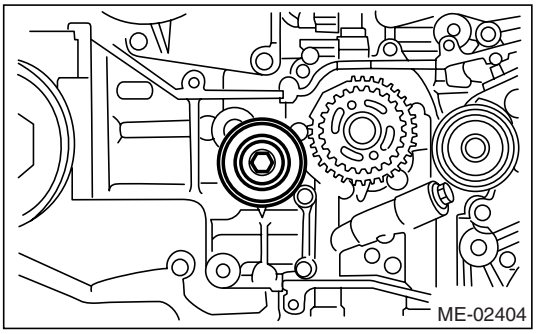
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



3) Install the belt idler (No. 1).

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



2. TIMING BELT

1) Prepare for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4SO 2.0)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

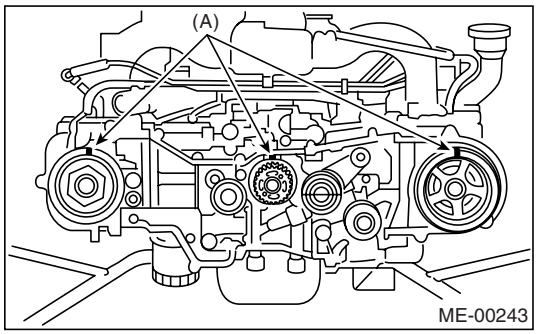
2) Install the timing belt.

(1) Turn the cam sprocket No. 2 using ST1, and turn the cam sprocket No. 1 using ST2 so that their alignment marks (A) come to top positions.

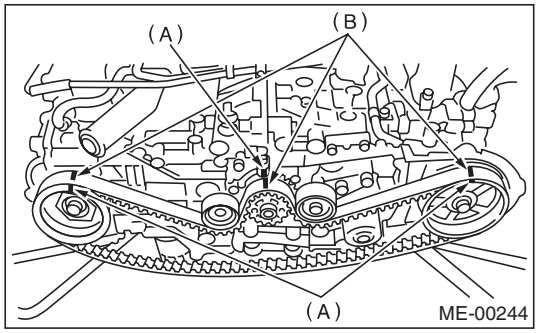
ST1 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

ST2 499207400 CAM SPROCKET WRENCH



(2) While aligning alignment marks (B) on the timing belt with marks (A) on sprockets, position the timing belt properly.

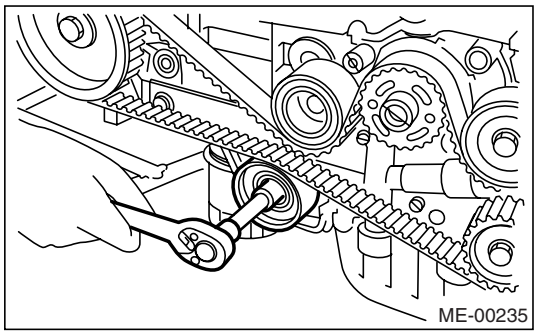


3) Install the belt idler No. 2.

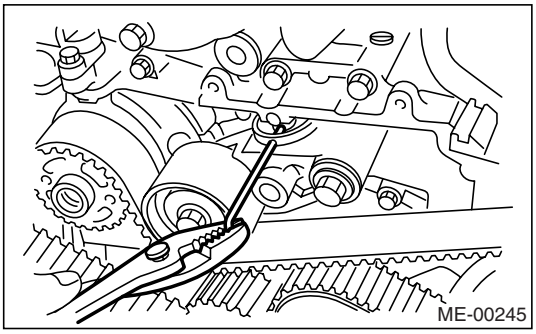
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

4) Install the belt idler (No. 2).

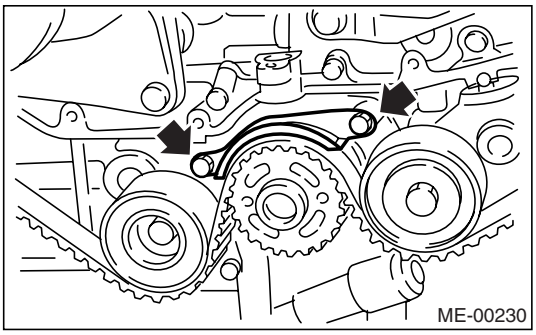
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



5) After ensuring the marks on timing belt and cam sprockets are aligned, remove the stopper pin from belt tension adjuster.

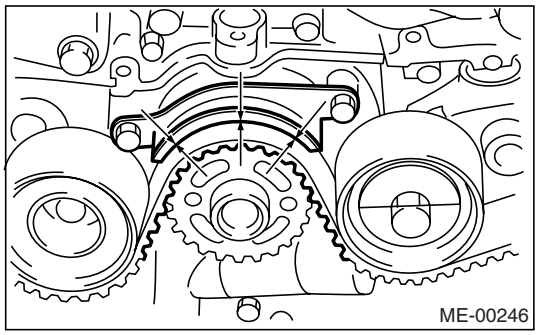


6) Install the timing belt guide. (MT model)
(1) Temporarily tighten the timing belt guide mounting bolts.



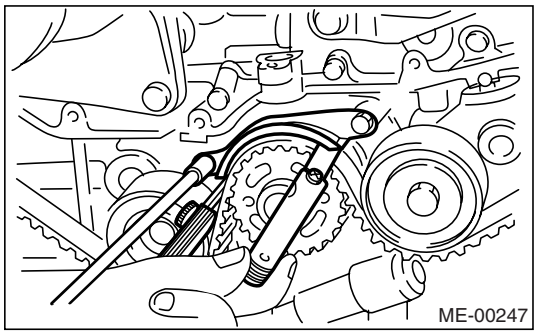
(2) Check and adjust the clearance between timing belt and timing belt guide by using thickness gauge.

Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten the timing belt guide mounting bolts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



7) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
8) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
9) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

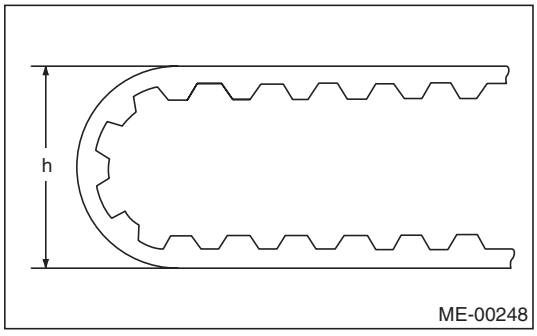
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks or wear. If any fault is found, replace the belt.
2) Check the condition of the backside of belt. If cracks are found, replace the belt.

CAUTION:
• Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the timing belt sharply.

In radial diameter h:
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check the oil seals for leaks, and rod ends for abnormal wear and scratches. If necessary, replace the automatic belt tension adjuster assembly.

NOTE:
Slight traces of oil at rod's oil seal does not indicate a problem.

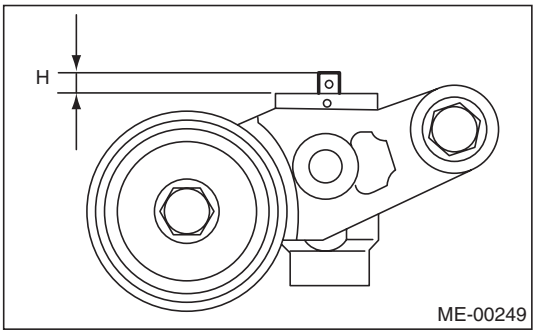
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lbf) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lbf), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this operation two to three times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lbf) to it. Check the adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press the adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.

4) Measure the amount of rod protrusion beyond the body. If it is not within specifications, replace with a new one.

Amount of rod protrusion H:
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the automatic belt tension adjuster assembly if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play occurs.
3) Check the belt tension pulley for grease leakage.

4. BELT IDLER

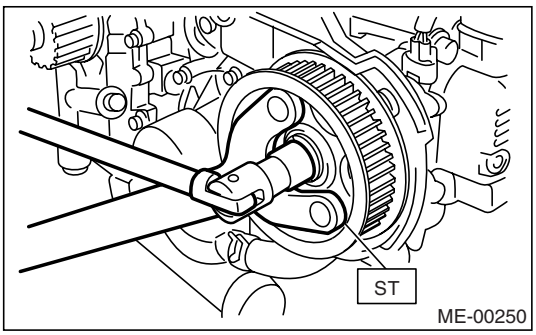
1) Check the belt idler for smooth rotation. Replace if noise or excessive play occurs.
2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the belt idler for grease leakage.

16.Cam Sprocket

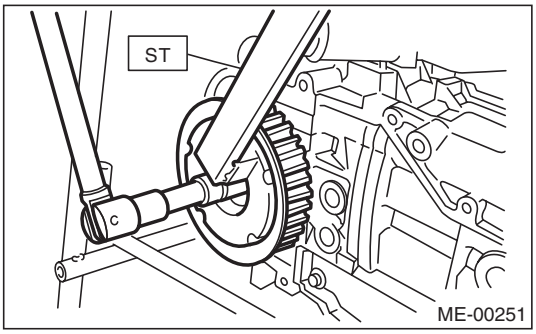
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, REMOVAL, Camshaft Position Sensor.>
6) Remove the cam sprocket No. 2. To lock the camshaft, use the ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.



7) Remove the cam sprocket No. 1. To lock the camshaft, use the ST.
ST 499207400 CAM SPROCKET WRENCH

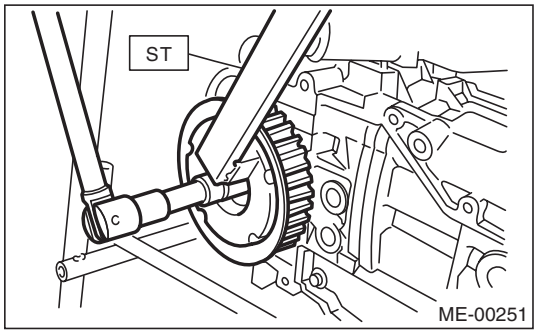


B: INSTALLATION

1) Install the cam sprocket No. 1. To lock the crankshaft, use the ST.
ST 499207400 CAM SPROCKET WRENCH

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

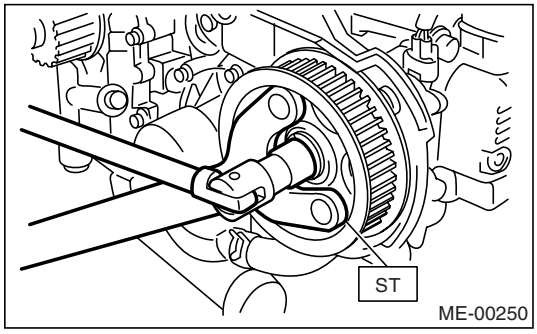
NOTE:
Do not confuse the cam sprocket LH with RH during installation. Cam sprocket No. 2 can be identified by a protrusion used to monitor the camshaft position sensor.



2) Install the cam sprocket No. 2. To lock the camshaft, use the ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



3) Install the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, INSTALLATION, Camshaft Position Sensor.>
4) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
5) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
6) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
7) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

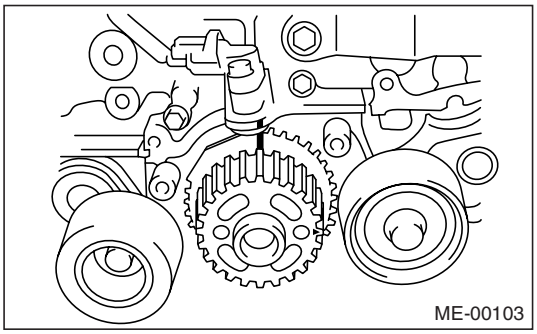
C: INSPECTION

1) Check the cam sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between cam sprocket and key.
3) Check the cam sprocket protrusion used for sensor for damage and contamination of foreign matter.

17.Crank Sprocket

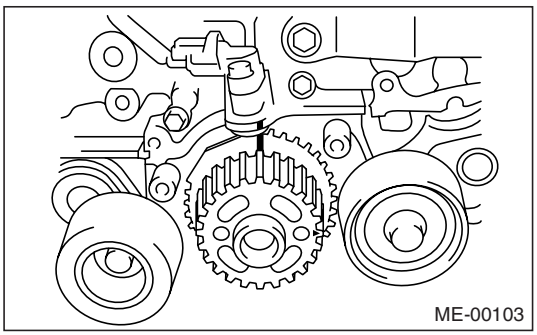
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket.



B: INSTALLATION

1) Install the crank sprocket.



2) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
3) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
4) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
6) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: INSPECTION

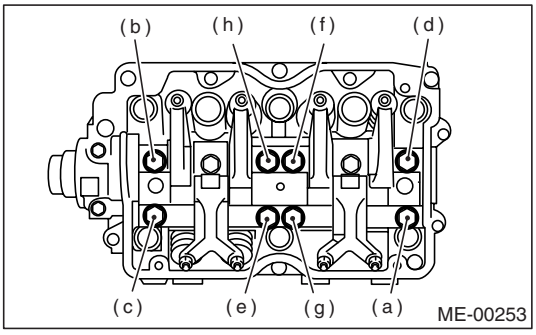
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.
3) Check the crank sprocket protrusion used for sensor for damage and contamination of foreign matter.

18. Valve Rocker Assembly

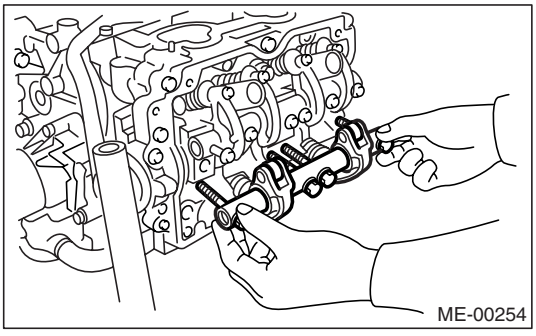
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Disconnect the PCV hose and remove the rocker cover.
7) Removal of valve rocker assembly
   (1) Remove the bolts (a) through (h) in alphabetical sequence.

NOTE:
Leave two or three threads of bolts (g) and (h) engaged to retain the valve rocker assembly.



   (2) Remove the valve rocker assembly.



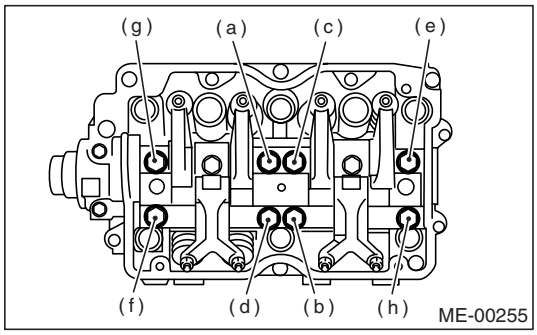
B: INSTALLATION

1) Installation of valve rocker assembly
   (1) Temporarily tighten the bolts (a) through (d) equally in order as shown in the figure.

NOTE:
Do not allow the valve rocker assembly to damage knock pins.

   (2) Tighten the bolts (e) through (h) to specified torque.
   (3) Tighten the bolts (a) through (d) to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



2) Adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>
3) Install the rocker cover and rocker cover gasket, and then connect the PCV hose.

NOTE:
Use a new rocker cover gasket.

4) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
5) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
6) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
7) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
8) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: DISASSEMBLY

1) Remove the bolts which secure rocker shaft.
2) Extract the rocker shaft. Remove the valve rocker arms, springs and shaft supports from rocker shaft.

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

3) Remove the nut and adjusting screw from valve rocker.

D: ASSEMBLY

1) Install the adjusting screw and nut to valve rocker.
2) Arrange the valve rocker arms, springs and shaft supports in assembly order, and then insert the valve rocker shaft.

Tightening torque (Shaft support installing bolt):
5 N·m (0.5 kgf-m, 3.7 ft-lb)

NOTE:
Valve rocker arms, rocker shaft and shaft supports have identification marks. Ensure the parts with same markings are properly assembled.

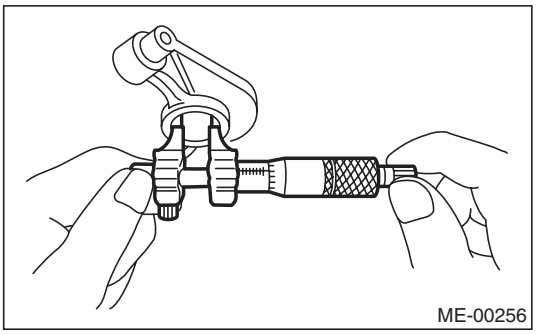
3) Install the valve rocker shaft securing bolts.

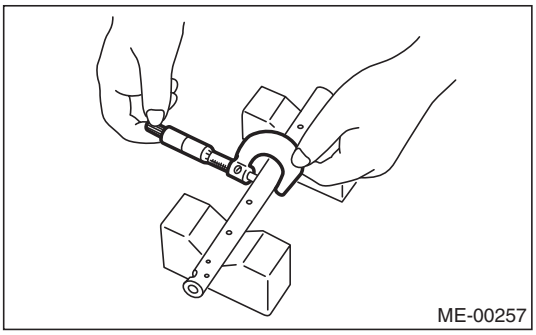
E: INSPECTION

1. VALVE ROCKER ARM AND ROCKER SHAFT

1) Measure the inner diameter of valve rocker arm and outer diameter of valve rocker shaft, and confirm the difference (oil clearance) between the two values.

Clearance between arm and shaft:
Standard
0.020 — 0.054 mm (0.0008 — 0.0021 in)


ME-00256


ME-00257

2) If the oil clearance exceeds the standard, replace the valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:
22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)

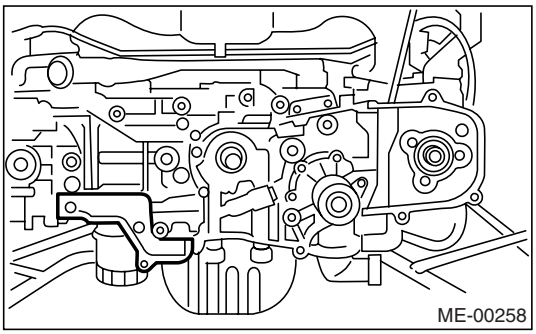
3) If the cam or valve contact surface of valve rocker arm is worn or dented excessively, replace the valve rocker arm.
4) Check that the valve rocker arm roller rotates smoothly. If not, replace the valve rocker arm.

19.Camshaft

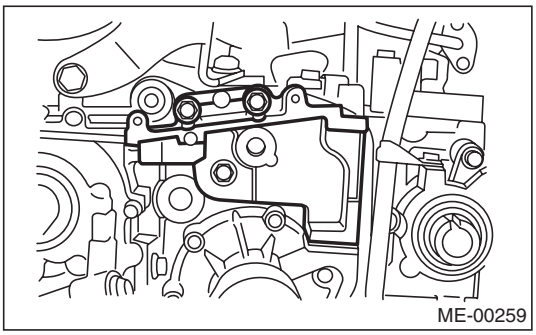
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4SO 2.0)-50, REMOVAL, Crank Sprocket.>
7) Remove the timing belt cover No. 2 (LH).
8) Remove the timing belt cover No. 2 (RH).

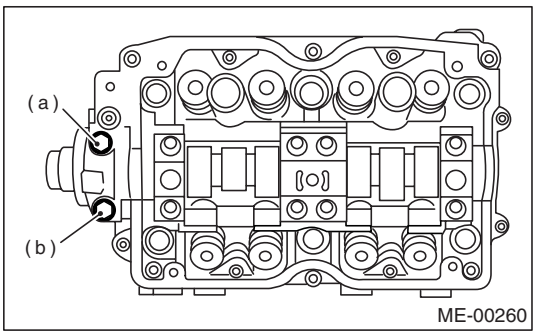
NOTE:
Do not damage or lose the seal rubber when removing the timing belt covers.


ME-00258

9) Remove the tensioner bracket.

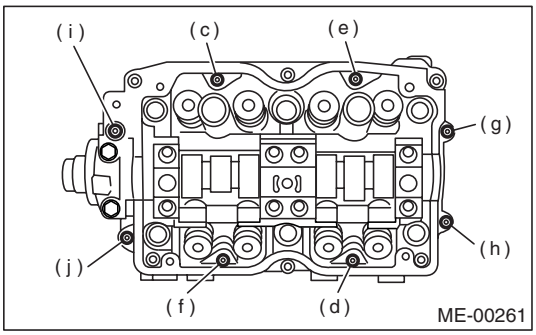

ME-00259

10) Remove the camshaft position sensor support. (LH side only)
11) Remove the oil level gauge guide. (LH side only)
12) Remove the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, REMOVAL, Valve Rocker Assembly.>
13) Remove the camshaft cap.
(1) Remove the bolts (a) and (b) in alphabetical sequence.



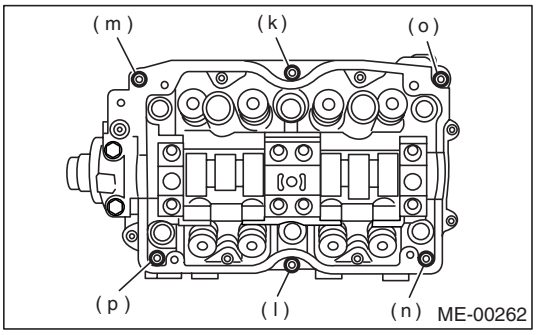
ME-00260

(2) Equally loosen the bolts (c) through (j) all the way in alphabetical sequence.



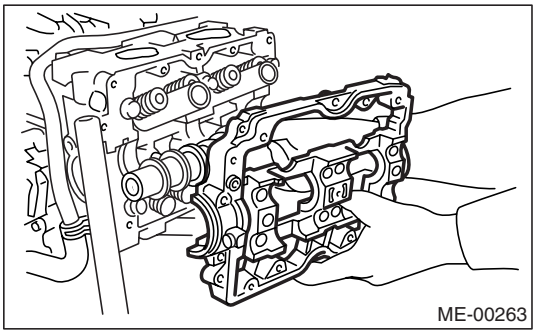
ME-00261

(3) Remove the bolts (k) through (p) in alphabetical sequence using ST.
ST 499497000 TORX PLUS®



ME-00262

(4) Remove the camshaft cap.


ME-00263

14) Remove the camshaft.
15) Remove the oil seal.

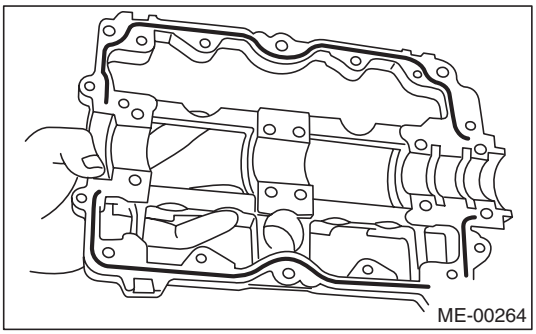
16) Remove the plug from rear side of camshaft.

CAUTION:
• Do not remove the oil seal unless necessary.
• Do not scratch the journal surface when removing the oil seal.

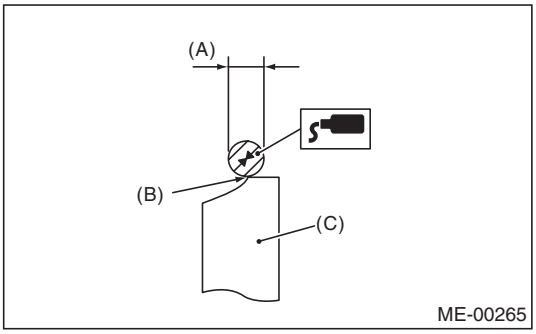
B: INSTALLATION

1) Apply a thin coat of engine oil to camshaft journals, and install the camshaft.
2) Install the camshaft cap.
(1) Apply liquid gasket to the mating surfaces of camshaft cap.

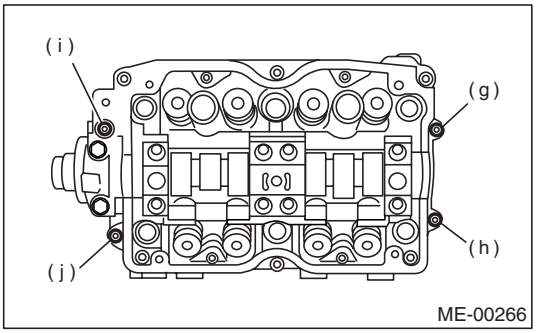
Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)



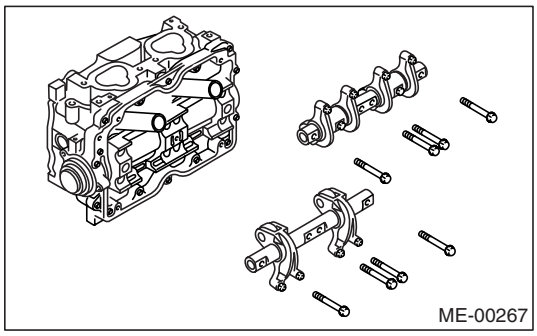
NOTE:
• Apply a coat of liquid gasket of 3 mm (0.12 in) in diameter (A) along the edge (B) of camshaft cap (C) mating surface.
• Assemble them within 20 min. after applying liquid gasket.



(2) Temporarily tighten the bolts (g) through (j) in alphabetical sequence.

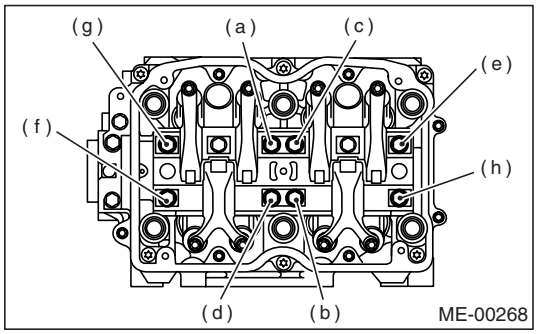


(3) Install the valve rocker assembly.



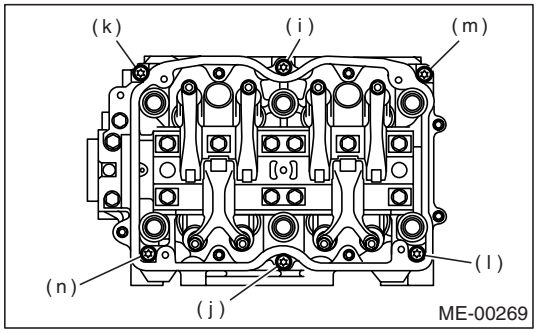
(4) Tighten the bolts (a) through (h) in alphabetical sequence.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



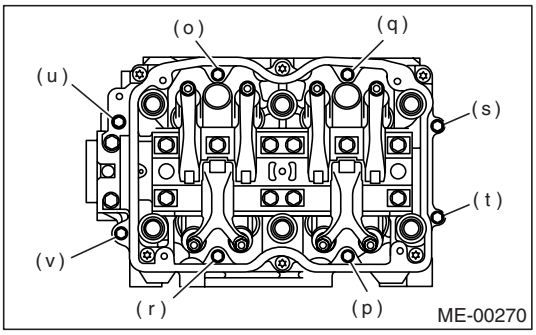
(5) Tighten the TORX® bolts (i) through (n) in alphabetical sequence using ST.
ST 499497000 TORX PLUS®

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



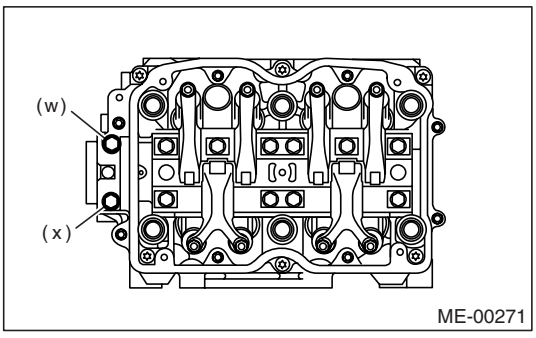
(6) Tighten the bolts (o) through (v) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



(7) Tighten the bolts (w) and (x) in alphabetical sequence.

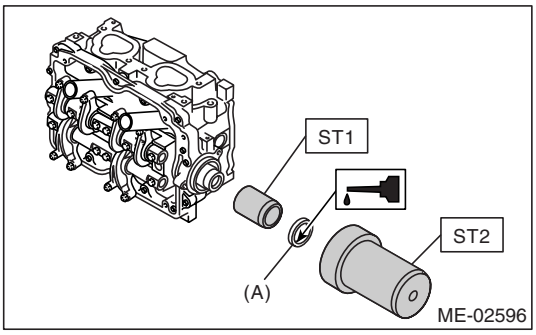
Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



3) Apply a coat of engine oil to oil seal lips and install the oil seal (A) on camshaft using ST1 and ST2.

NOTE:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587500 OIL SEAL INSTALLER



4) Install the plug using ST.

ST 499587700 CAMSHAFT OIL SEAL INSTALLER

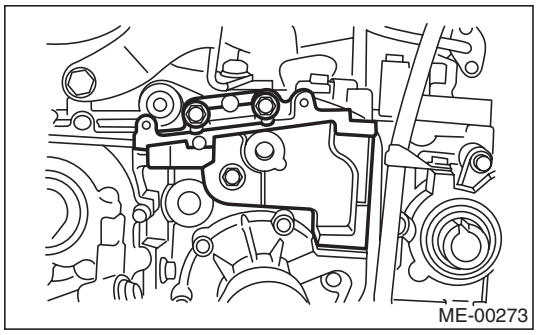
5) Adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>

6) Install the rocker cover and rocker cover gasket, and then connect the PCV hose.

NOTE:
Use a new rocker cover gasket.

7) Install the oil level gauge guide. (LH side only)
8) Install the camshaft position sensor support. (LH side only)
9) Install the tensioner bracket.

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

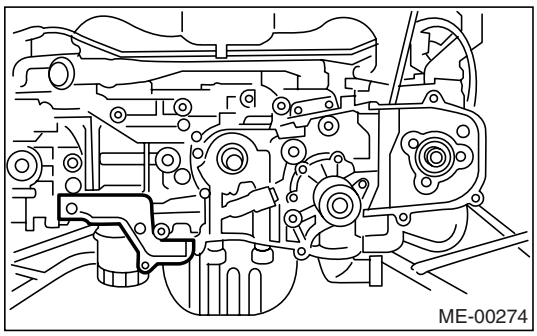


10) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

11) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



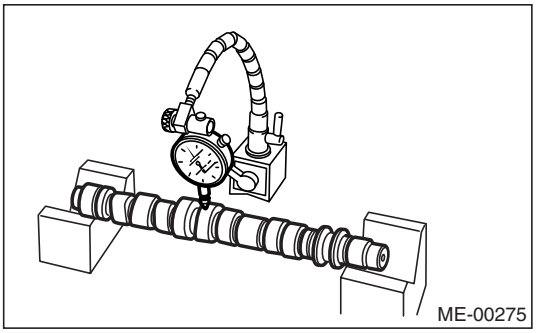
12) Install the crank sprocket.
<Ref. to ME(H4SO 2.0)-50, INSTALLATION, Crank Sprocket.>
13) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
14) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
15) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
16) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
17) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Service limit:
0.020 mm (0.00079 in)



2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outer diameter of camshaft journal and inner diameter of cylinder head journal, and confirm the difference (oil clearance) between the two values. If the oil clearance exceeds standard, replace the camshaft or cylinder head as necessary.

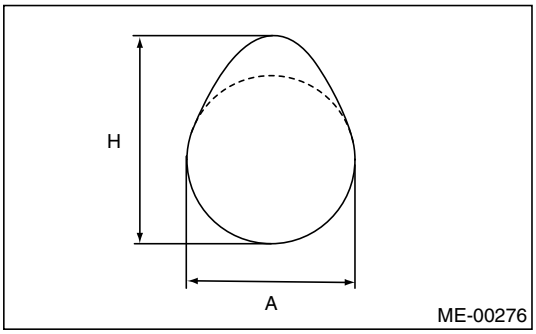
		Unit: mm (in)
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

4) Check the cam face condition, and remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds standard, replace it.

Cam height H:

Model	Parts		Unit: mm (in)
2.0 L	Intake	Standard	39.646 — 39.746 (1.5609 — 1.5648)
	Exhaust	Standard	39.351 — 39.451 (1.5493 — 1.5532)
2.5 L	Intake	Standard	39.485 — 39.585 (1.5545 — 1.5585)
	Exhaust	Standard	39.904 — 40.004 (1.5710 — 1.5750)

Cam base circle diameter A:
Intake: 34.00 mm (1.3386 in)
Exhaust: 34.00 mm (1.3386 in)



5) Measure the thrust clearance of camshaft with setting the dial gauge at end of camshaft. If the thrust clearance exceeds the standard, replace the camshaft caps and cylinder head as a set. If necessary, replace the camshaft.

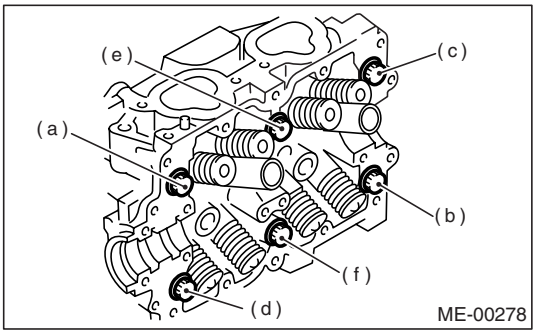
Standard:
0.030 — 0.090 mm (0.0012 — 0.0035 in)

20.Cylinder Head

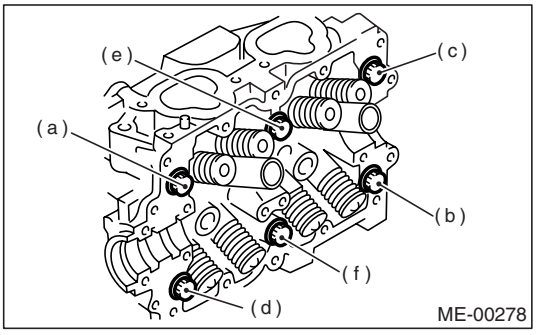
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the intake manifold. <Ref. to FU(H4SO 2.0)-11, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs A/C compressor bracket on cylinder head.
8) Remove the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, REMOVAL, Valve Rocker Assembly.>
9) Remove the camshaft. <Ref. to ME(H4SO 2.0)-53, REMOVAL, Camshaft.>
10) Remove the cylinder head bolts in alphabetical sequence as shown in the figure.

NOTE:
Leave the bolts (a) and (c) engaged by three or four threads to prevent the cylinder head from falling.



11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
12) Remove the bolts (a) and (c) to remove the cylinder head.



13) Remove the cylinder head gasket.

CAUTION:
Be careful not to scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the cylinder head RH.

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

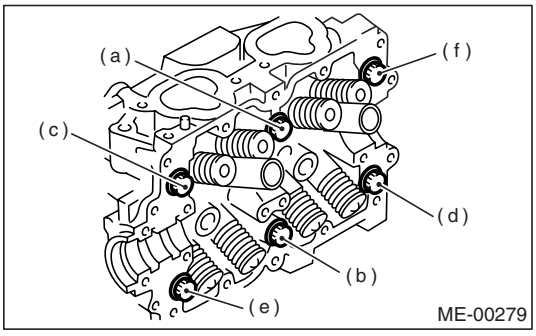
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder block and cylinder head.**

2) Tighten the cylinder head bolts.
   (1) Apply a coat of engine oil to washers and bolt threads.
   (2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence. Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
   (3) Back off all bolts by 180° in reverse order of installation, and back them off again by 180°.
   (4) Tighten all bolts to 42 N·m (4.3 kgf-m, 31 ft-lb) in alphabetical sequence.
   (5) Tighten all bolts by 80 — 90° in alphabetical sequence.
   (6) Tighten all bolts by 40 — 45° in alphabetical sequence.

CAUTION:
Do not tighten the bolts more than 45°

   (7) Further tighten the bolts (A) and (B) by 40 — 45°.

CAUTION:
Ensure the total re-tightening angle of the step (6) and (7) does not exceed 90°.



3) Install the camshaft. <Ref. to ME(H4SO 2.0)-54, INSTALLATION, Camshaft.>
4) Install the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, INSTALLATION, Valve Rocker Assembly.>
5) Install the A/C compressor bracket on cylinder head.
6) Install the intake manifold.
<Ref. to FU(H4SO 2.0)-12, INSTALLATION, Intake Manifold.>

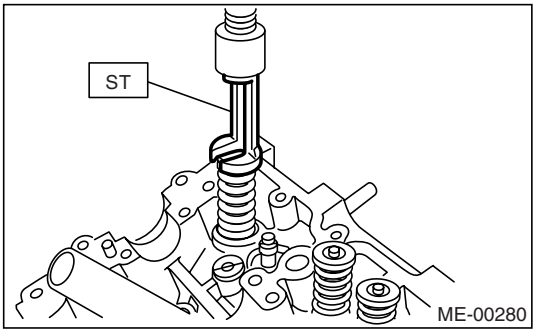
7) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
8) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
9) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
10) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
11) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>

C: DISASSEMBLY

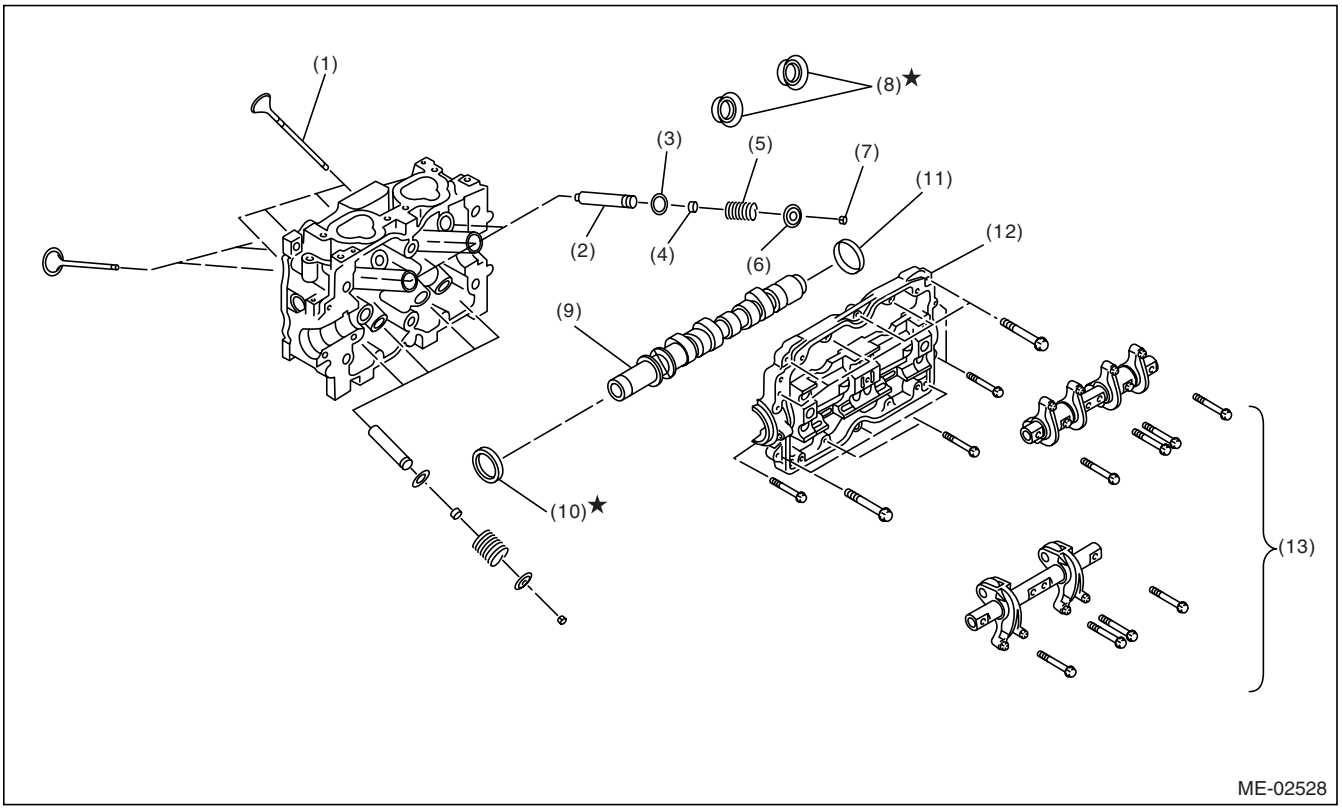
1) Place the cylinder head on the ST.
ST 498267800 CYLINDER HEAD TABLE
2) Set the ST on valve spring. Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



D: ASSEMBLY



(1) Valve
(2) Valve guide
(3) Valve spring seat
(4) Oil seal
(5) Valve spring
(6) Retainer
(7) Retainer key
(8) Spark plug gasket
(9) Camshaft
(10) Oil seal
(11) Plug
(12) Camshaft cap
(13) Valve rocker ASSY

1) Installation of valve spring and valve
(1) Place the cylinder head on the ST.

ST 498267800 CYLINDER HEAD TABLE

(2) Coat the stem of each valve with engine oil and insert the valve into valve guide.

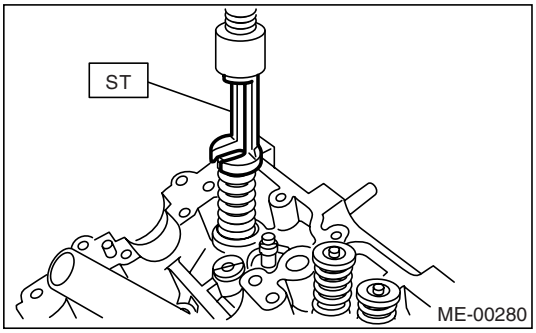
CAUTION:
Use extreme care not to damage the oil seal lips when inserting the valve into valve guide.

(3) Install the valve spring and retainer.

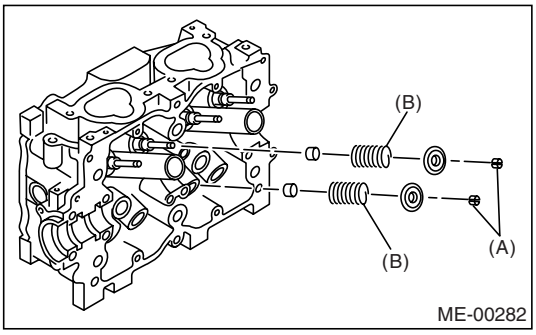
NOTE:
Be sure to install the valve spring with its close-coiled end facing the seat on cylinder head.

(4) Set the ST on valve spring.

ST 499718000 VALVE SPRING REMOVER



(5) Compress the valve spring and install the valve spring retainer key.



(A) Retainer key
(B) Valve spring

(6) After installing, tap the valve spring retainers lightly with a plastic hammer for better seating.

E: INSPECTION

1. CYLINDER HEAD

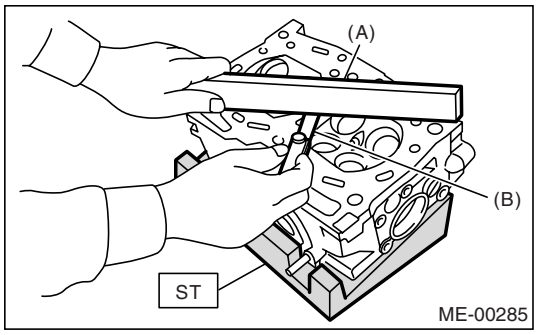
1) Make sure that no crack or other damage do not exist. In addition to visual inspection, inspect important areas using liquid penetrant tester.
Also make sure the gasket installing surface shows no trace of gas and water leaks.
2) Place the cylinder head on the ST.
ST 498267800 CYLINDER HEAD TABLE
3) Measure the warping of the cylinder head surface that mates with crankcase using a straight edge and thickness gauge.
If the warping exceeds the limit, regrind the surface with a surface grinder.

Warping limit:
0.03 mm (0.0012 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder head:
97.5 mm (3.839 in)

NOTE:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

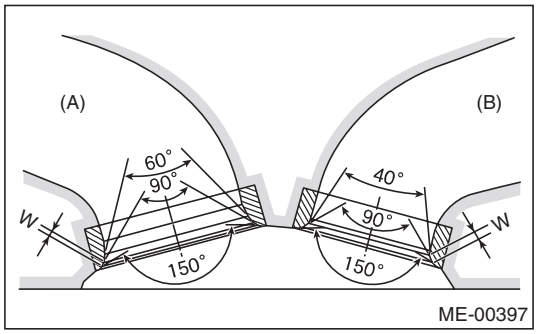


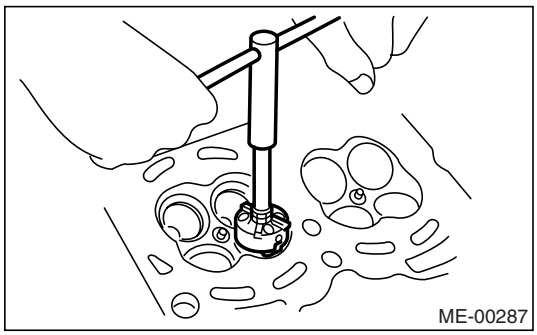
(A) Straight edge
(B) Thickness gauge

2. VALVE SEAT

Inspect the intake and exhaust valve seats, and correct the contact surfaces with a valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:
Intake (A)
Standard 0.8 — 1.4 mm (0.03 — 0.055 in)
Exhaust (B)
Standard 1.2 — 1.8 mm (0.047 — 0.071 in)





3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring respectively the outer diameter of valve stem and inner diameter of valve guide.

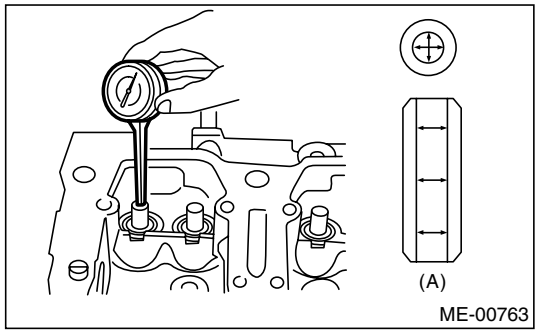
Clearance between the valve guide and valve stem:

Intake

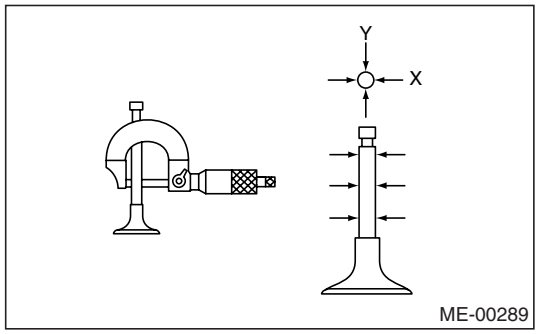
Standard 0.035 — 0.062 mm (0.0014 — 0.0024 in)

Exhaust

Standard 0.040 — 0.067 mm (0.0016 — 0.0026 in)



(A) Valve guide



2) If the clearance between valve guide and stem exceeds the standard, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

Valve guide inner diameter:

6,000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameter:

Intake

5.950 — 5.965 mm (0.2343 — 0.2348 in)

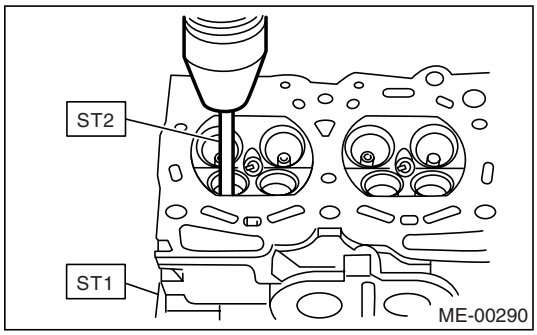
Exhaust

5.945 — 5.960 mm (0.2341 — 0.2346 in)

(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides fit the holes in ST1.

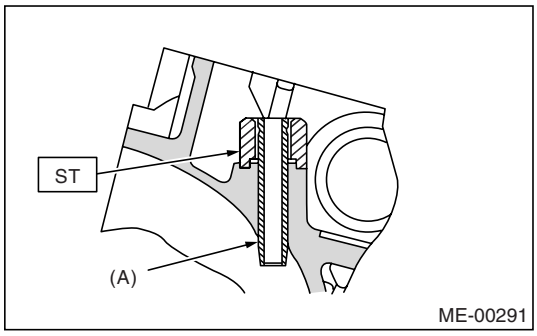
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place the ST as shown in the figure.

Intake side:
ST 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST 499767800 VALVE GUIDE ADJUSTER

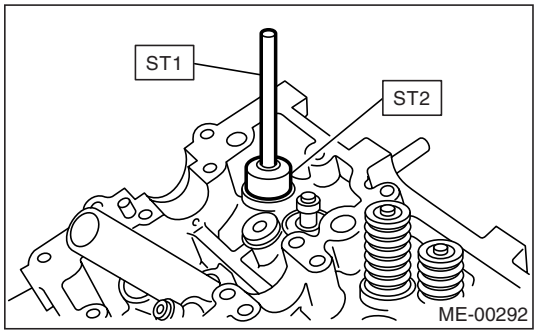


(A) Valve guide

(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

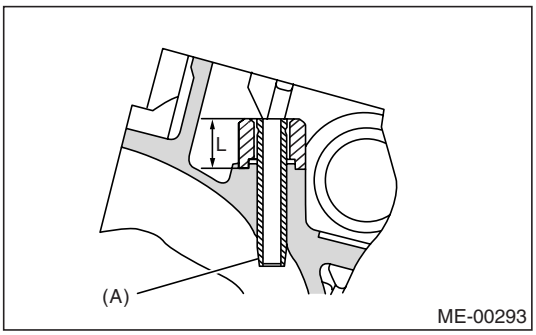
(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert the ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
Intake side:
ST2 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST2 499767800 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
Intake
20.0 — 21.0 mm (0.787 — 0.827 in)
Exhaust
16.5 — 17.5 mm (0.650 — 0.689 in)

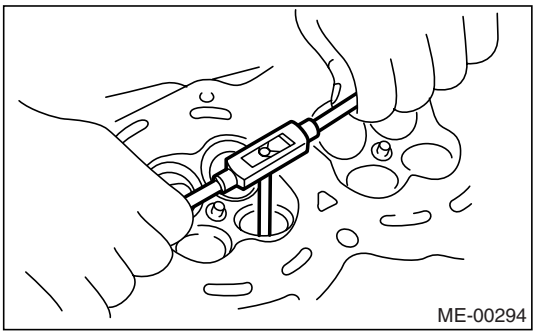


(A) Valve guide

(7) Ream the inside of valve guide using ST. Put the reamer in valve guide, and rotate the reamer slowly clockwise while pushing it lightly. Bring the reamer back while rotating it clockwise. After reaming, clean the valve guide to remove chips.

CAUTION:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chip, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



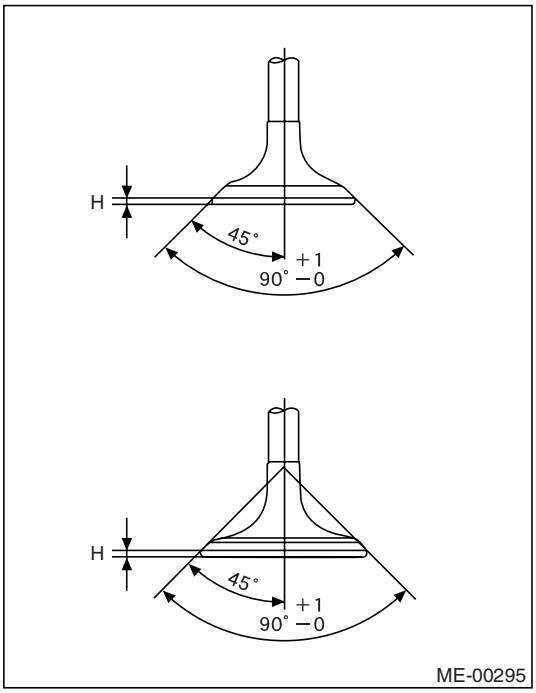
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn or deformed, or if "H" exceeds the standard.

H:
Intake
Standard 0.8 — 1.2 mm (0.03 — 0.047 in)
Exhaust
Standard 1.0 — 1.4 mm (0.039 — 0.055 in)

Valve overall length:
Intake
120.6 mm (4.75 in)
Exhaust
121.7 mm (4.79 in)

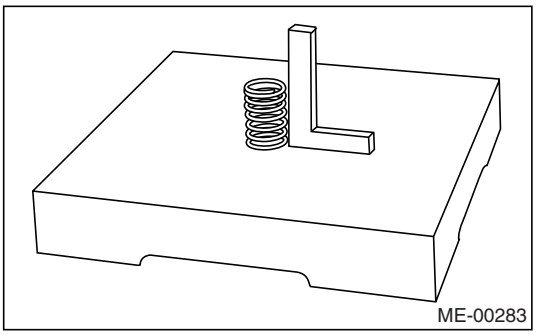


2) Put a small amount of grinding compound on the seat surface, and lap the valve and seat surface. <Ref. to ME(H4SO 2.0)-60, VALVE SEAT, INSPECTION, Cylinder Head.> Install a new intake valve oil seal after lapping.

5. VALVE SPRING

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top of spring using a try square.

Free length	mm (in)	54.30 (2.1378)
Tension/spring height N (kgf, lbf)/mm (in)	Set	214 — 246 (22 — 25, 48 — 55)/45.0 (1.772)
	Lift	526 — 582 (54 — 59, 119 — 130)/34.7 (1.366)
Squareness		2.5°, 2.4 mm (0.094 in)



6. INTAKE AND EXHAUST VALVE OIL SEAL

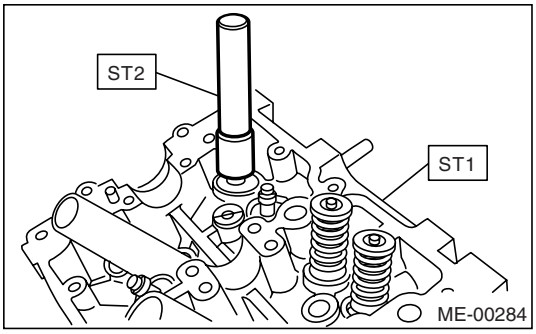
In the following case, pinch and remove the oil seal from valve using pliers, and then replace it with a new one.
- When the lip is damaged.
- When the spring is out of the specified position.
- When readjusting the surfaces of intake valve and valve sheet.
- When replacing the intake valve guide.

1) Place the cylinder head on ST1.
2) Using ST2, press-fit the oil seal.

CAUTION:
- **Apply engine oil to oil seal before press-fitting.**
- **When press-fitting the oil seal, do not use a hammer or strike in.**
- **Differentiate between the intake valve oil seal and exhaust valve oil seal by noting their difference in color.**

ST1 498267800 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

Color of rubber part:
Intake [Gray]
Exhaust [Green]



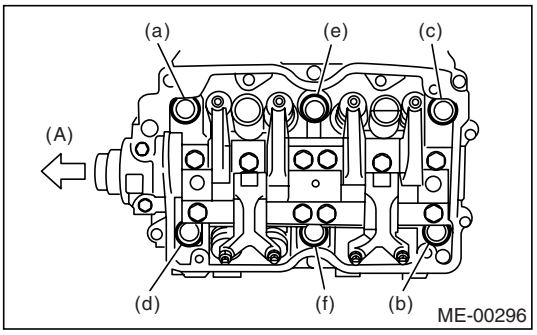
21.Cylinder Block

A: REMOVAL

NOTE:
Before conducting this procedure, drain engine oil completely.

1) Remove the intake manifold. <Ref. to FU(H4SO 2.0)-11, REMOVAL, Intake Manifold.>
2) Remove the V-belts. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
3) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
4) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
5) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
6) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
7) Remove the crank sprocket. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the rocker cover.
10) Remove the cylinder head bolts in alphabetical sequence shown in the figure.

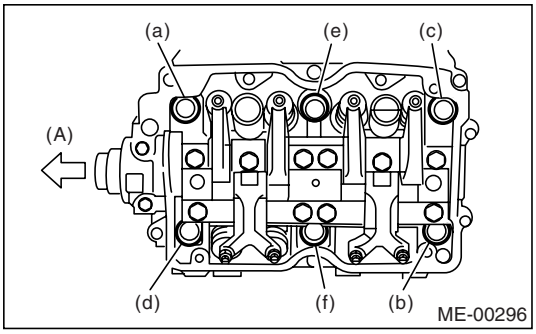
NOTE:
Leave the bolts (a) and (c) engaged by three or four threads to prevent the cylinder head from falling.



(A) Front side

11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.

12) Remove the bolts (a) and (c) to remove the cylinder head.



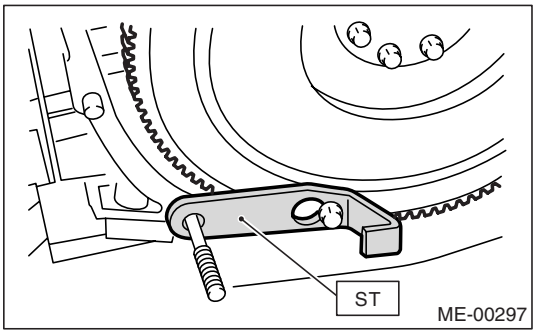
(A) Front side

13) Remove the cylinder head gasket.

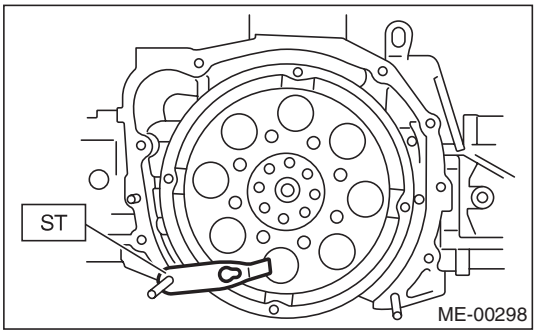
NOTE:
Do not scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the cylinder head RH.
15) Remove the clutch housing cover (MT model).
16) Remove the flywheel (MT model) or drive plate (AT model).
Lock the crankshaft using ST.
ST 498497100 CRANKSHAFT STOPPER

- MT model

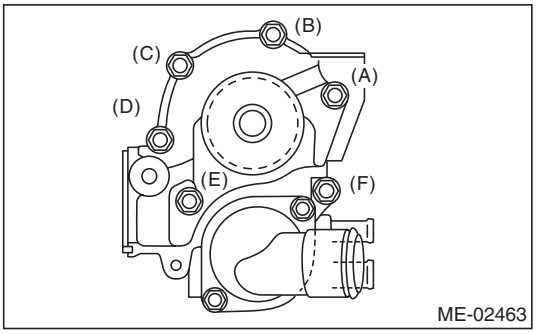


- AT model

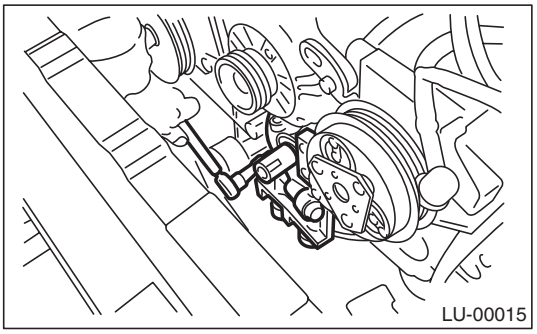


17) Remove the oil separator cover.
18) Remove the water by-pass pipe for heater.

19) Remove the water pump after loosening the bolts in alphabetical sequence as shown in the figure.

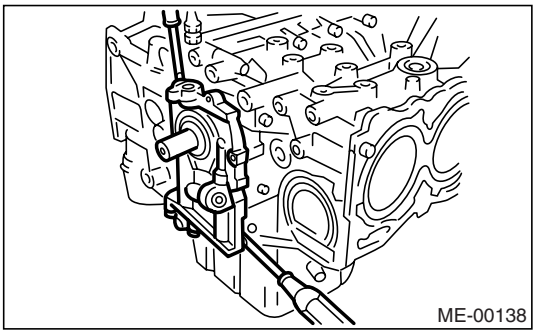


20) Remove the bolt which installs oil pump to cylinder block.



21) Remove the oil pump from cylinder block using flat tip screwdriver.

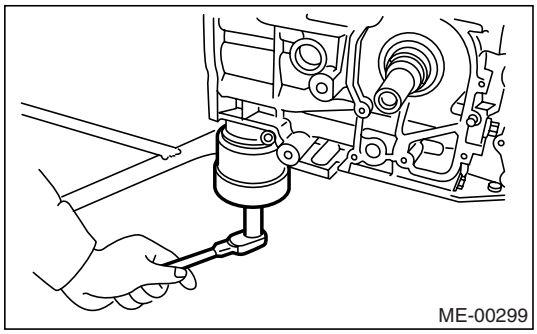
CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



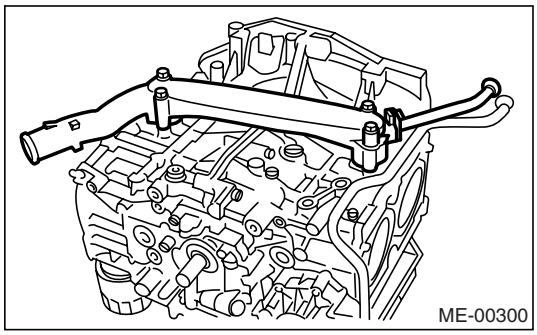
22) Removal of oil pan
(1) Place the cylinder block to face the #2 and #4 piston side upward.
(2) Remove the bolts which secure oil pan to cylinder block.
(3) Insert an oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

NOTE:
Do not use a screwdriver or similar tools in place of oil pan cutter.

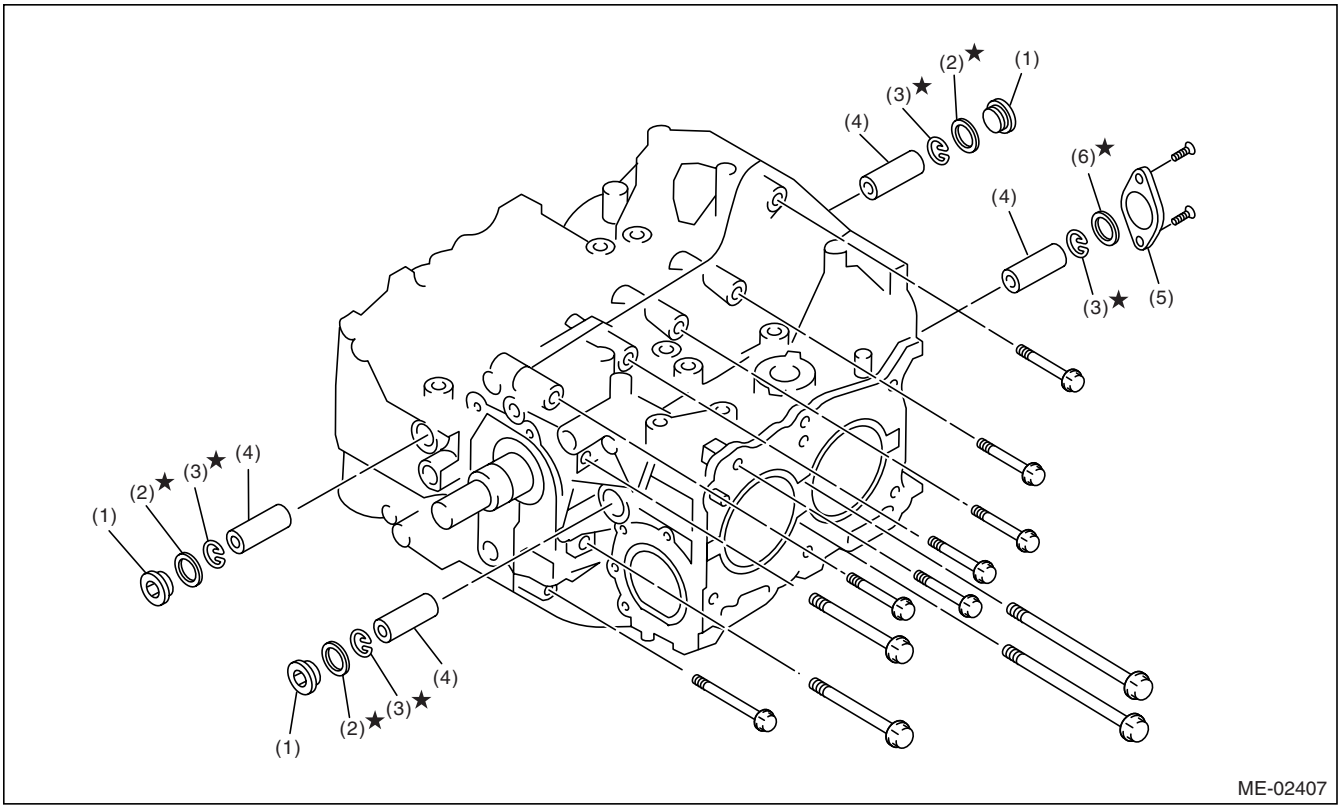
23) Remove the oil strainer stay.
24) Remove the oil strainer.
25) Remove the baffle plate.
26) Remove the oil filter.



27) Remove the water pipe.

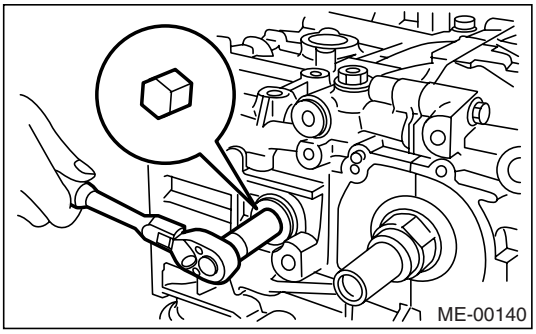


Cylinder Block

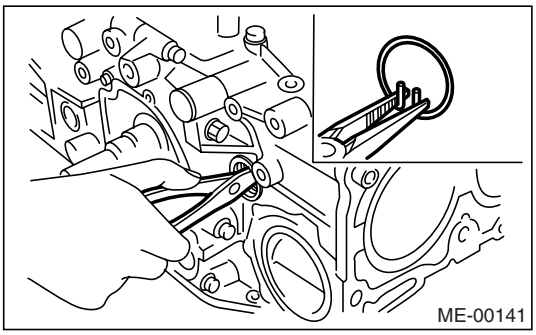


(1) Service hole plug
(2) Gasket
(3) Snap ring
(4) Piston pin
(5) Service hole cover
(6) O-ring

28) Remove the service hole cover and service hole plugs using a hexagon wrench (14 mm).

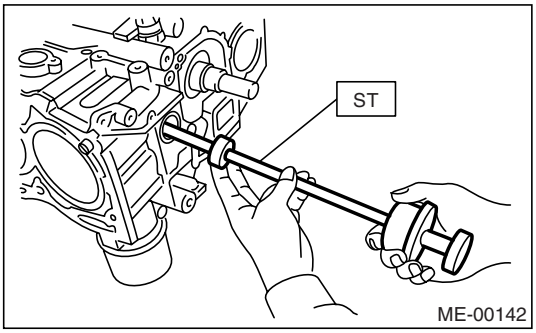


29) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston snap ring through service hole of #1 and #2 cylinders.



30) Draw out the piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

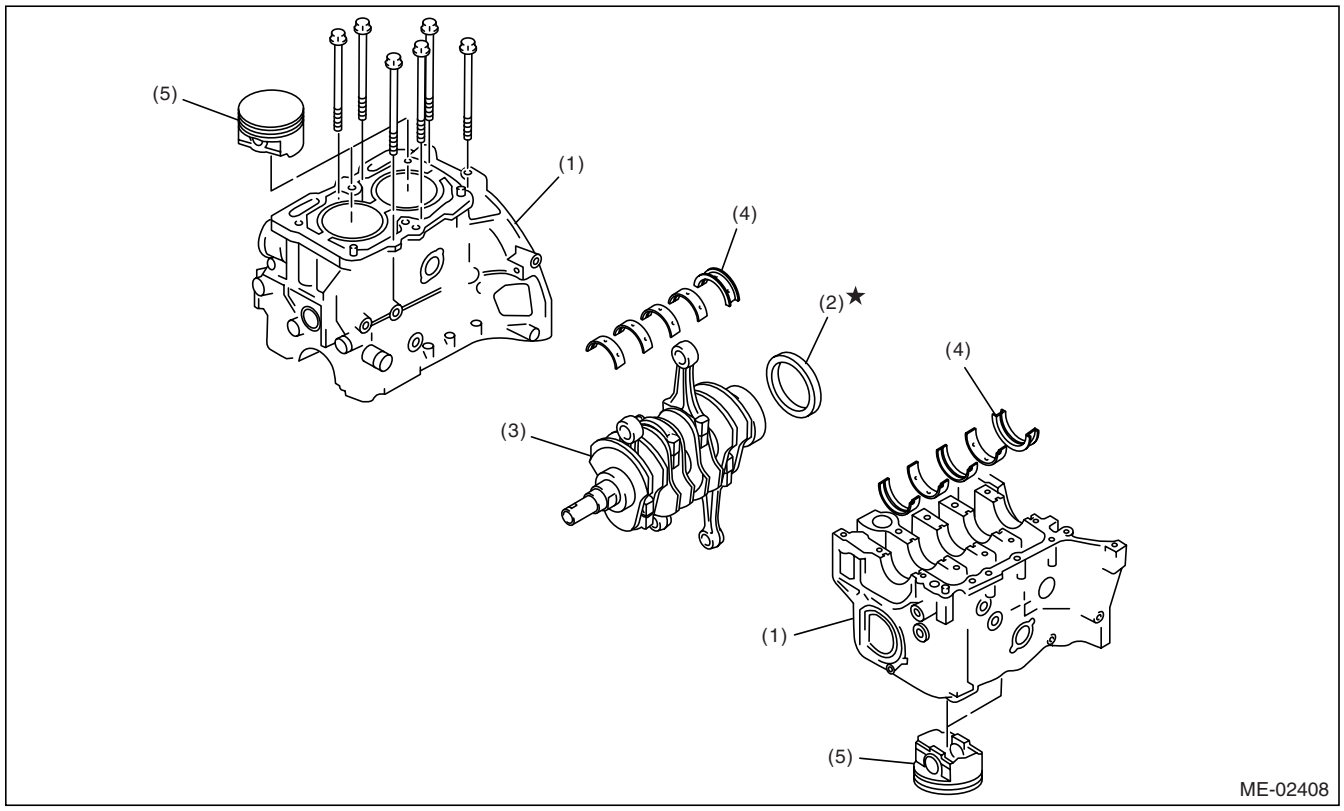
NOTE:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



31) Similarly remove the piston pins from #3 and #4 pistons.
32) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.
33) Loosen the bolts which connect cylinder block on the side of #1 and #3 cylinders for two or three turns.
34) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, then remove the cylinder block connecting bolts.

35) Separate the cylinder block (RH) and (LH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall or damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

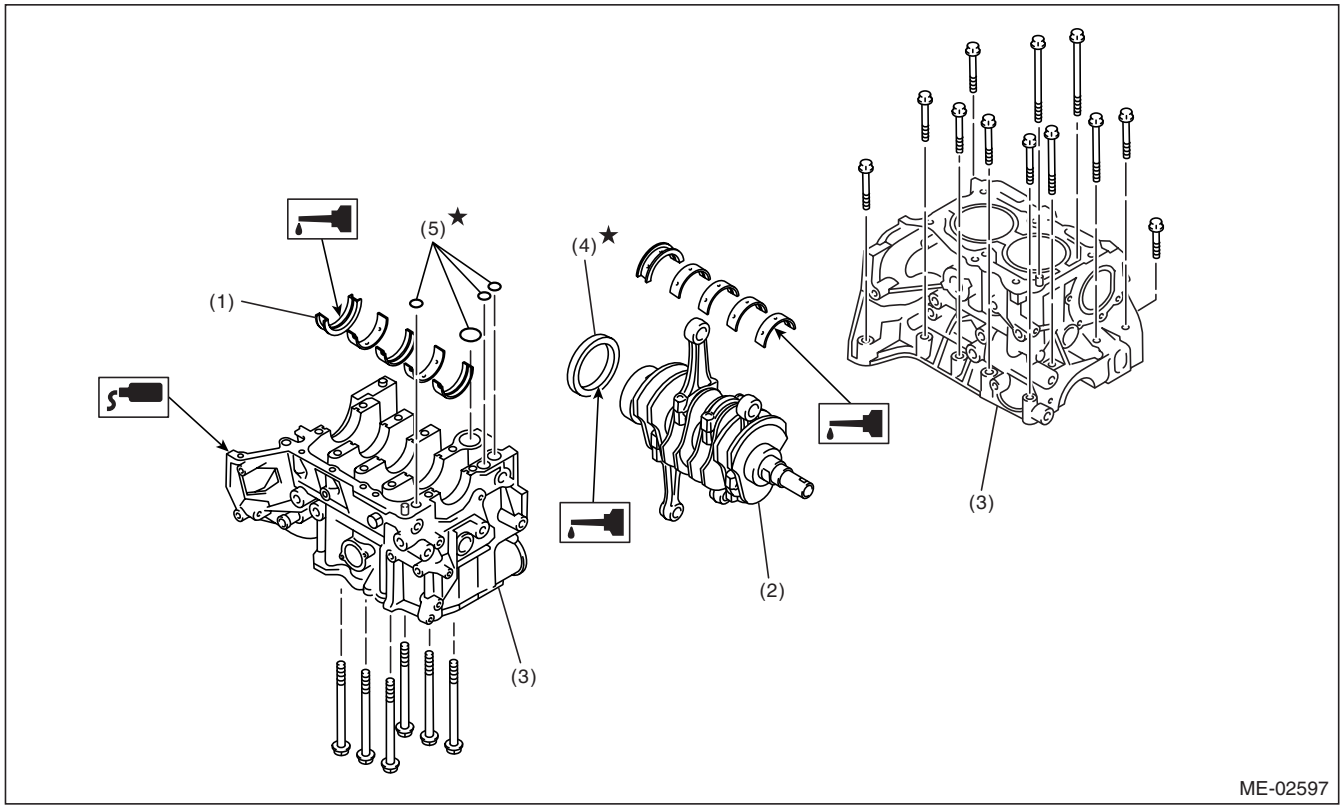
36) Remove the rear oil seal.
37) Remove the crankshaft together with connecting rod.
38) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:
Be careful not to confuse the crankshaft bearing combination. Press the bearing at the end opposite to locking lip.

39) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:
Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION



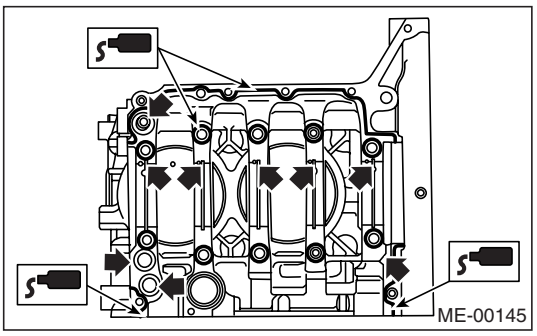
(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal
(5) O-ring

NOTE:
Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.

1) Position the crankshaft on the #2 and #4 cylinder block.
2) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

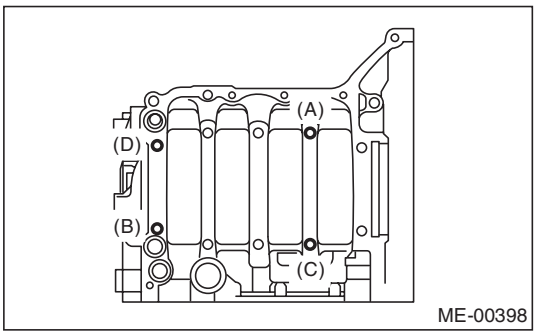
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:
Do not allow liquid gasket to flow into O-ring grooves, oil passages, bearing grooves, etc.



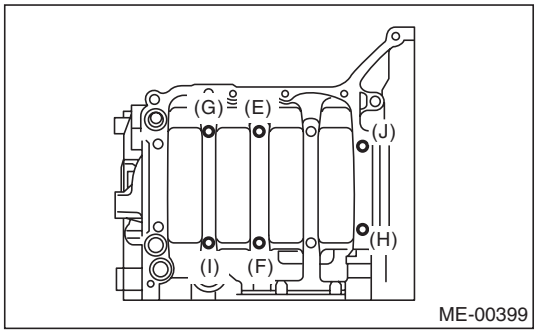
3) Tighten the 10 mm cylinder block connecting bolts on LH side (A — D) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



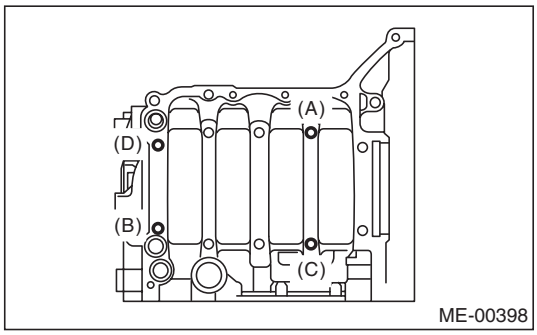
4) Tighten the 10 mm cylinder block connecting bolts on RH side (E — J) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



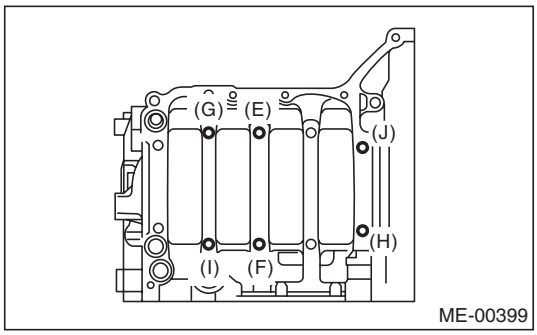
5) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

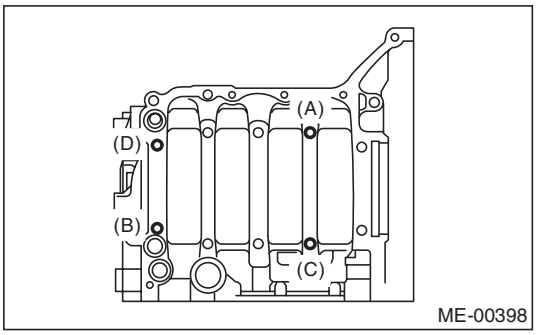


6) Further tighten the RH side bolts (E — J) in alphabetical sequence.

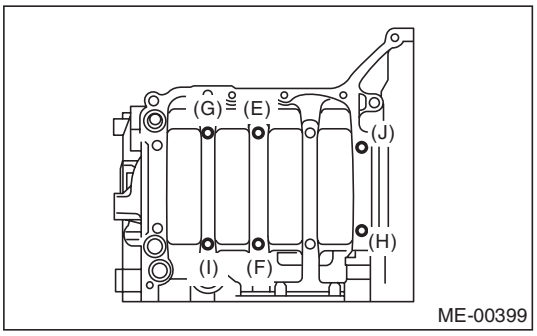
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



7) Further tighten the LH side bolts to 90° for (A) and (C), and to 40 N·m (4.1 kgf-m, 29.5 ft-lb) for (B) and (D), in alphabetical sequence.

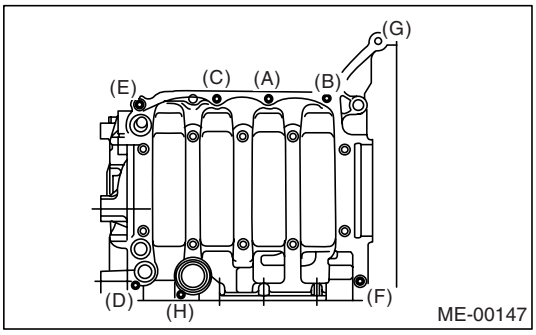


8) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.



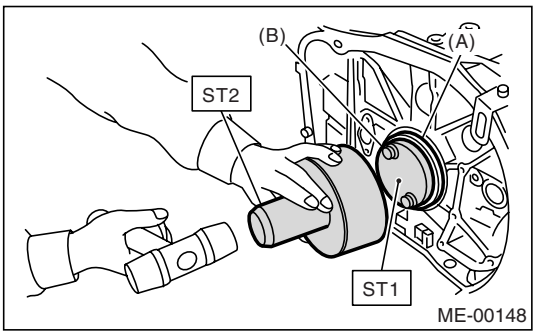
9) Tighten the 8 mm and 6 mm cylinder block connecting bolts on LH side (A — H) in alphabetical sequence.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.4 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



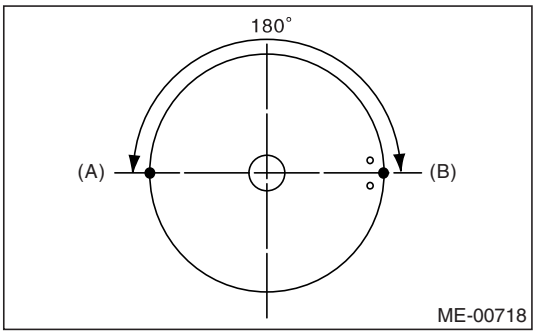
10) Install the rear oil seal using ST1 and ST2.

ST1	499597100	CRANKSHAFT OIL SEAL GUIDE
ST2	499587200	CRANKSHAFT OIL SEAL INSTALLER

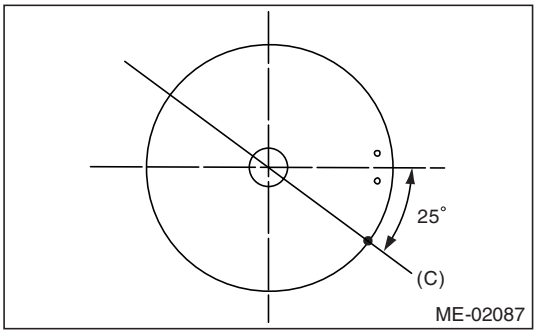


(A) Rear oil seal
(B) Flywheel attaching bolt

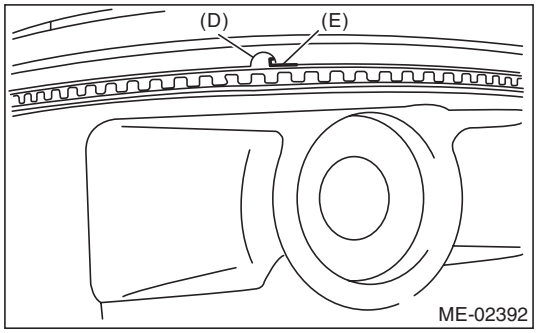
11) Position the top ring gap at (A) or (B) in the figure.
12) Position the second ring gap at 180° on the reverse side for the top ring gap.



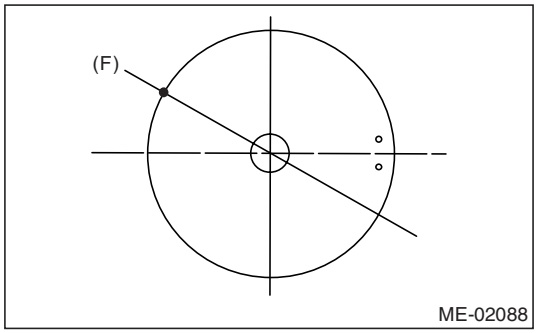
13) Position the upper rail gap at (C) in the figure.



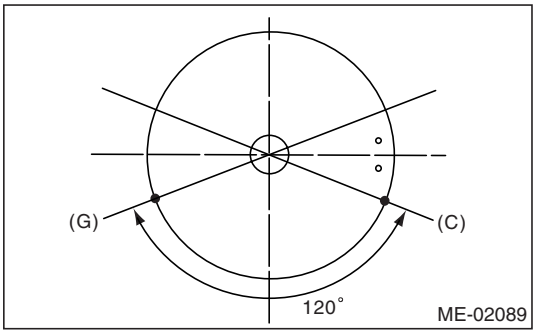
14) Align the upper rail spin stopper (E) to the side hole (D) on the piston.



15) Position the expander gap at 180° on the reverse side of (C) that shown (F) in the figure.



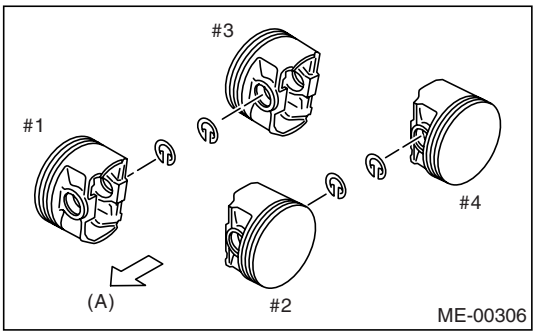
16) Position the lower rail gap at 120° clockwise of (C) that shown (G) in the figure.



CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

17) Install the snap ring.
Install snap rings in the piston holes located opposite to the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

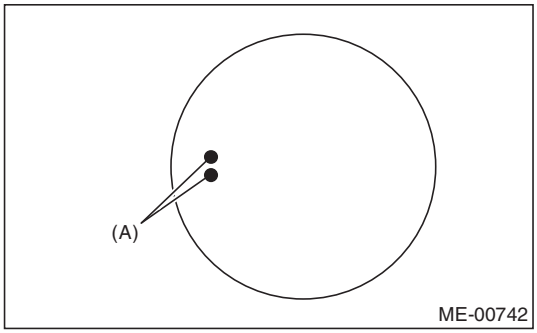
NOTE:
Use new snap rings.



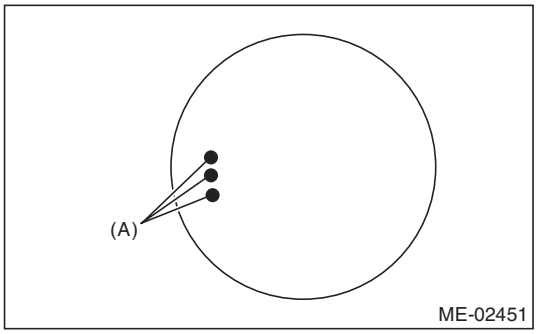
(A) Front side

CAUTION:
Piston front mark must be faced toward the front of engine.

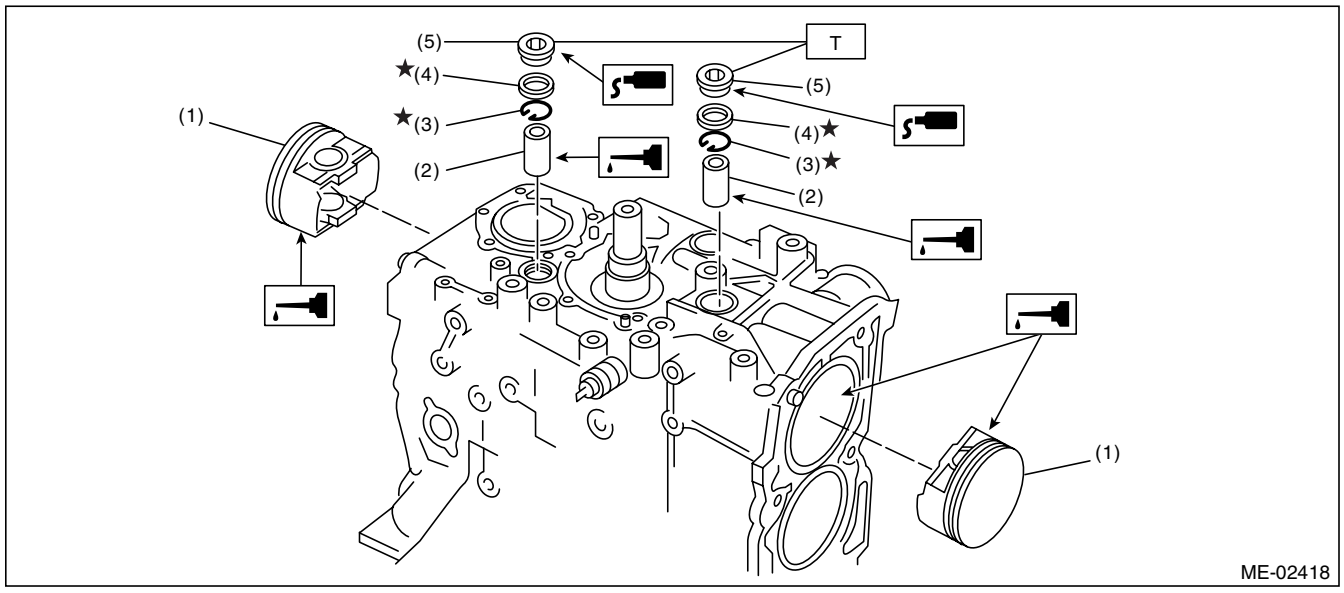
- **2.0 L model**



- **2.5 L model**



(A) Front mark



(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug

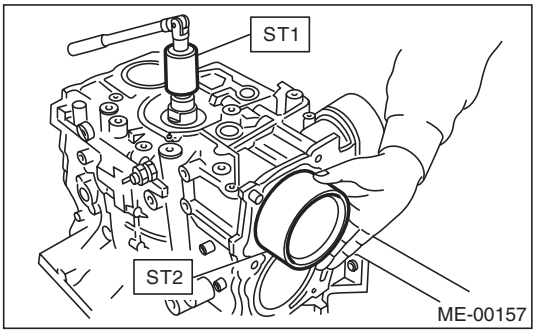
Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.1, 51.6)

18) Piston installation
(1) Place the cylinder block to face the #1 and #2 cylinder side upward.
(2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

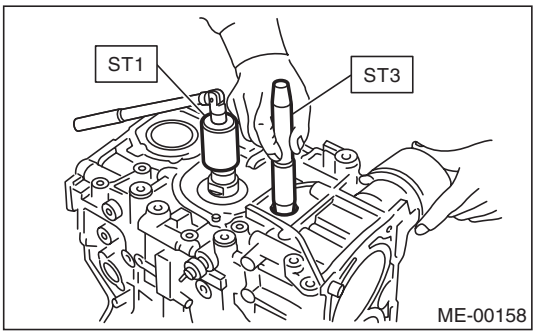
(3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 398744300 PISTON GUIDE (2.0 L model)
ST2 498747300 PISTON GUIDE (2.5 L model)



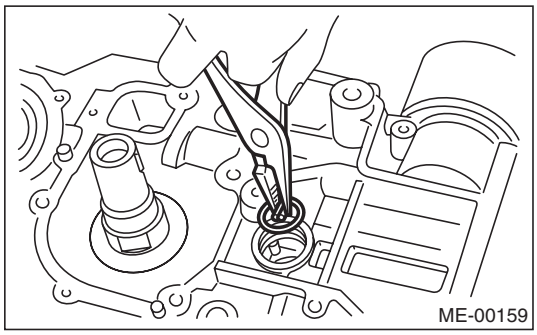
19) Piston pin installation
(1) Apply a coat of engine oil to ST3.
(2) Insert ST3 into the service hole to align piston pin hole with connecting rod small end.

ST3 499017100 PISTON PIN GUIDE



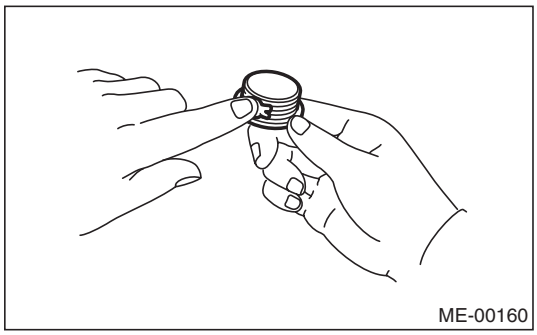
(3) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
(4) Install the snap ring.

NOTE:
Use new snap rings.



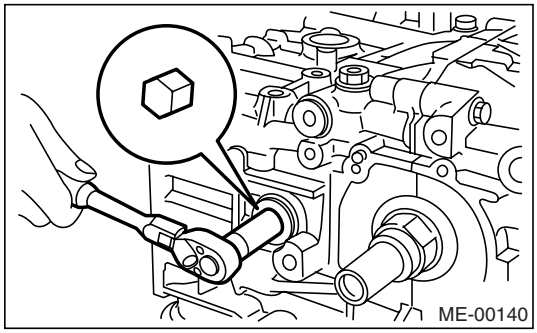
(5) Apply liquid gasket around the service hole plug.

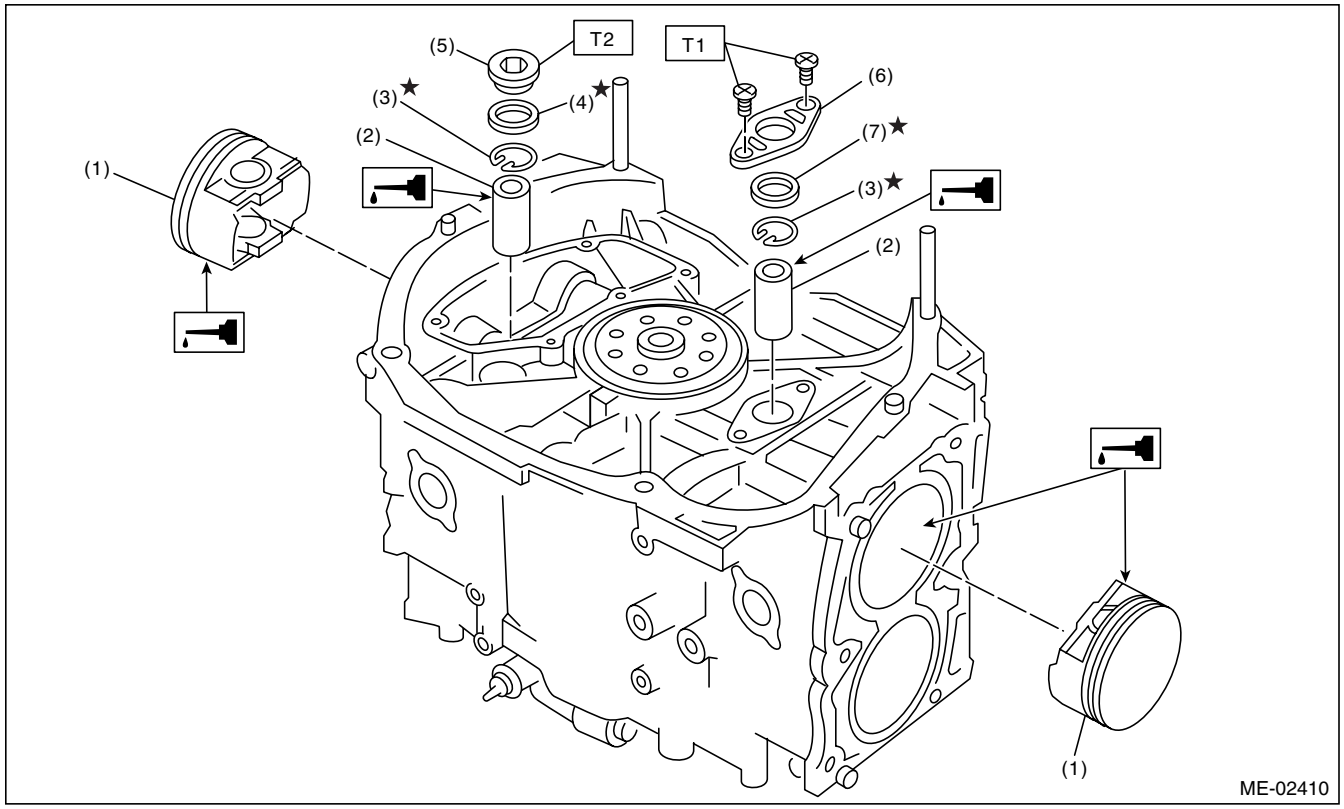
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(6) Install the service hole plug and gasket.

NOTE:
Use a new gasket.



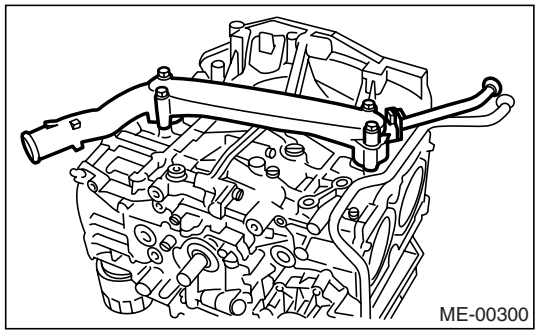


(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 70 (7.1, 51.6)

(7) Place the cylinder block to face the #3 and #4 cylinder side upward. Following the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

20) Install the water pipe.



21) Install the baffle plate.

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

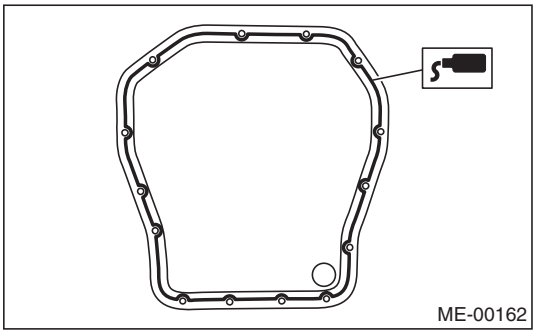
22) Install the oil strainer and O-ring.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

23) Install the oil strainer stay.

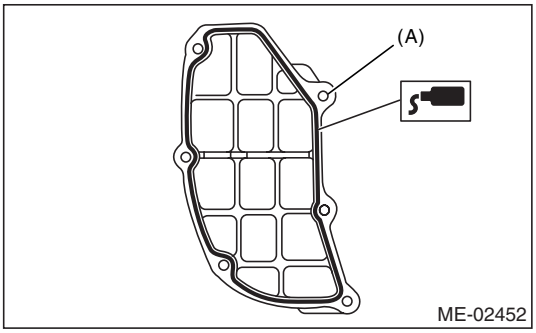
24) Apply liquid gasket to the mating surfaces, and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



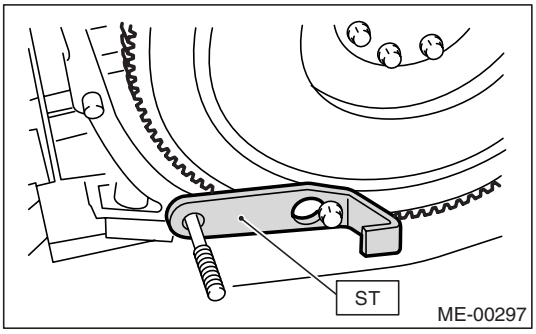
25) Apply liquid gasket to the mating surfaces and threaded portion of bolt (A) as shown in the figure, and then install the oil separator cover.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



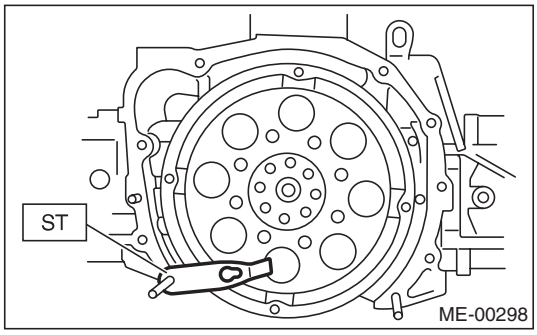
26) Install the flywheel. (MT model)
<Ref. to CL-21, INSTALLATION, Flywheel.>
To lock the crankshaft, use the ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 53.1 ft-lb)



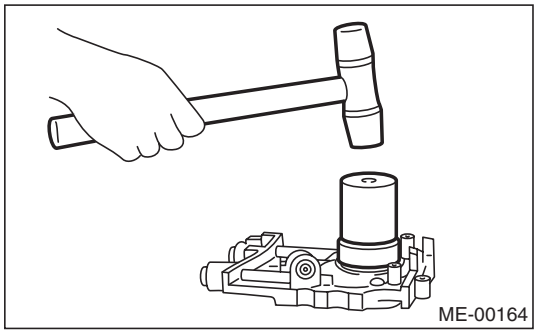
27) Install the drive plate. (AT model)
To lock the crankshaft, use the ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



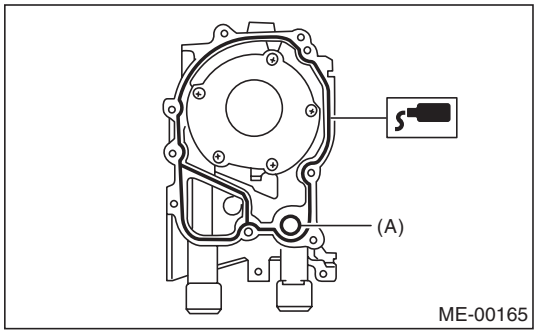
28) Install the housing cover.

29) Installation of oil pump
(1) Discard the front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER



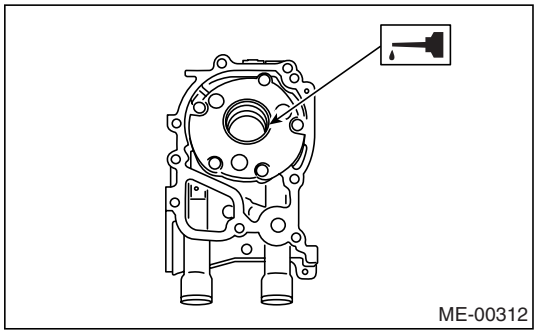
(2) Apply liquid gasket to the matching surface of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of oil seal.



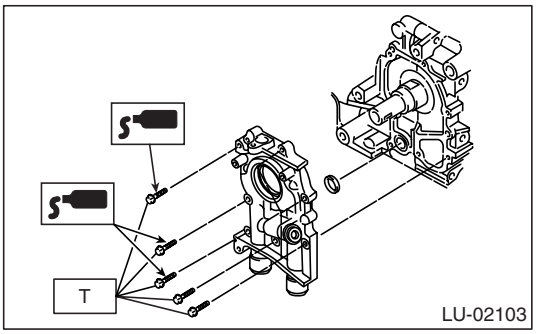
(4) Install the oil pump to cylinder block. Be careful not to damage the oil seal during installation.
(5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
• Make sure the oil seal lip is not folded.
• Do not forget to install the O-ring and seal when installing oil pump.

(6) Install the oil pump.
(7) Apply liquid gasket to the three bolts thread.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

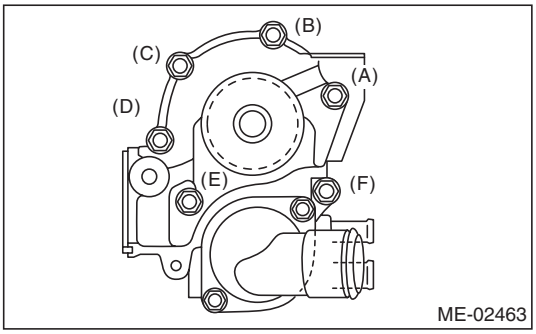
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



30) Install the water pump and gasket.

Tightening torque:
First: 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second: 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
• Be sure to use a new gasket.
• When installing the water pump, tighten bolts in two stages in alphabetical sequence as shown in the figure.

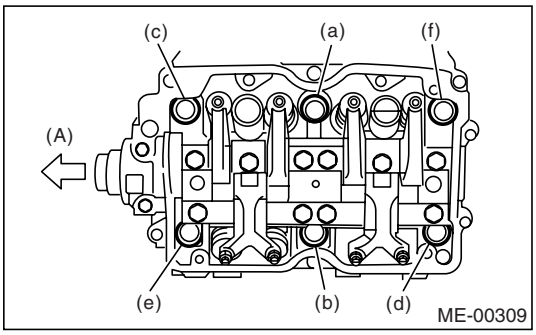


31) Install the water by-pass pipe for heater.
32) Install the oil filter.
33) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence. Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° in reverse order of installation, and back them off again by 180°.
(4) Tighten all bolts to 42 N·m (4.3 kgf-m, 31 ft-lb) in alphabetical sequence.
(5) Tighten all bolts by 80 — 90° in alphabetical sequence.
(6) Tighten all bolts by 40 — 45° in alphabetical sequence.

CAUTION:
Do not tighten the bolts more than 45°.

(7) Further tighten the bolts (A) and (B) by 40 — 45°.

CAUTION:
Ensure the total "re-tightening angle" of the step (6) and (7) does not exceed 90°.



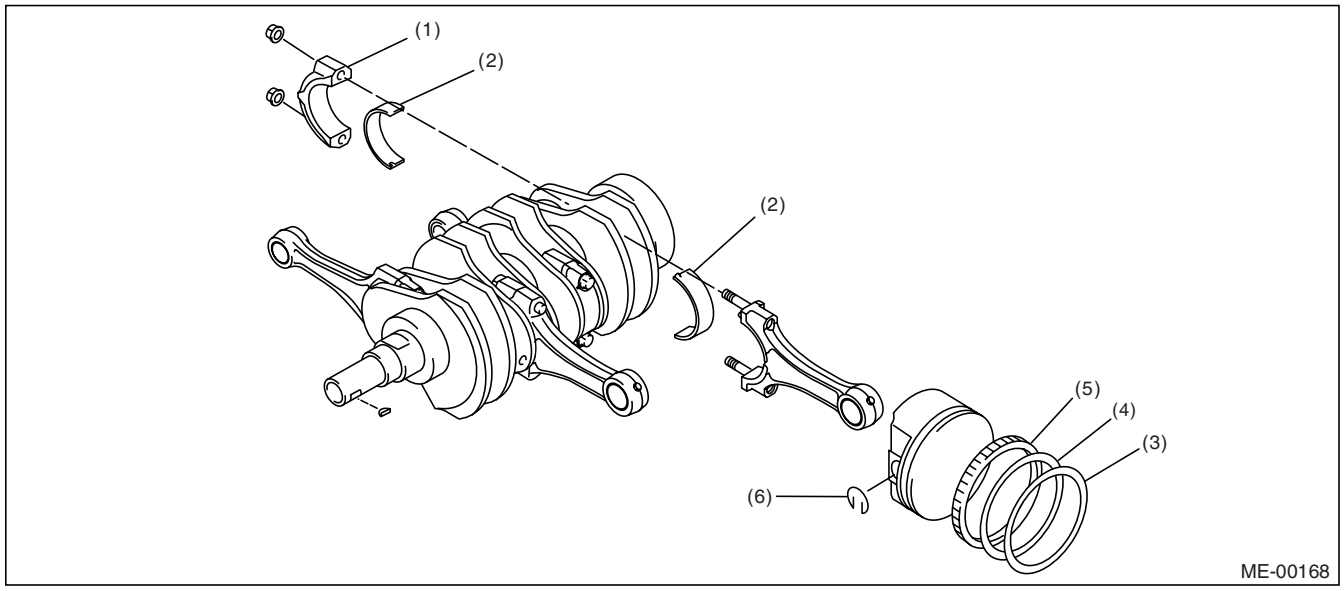
(A) Front side

34) Install the oil level gauge guide and tighten the bolt. (LH side only)
35) Install the rocker cover and rocker cover gasket.

NOTE:
Use a new rocker cover gasket.

36) Install the crank sprocket.
<Ref. to ME(H4SO 2.0)-50, INSTALLATION, Crank Sprocket.>
37) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
38) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
39) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
40) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
41) Install the generator and A/C compressor brackets on cylinder head.
42) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>
43) Install the intake manifold.
<Ref. to FU(H4SO 2.0)-12, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Snap ring

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

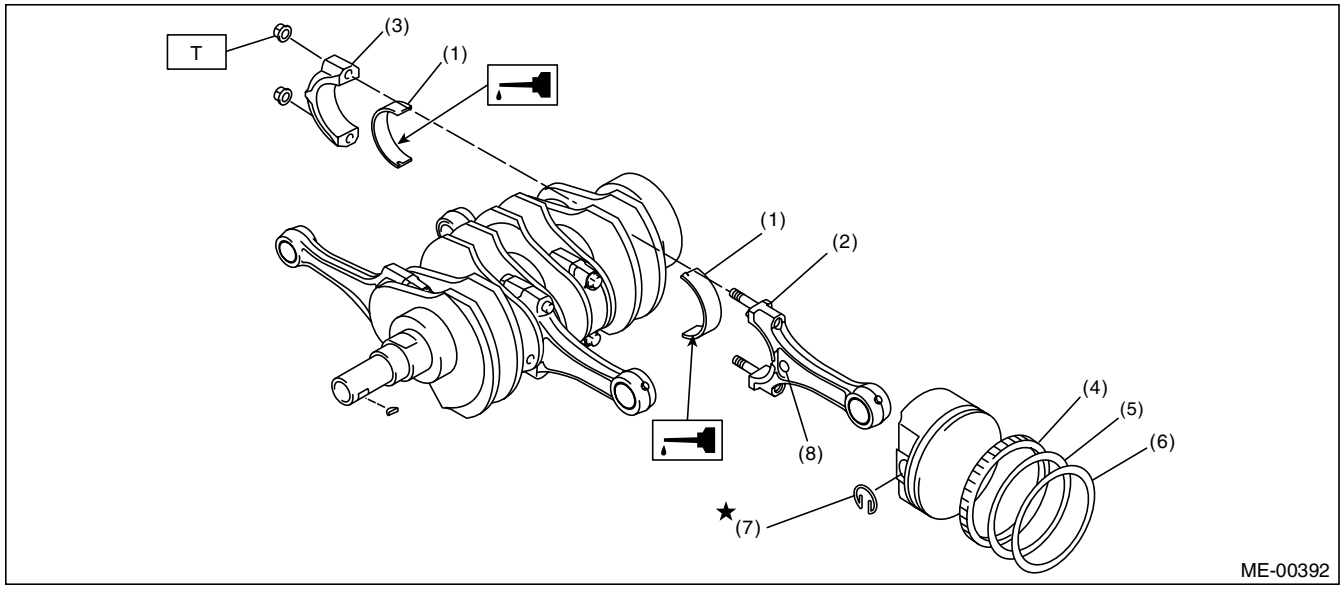
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order, to prevent confusion.

3) Remove the piston rings using piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order, to prevent confusion.

5) Remove the snap ring.

D: ASSEMBLY



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Snap ring
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 45 (4.6, 33.3)

1) Apply oil to the surfaces of the connecting rod bearings.
2) Install the connecting rod bearings on connecting rods and connecting rod caps.
3) Position each connecting rod with the marked side facing forward, and install it.
4) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces toward front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

5) Install the expander, lower rail and upper rail in this order by hand. Install the second ring and top ring using piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts using liquid penetrant tester.
2) Check the oil passages for clogging.
3) Inspect the cylinder block surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.025 mm (0.00098 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

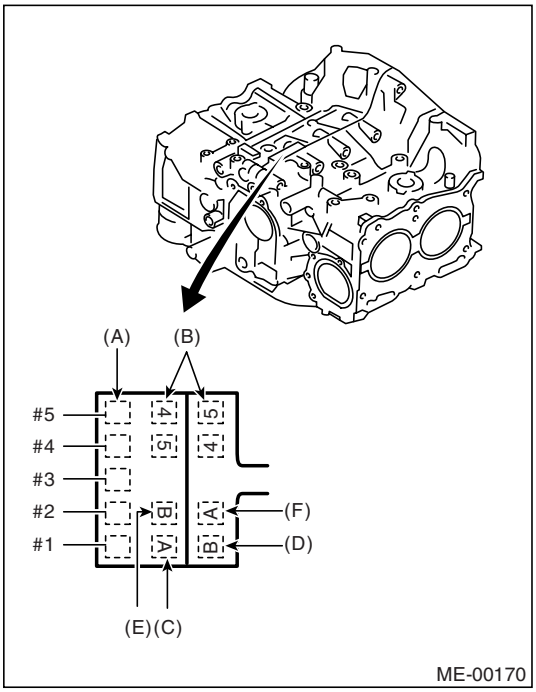
1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
• Measurement should be performed at a temperature of 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines in selecting a standard piston.

Standard diameter:

2.0 L model
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)

2.5 L model
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9671 — 3.9175 in)



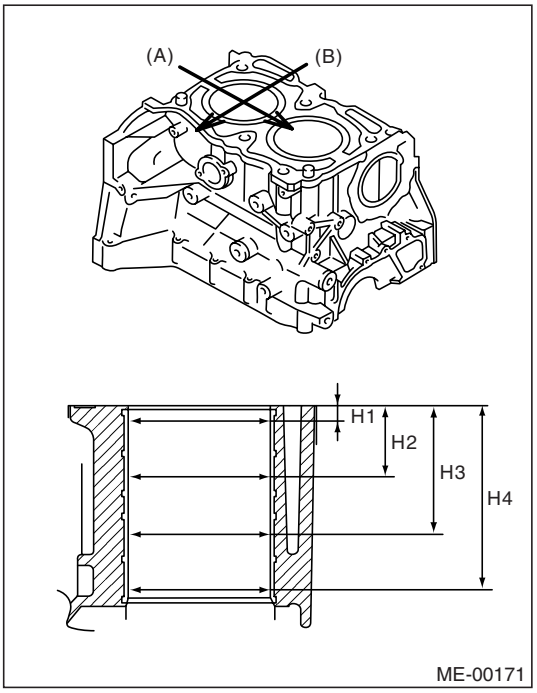
(A) Main journal size mark
(B) Cylinder block (RH) - (LH) combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights as shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylindricality:
Standard
0.015 mm (0.0006 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)



(A) Piston pin direction
(B) Thrust direction
H1 10 mm (0.39 in)
H2 45 mm (1.77 in)
H3 80 mm (3.15 in)
H4 115 mm (4.53 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each cylinder:
Measure the outer diameter of each piston at the height as shown in the figure. (Thrust direction)

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
2.0 L model
40.0 mm (1.575 in)
2.5 L model
37.0 mm (1.457 in)

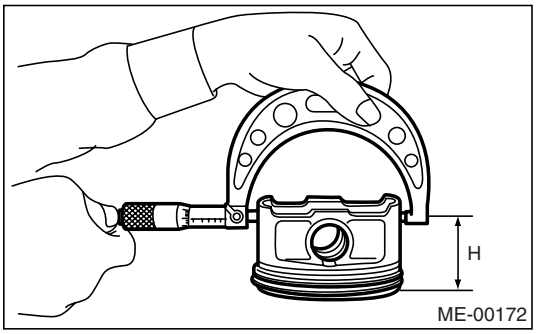
Standard:

2.0 L model
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6219 — 3.6222 in)

2.5 L model
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)

0.25 mm (0.0098 in) oversize
2.0 L model
92.245 — 92.265 mm (3.6317 — 3.6325 in)
2.5 L model
99.745 — 99.765 mm (3.9270 — 3.9278 in)

0.50 mm (0.0197 in) oversize
2.0 L model
92.495 — 92.515 mm (3.6415 — 3.6423 in)
2.5 L model
99.995 — 100.015 mm (3.9368 — 3.9376 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
–0.010 — 0.010 mm (–0.00039 — 0.00039 in)

6) Boring and honing
(1) If any of the measured value of taper, out-of-roundness or cylinder-to-piston clearance exceeds the standard or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only. Nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the cylinder block.

Cylinder inner diameter limit:

2.0 L model
92.515 mm (3.6423 in)

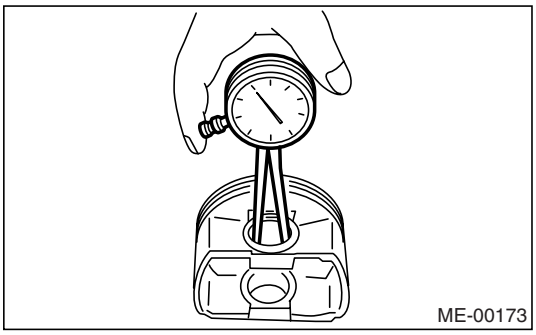
2.5 L model
100.015 mm (3.9376 in)

NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention when measuring the cylinder diameter.

3. PISTON AND PISTON PIN

1) Check the pistons and piston pins for damage, cracks and wear, and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4SO 2.0)-78, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not within standard, replace the piston, or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Clearance between piston hole and piston pin:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)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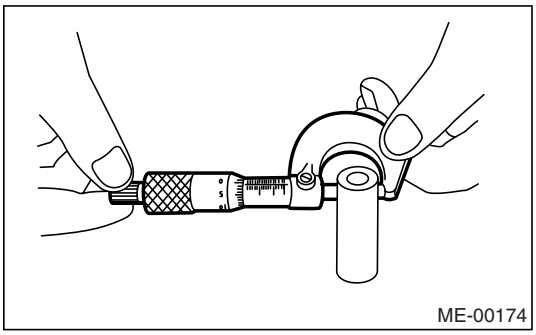
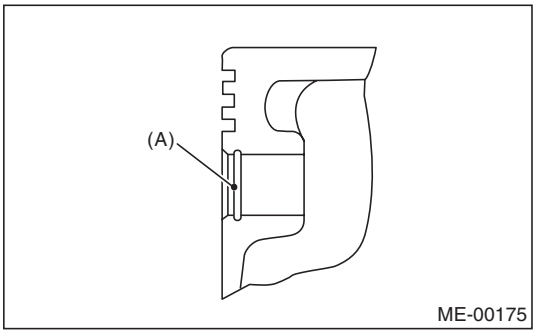

ME-00174

4) Check the snap ring installation groove (A) on the piston for burr. If necessary, remove burr from the groove so that the piston pin can lightly move.



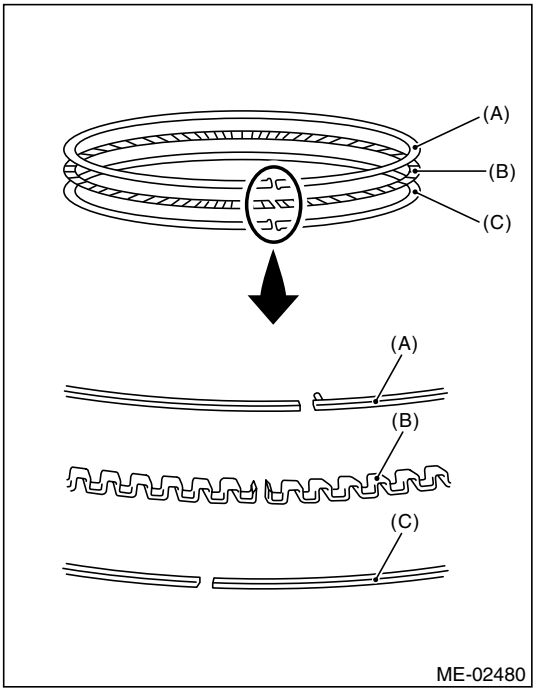
ME-00175

5) Check the piston pin snap ring for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

CAUTION:
• Marks are displayed on the end of top and second rings. When installing the rings to the piston, face these marks upward.
• Oil ring consists of the upper rail, expander and lower rail. Be careful about the direction of rail when installing the oil ring to piston.

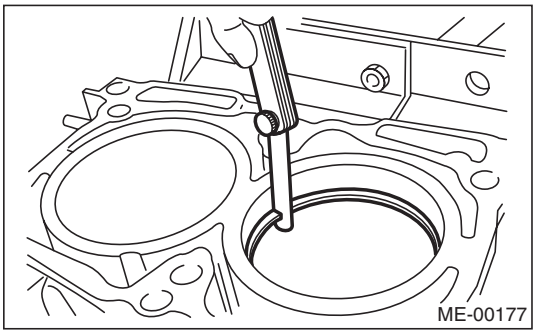


(A) Upper rail
(B) Expander
(C) Lower rail

2) Clean the piston ring groove and piston ring.

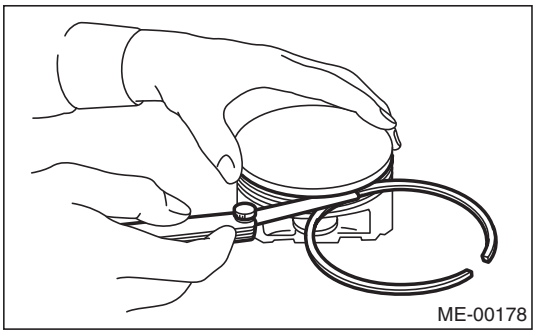
3) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

			Standard mm (in)
Piston ring gap	Top ring		0.20 — 0.35 (0.0079 — 0.0138)
	Second ring	2.0 L	0.40 — 0.50 (0.0157 — 0.0197)
		2.5 L	0.37 — 0.52 (0.0146 — 0.0204)
	Oil ring rail		0.20 — 0.50 (0.0079 — 0.0197)



4) Measure the clearance between piston ring and piston ring groove using thickness gauge.

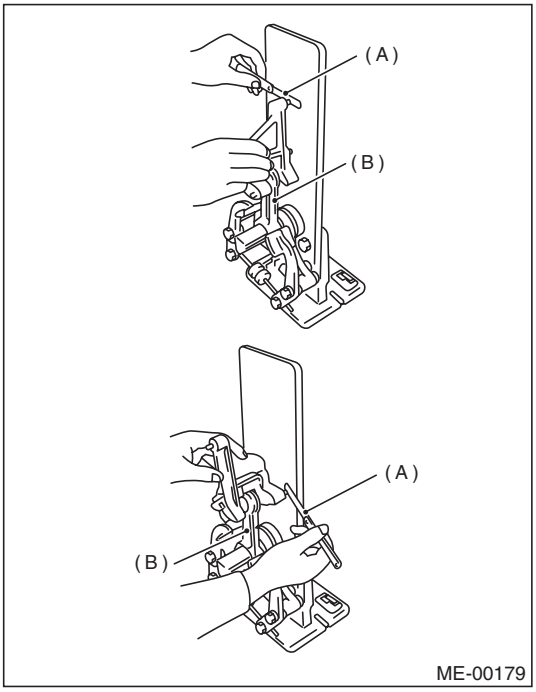
		Standard mm (in)
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

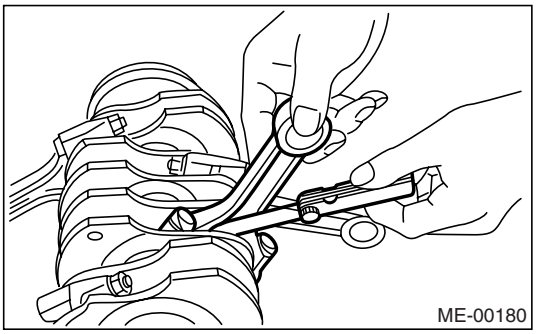
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the thrust clearance. If thrust clearance exceeds the standard, replace the connecting rod.

Connecting rod thrust clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within the standard, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

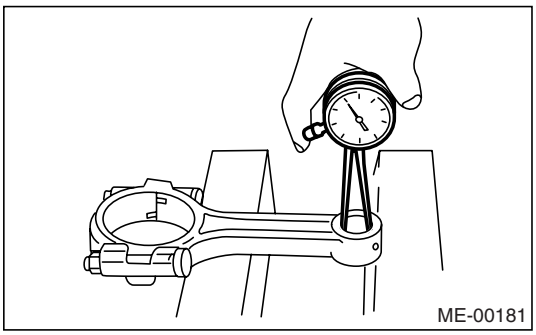
Connecting rod oil clearance:
Standard
0.016 — 0.044 mm (0.00063 — 0.0017 in)

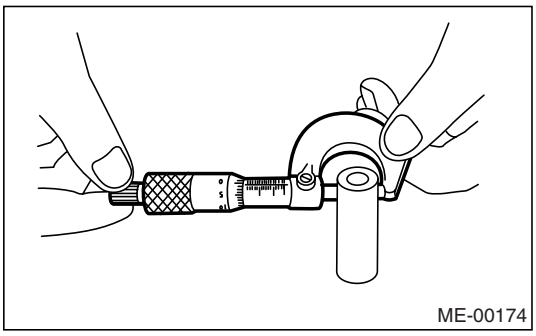
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

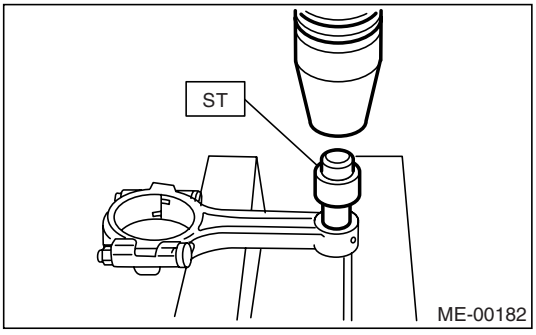
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)





7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



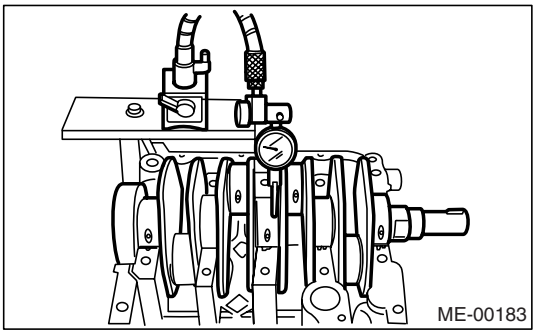
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely, and check it for cracks using liquid penetrant tester. Replace if faulty.
2) Measure the bend of crankshaft. If it exceeds the limit, repair or replace it.

NOTE:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings, and then measure the crankshaft bend using a dial gauge.

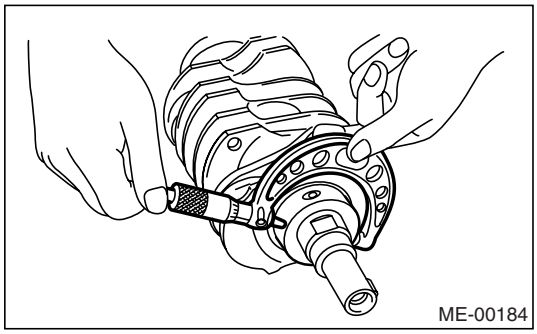
Crankshaft bend limit:
0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin:
2.0 L model
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)
Grinding limit
To 51.750 mm (2.0374 in) dia.
2.5 L model
Out-of-roundness
0.003 mm (0.0001 in)
Cylindricality
0.004 mm (0.0002 in)
Grinding limit
To 51.750 mm (2.0374 in) dia.

Crank journal:
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)
Grinding limit
To 59.750 mm (2.3524 in) dia.

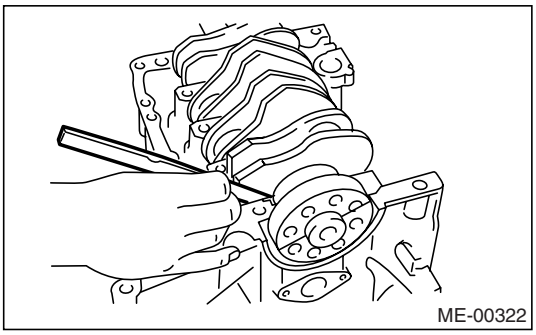


Unit: mm (in)

		Crank journal outer diameter		Crank pin outer diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

4) Measure the thrust clearance of crankshaft at center bearing. If thrust clearance exceeds the standard, replace the bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)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5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing using plastigauge. If the measurement is not within the standard, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)

22.Intake and Exhaust Valve

A: SPECIFICATION

Refer to “Cylinder Head” for removal and installation procedures of intake and exhaust valves. <Ref. to ME(H4SO 2.0)-57, REMOVAL, Cylinder Head.> <Ref. to ME(H4SO 2.0)-57, INSTALLATION, Cylinder Head.>

23.Piston

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of pistons. <Ref. to ME(H4SO 2.0)-64, REMOVAL, Cylinder Block.> <Ref. to ME(H4SO 2.0)-69, INSTALLATION, Cylinder Block.>

24.Connecting Rod

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of connecting rod.
<Ref. to ME(H4SO 2.0)-64, REMOVAL, Cylinder Block.> <Ref. to ME(H4SO 2.0)-69, INSTALLATION, Cylinder Block.>

25.Crankshaft

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of crankshaft. <Ref. to ME(H4SO 2.0)-64, REMOVAL, Cylinder Block.> <Ref. to ME(H4SO 2.0)-69, INSTALLATION, Cylinder Block.>

26.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refers to the possibility of the cause of trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

Symptom	Problem parts, etc.	Possible cause	Rank
1. Engine does not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective starter switch	C
		Defective inhibitor switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

Symptom	Problem parts, etc.	Possible cause	Rank
3) Initial combustion occurs.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

Symptom	Problem parts, etc.	Possible cause	Rank
2. Rough idle and engine stall	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Overheating	C
	Other	Evaporative emission control system malfunction	A
		Stuck or damaged throttle valve	B

Symptom	Problem parts, etc.	Possible cause	Rank
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Overheating	C
		Over-cooling	C
	Other	Evaporative emission control system malfunction	A
4. Surging	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Cooling system	Overheating	B
	Other	Evaporative emission control system malfunction	C

Symptom	Problem parts, etc.	Possible cause	Rank
5. Engine does not return to idle.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Other	Stuck or damaged throttle valve	A
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Overheating	B
	Other	Evaporative emission control system malfunction	B
7. After burning in exhaust system	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C
	Other	Evaporative emission control system malfunction	C
8. Knocking	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
	Cooling system	Overheating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter seal	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

Symptom	Problem parts, etc.	Possible cause	Rank
10. Excessive fuel consumption	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C

27.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Defective valve mechanism • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn camshaft main bearing • Worn connecting rod bearing (large end)
	Oil pressure is normal.	Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is 1,000 to 2,000 rpm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn camshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Worn cam sprocket • Worn camshaft journal bore in cylinder head assembly
Squeaky sound	—	Insufficient generator lubrication
Rubbing sound	—	Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Insufficient compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting with case/adjacent part
Valve tappet noise	—	Incorrect valve clearance

NOTE*)
When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, carry out the clear memory mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> <Ref. to EN(H4SO 2.5)(diag)-40, OPERATION.> and inspection mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.> <Ref. to EN(H4SO 2.5)(diag)-2, PROCEDURE.> after connecting the fuel injector connector.

EXHAUST

EX(H4SO 2.0)

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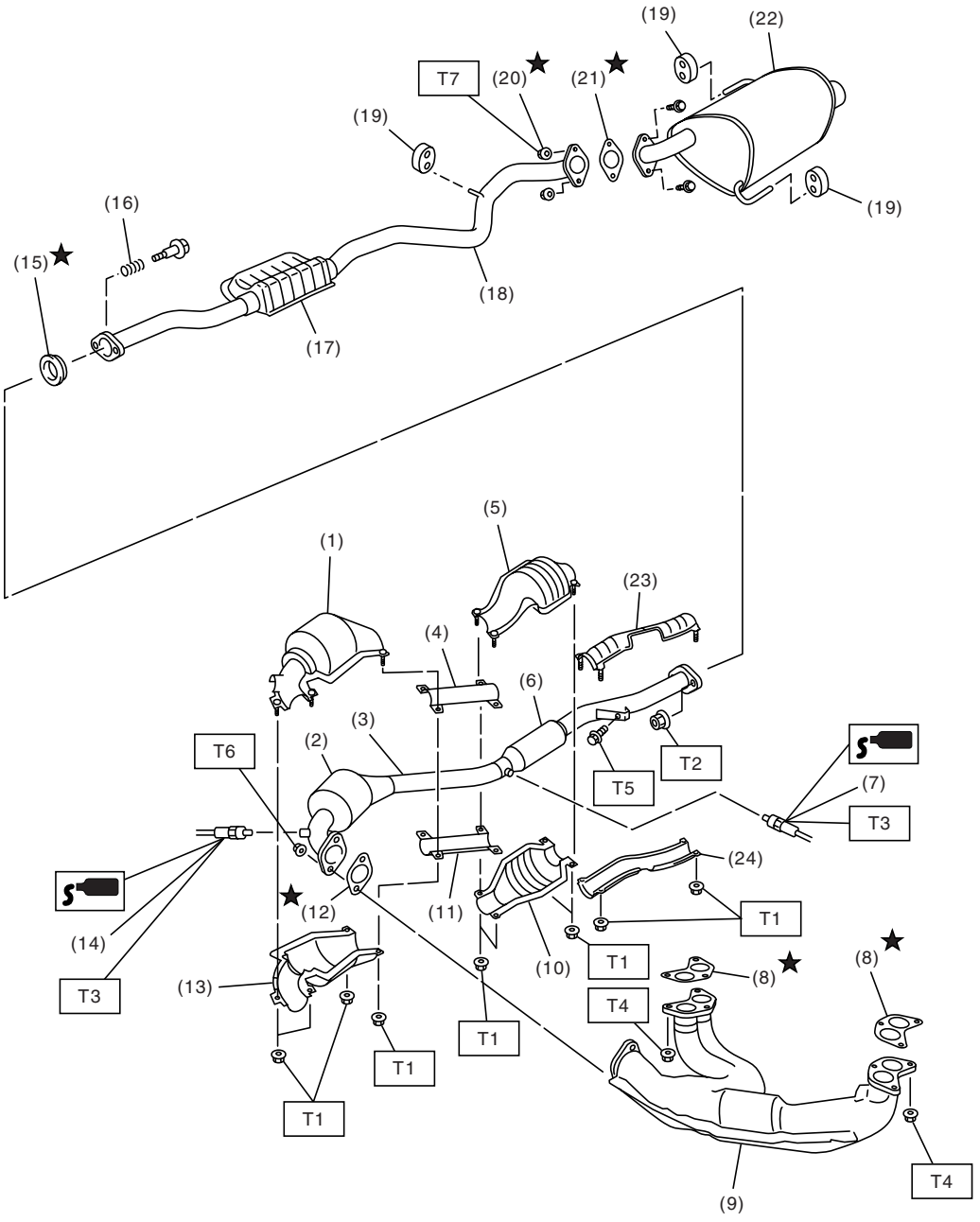
2. Front Exhaust Pipe.....6
3. Center Exhaust Pipe 9
4. Rear Exhaust Pipe 10
5. Muffler 12

1. General Description

A: COMPONENT

- 2.0 L model



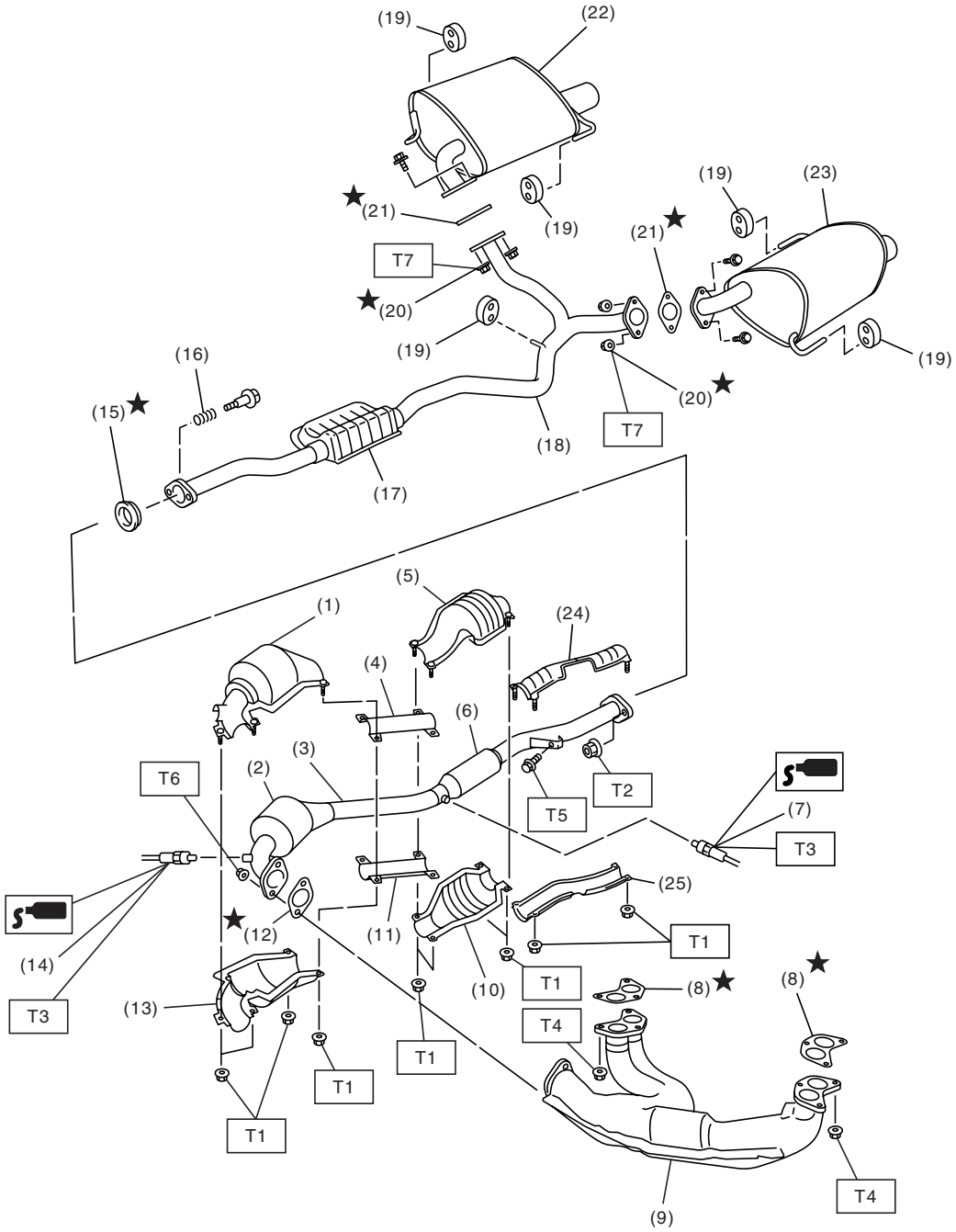
EX-02102

(1) Front catalytic converter upper cover
(2) Front catalytic converter
(3) Center exhaust pipe
(4) Center exhaust pipe upper cover
(5) Rear catalytic converter upper cover
(6) Rear catalytic converter
(7) Rear oxygen sensor
(8) Gasket
(9) Front exhaust pipe
(10) Rear catalytic converter lower cover
(11) Center exhaust pipe lower cover
(12) Gasket
(13) Front catalytic converter lower cover
(14) Front oxygen (A/F) sensor
(15) Gasket
(16) Spring
(17) Chamber
(18) Rear exhaust pipe
(19) Cushion rubber
(20) Self-locking nut
(21) Gasket
(22) Muffler
(23) Rear exhaust pipe upper cover
(24) Rear exhaust pipe lower cover

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 40.8 (4.2, 30.1)
T7: 48 (4.9, 35.4)

- 2.5 L model



EX-02103

(1) Front catalytic converter upper cover
(2) Front catalytic converter
(3) Center exhaust pipe
(4) Center exhaust pipe upper cover
(5) Rear catalytic converter upper cover
(6) Rear catalytic converter
(7) Rear oxygen sensor
(8) Gasket
(9) Front exhaust pipe
(10) Rear catalytic converter lower cover
(11) Center exhaust pipe lower cover
(12) Gasket
(13) Front catalytic converter lower cover
(14) Front oxygen (A/F) sensor
(15) Gasket
(16) Spring
(17) Chamber
(18) Rear exhaust pipe
(19) Cushion rubber
(20) Self-locking nut
(21) Gasket
(22) Muffler (RH)
(23) Muffler (LH)
(24) Rear exhaust pipe upper cover
(25) Rear exhaust pipe lower cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 40.8 (4.2, 30.1)
T7: 48 (4.9, 35.4)

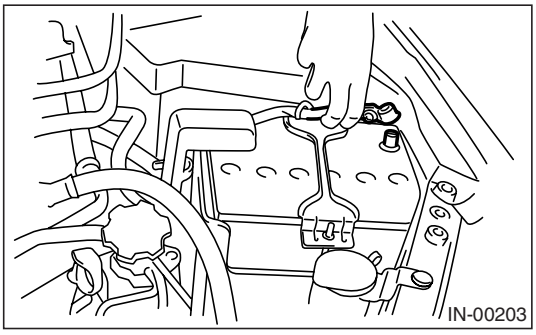
B: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

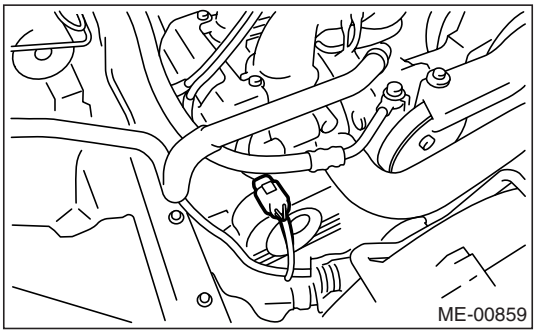
2. Front Exhaust Pipe

A: REMOVAL

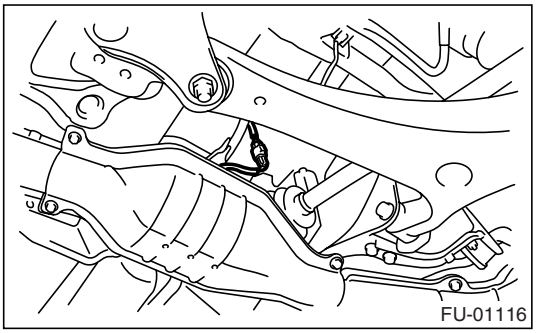
1) Disconnect the ground cable from battery.



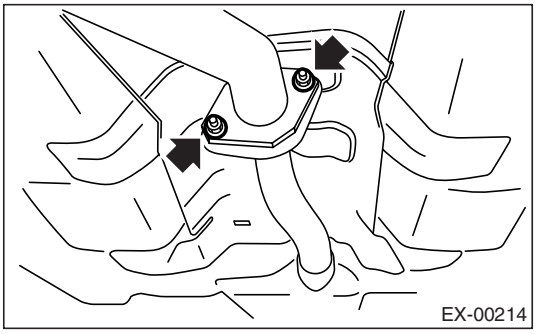
2) Disconnect the front oxygen (A/F) sensor connector.



3) Lift-up the vehicle.
4) Disconnect the rear oxygen sensor connector.



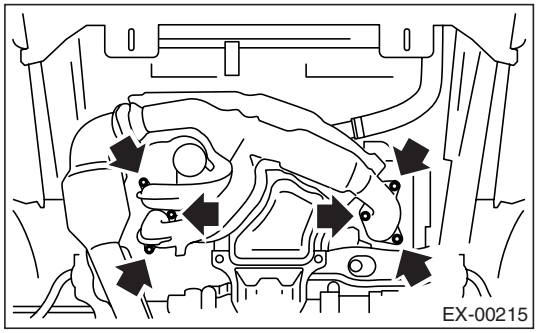
5) Separate the center exhaust pipe from rear exhaust pipe.



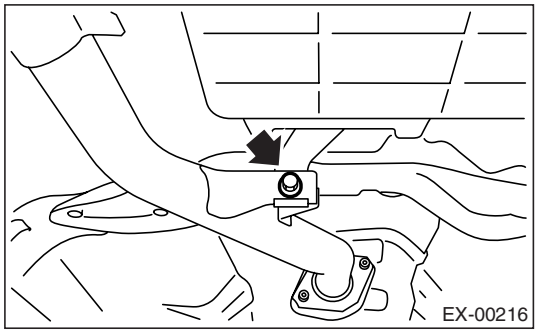
6) Remove the under cover.

7) Remove the nuts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front and center exhaust pipe assembly.



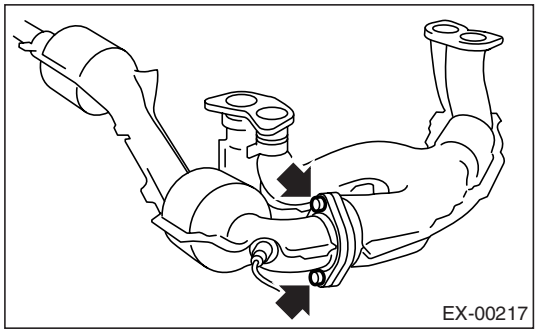
8) Remove the bolt which holds center exhaust pipe to hanger bracket.



9) Remove the front and center exhaust pipe assembly from vehicle.

CAUTION:
• Be careful not to let the front and center exhaust pipe assembly fall off when removing, as it is quite heavy.
• After removing the front and center exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.

10) Separate the front exhaust pipe from center exhaust pipe.



11) Remove the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H4SO 2.0)-32, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.0)-33, REMOVAL, Rear Oxygen Sensor.> or <Ref. to FU(H4SO 2.5)-35, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.5)-36, REMOVAL, Rear Oxygen Sensor.>

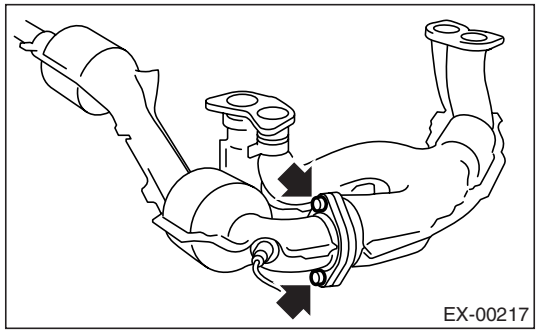
B: INSTALLATION

1) Install the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H4SO 2.0)-32, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.0)-33, INSTALLATION, Rear Oxygen Sensor.> or <Ref. to FU(H4SO 2.5)-35, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.5)-36, INSTALLATION, Rear Oxygen Sensor.>

2) Install the front exhaust pipe to center exhaust pipe.

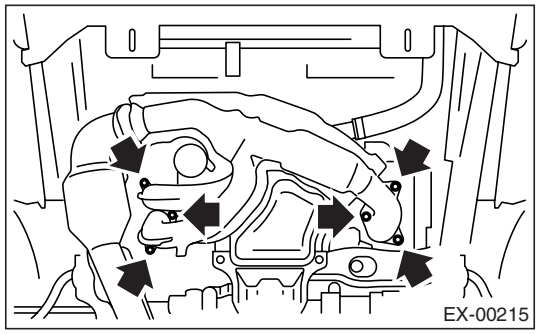
NOTE:
Use a new gasket.

Tightening torque:
40.8 N·m (4.2 kgf-m, 30.1 ft-lb)



3) Install the front and center exhaust pipe assembly to vehicle.

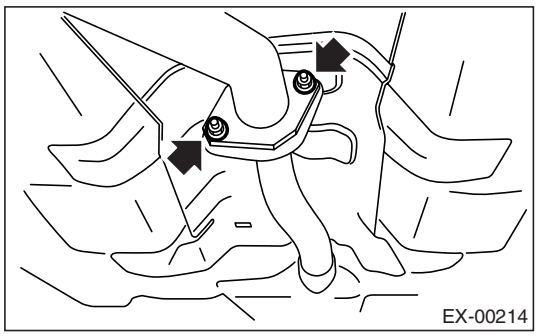
4) Temporarily tighten the nuts which hold front exhaust pipe to cylinder heads.



5) Install the front and center exhaust pipe assembly to rear exhaust pipe.

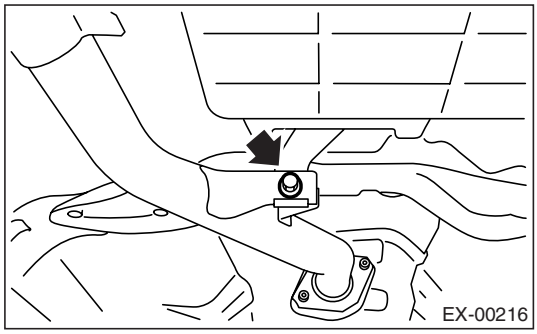
NOTE:
Use a new gasket.

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



6) Tighten the bolt which holds center exhaust pipe to hanger bracket.

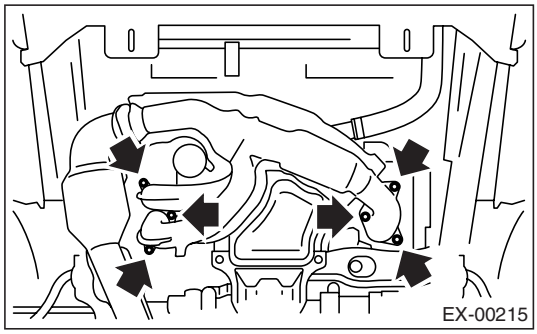
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



7) Tighten the nuts which hold front exhaust pipe to cylinder heads.

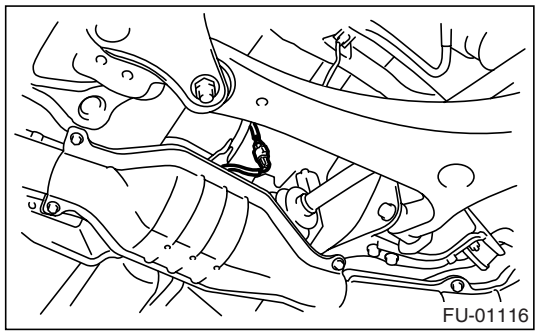
NOTE:
Use a new gasket.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)

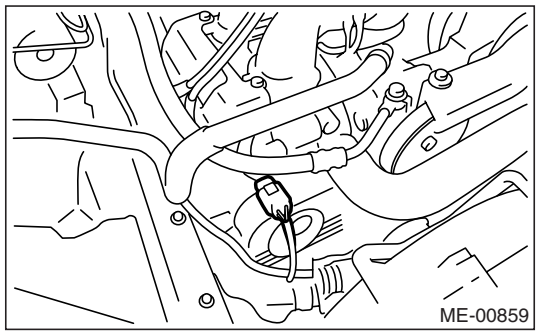


8) Install the under cover.

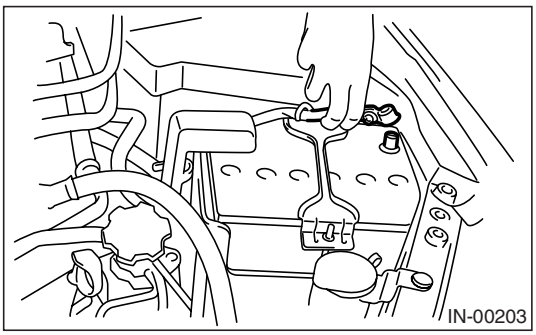
9) Connect the rear oxygen sensor connector.



10) Lower the vehicle.
11) Connect the front oxygen (A/F) sensor connector.



12) Connect the ground cable to battery.



C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.

3. Center Exhaust Pipe

A: REMOVAL

After removing the center and front exhaust pipes as an assembly, separate them. Refer to “Front Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-6, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION

Install the center exhaust pipe and front exhaust pipe as an assembly. Refer to “Front Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-7, INSTALLATION, Front Exhaust Pipe.>

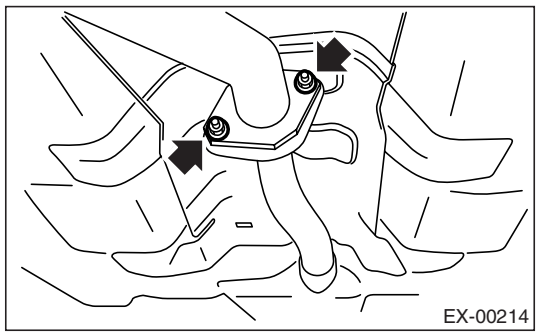
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.

4. Rear Exhaust Pipe

A: REMOVAL

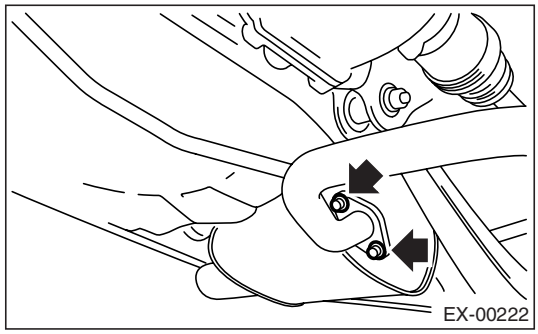
1) Separate the rear exhaust pipe from center exhaust pipe.



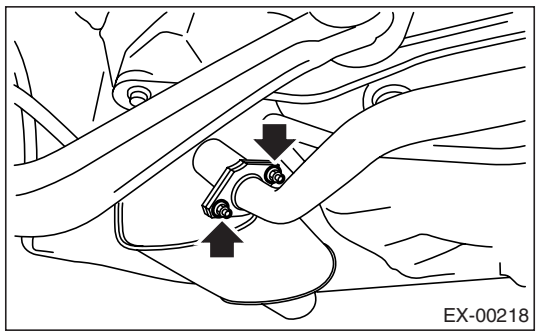
2) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.

- LH side

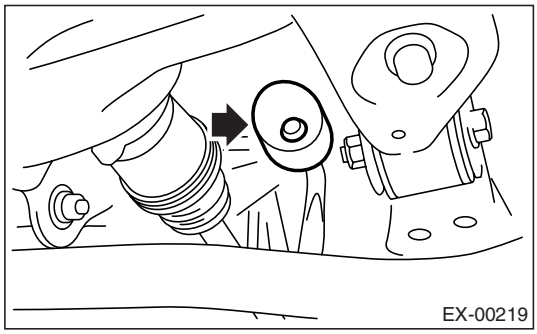


- RH side (2.5 L model)



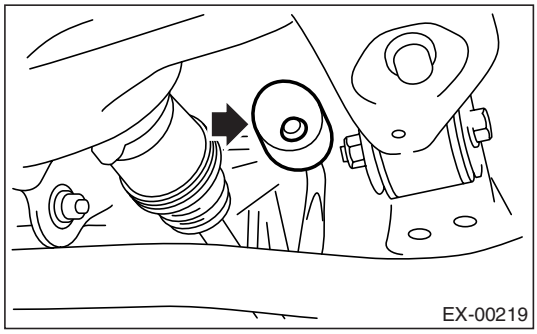
3) Apply a coat of spray type lubricant to the mating area of cushion rubber.

4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

1) Apply a coat of spray type lubricant to the mating area of cushion rubber.
2) Install the rear exhaust pipe bracket to cushion rubber.

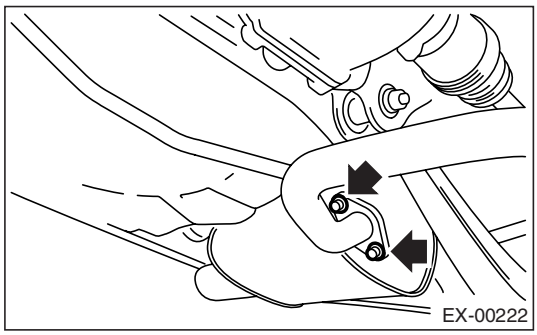


3) Install the rear exhaust pipe to muffler.

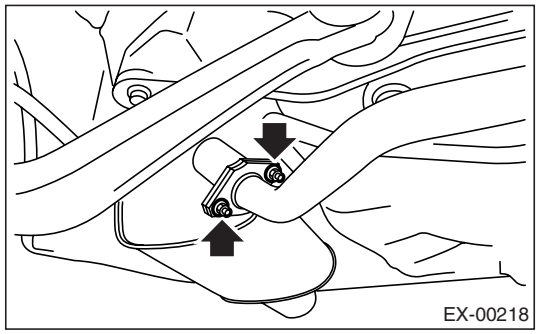
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

- LH side



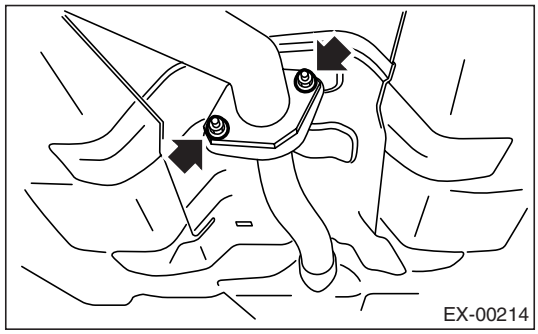
- RH side (2.5 L model)



4) Install the rear exhaust pipe to center exhaust pipe.

NOTE:
Use a new gasket.

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



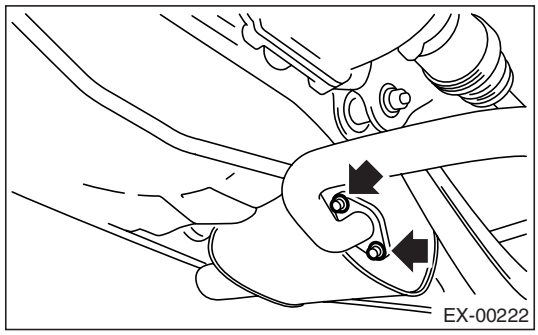
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.
3) Check the cushion rubber for wear or crack.

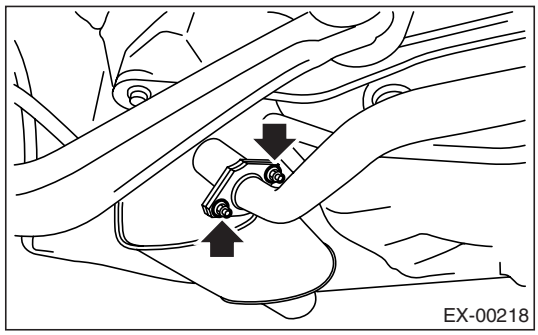
5. Muffler

A: REMOVAL

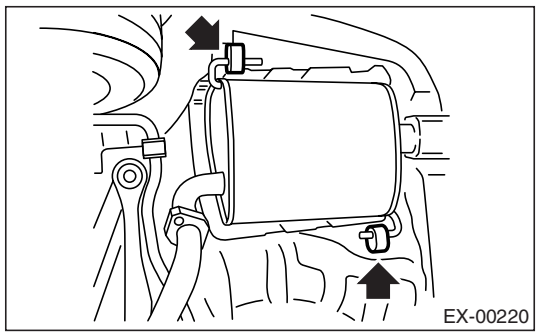
1) Separate the muffler from rear exhaust pipe.
- LH side



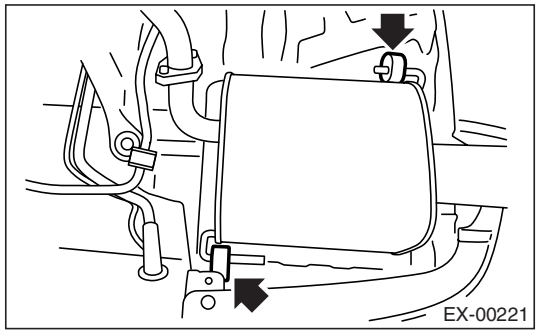
- RH side (2.5 L model)



2) Apply a coat of spray type lubricant to the mating area of cushion rubber.
- LH side



- RH side (2.5 L model)



3) Remove the front and rear cushion rubber, and then remove the muffler.

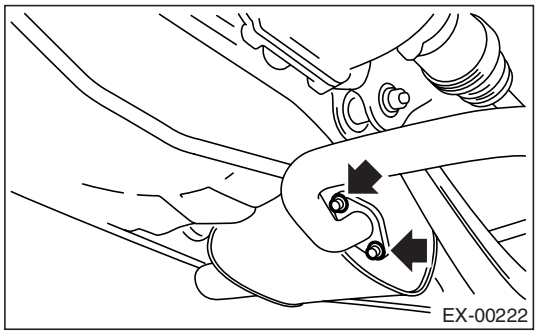
B: INSTALLATION

Install in the reverse order of removal.

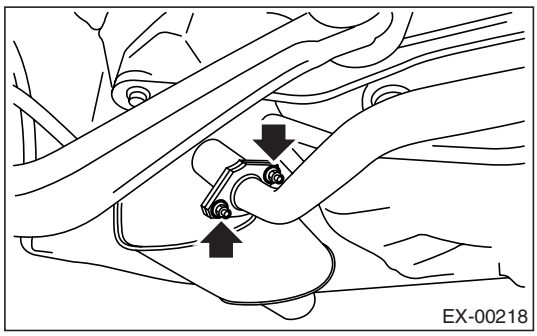
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

- LH side



- RH side (2.5 L model)



C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.
3) Check the cushion rubber for wear or crack.

COOLING

CO(H4SO 2.0)

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1. General Description

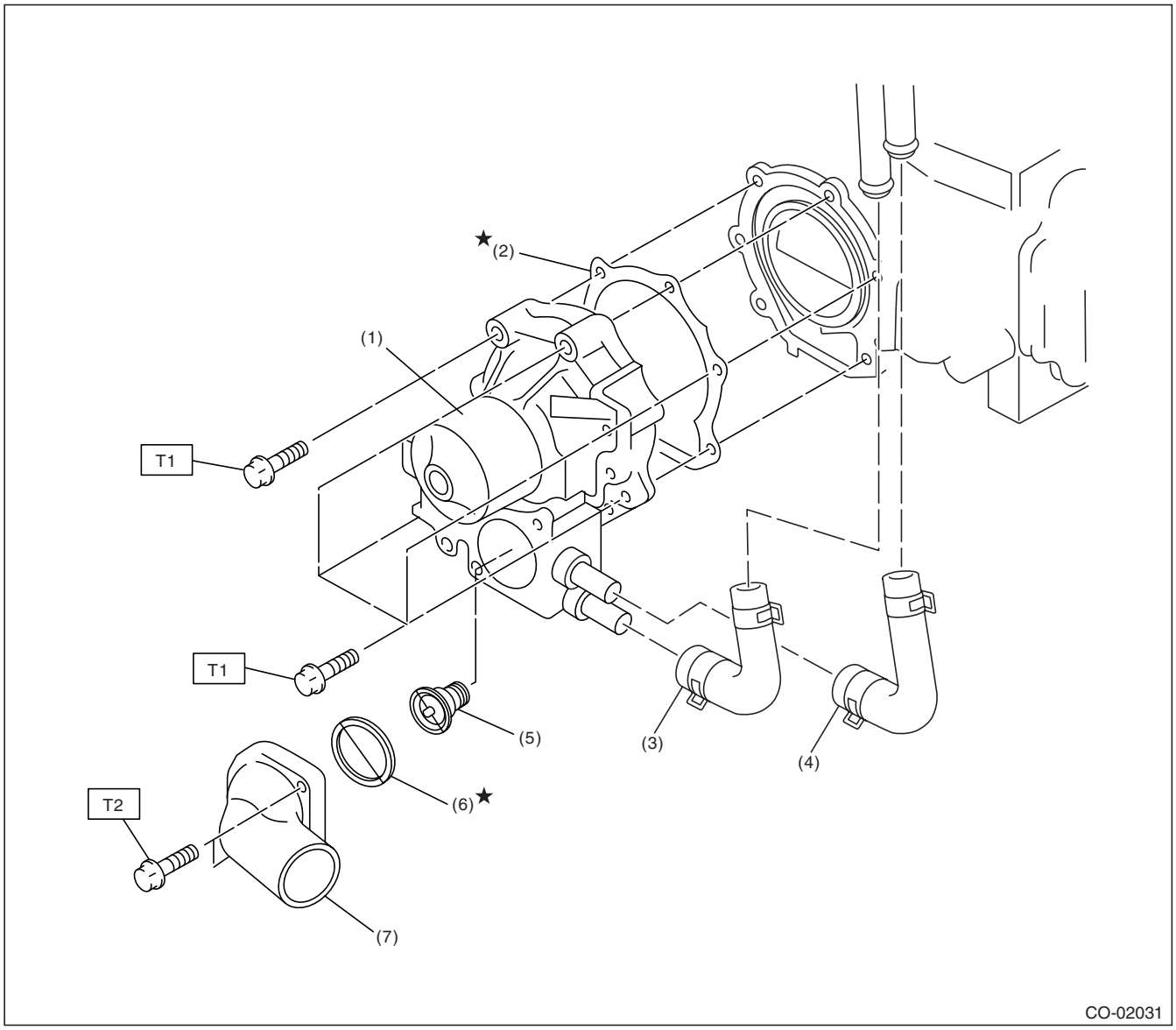
A: SPECIFICATION

Cooling system					Electric fan + Forced engine coolant circulation system
Total engine coolant capacity	LHD	MT		ℓ (US qt, Imp qt)	6.4 (6.8, 5.6)
		AT	Model without ATF warmer	ℓ (US qt, Imp qt)	6.3 (6.7, 5.5)
			Model with ATF warmer	ℓ (US qt, Imp qt)	6.7 (7.0, 5.9)
	RHD	MT		ℓ (US qt, Imp qt)	6.5 (6.9, 5.7)
		AT	Model without ATF warmer	ℓ (US qt, Imp qt)	6.4 (6.8, 5.6)
			Model with ATF warmer	ℓ (US qt, Imp qt)	6.8 (7.2, 6.0)
Water pump	Type				Centrifugal impeller type
	Discharge performance I		Discharge rate	ℓ (US gal, Imp gal) /min	20 (5.3, 4.4)
			Pump speed — Discharge pressure		760 rpm — 2.9 kPa (0.3 mAq)
			Engine coolant temperature		80°C (176°F)
	Discharge performance II		Discharge rate	ℓ (US gal, Imp gal) /min	100 (26.4, 22.0)
			Pump speed — Discharge pressure		3,000 rpm — 49.0 kPa (5.0 mAq)
			Engine coolant temperature		80°C (176°F)
	Discharge performance III		Discharge rate	ℓ (US gal, Imp gal) /min	200 (52.8, 44.0)
			Pump speed — Discharge pressure		6,000 rpm — 225.4 kPa (23.0 mAq)
			Engine coolant temperature		80°C (176°F)
	Impeller diameter			mm (in)	76 (2.99)
	Number of impeller vanes				8
	Pump pulley diameter			mm (in)	60 (2.36)
	Clearance between impeller and case		Standard	mm (in)	0.5 — 1.5 (0.020 — 0.059)
Thermostat	Type				Wax pellet type
	Starting temperature to open				80 — 84°C (176 — 183°F)
	Fully opens				95°C (203°F)
	Valve lift			mm (in)	9.0 (0.354) or more
	Valve bore			mm (in)	35 (1.38)
Radiator fan	Motor input		Main fan		90 W
			Sub fan		90 W
	Fan diameter / Blades		Main fan		300 mm (11.81 in) / 4
			Sub fan		300 mm (11.81 in) / 5
Radiator	Type				Down flow, pressure type
	Core dimensions		Width × Height ×Thickness	mm (in)	687.4 × 340 × 16 (27.06 × 13.39 × 0.63)
	Pressure range in which cap valve is open			kPa (kgf/cm^2, psi)	Above: 108±15 or more (1.1±0.15, 16±2) Below: −1.0 — −4.9 or less (−0.01 — −0.05, −0.1 — −0.7)
	Fins				Corrugated fin type
Reservoir tank	Capacity			ℓ (US qt, Imp qt)	0.45 (0.48, 0.40)

Vehicle speed	A/C compressor load	Engine coolant temperature		
		95°C (203°F) or less	96 — 99°C (203 — 210°F)	100°C (212°F) or more
		Operation of radiator fan	Operation of radiator fan	Operation of radiator fan
19 km/h (12 MPH) or less	OFF	OFF	Low-Speed	High-Speed
	Low	Low-Speed	Low-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
20 — 69 km/h (12 — 43 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	High-Speed	High-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
70 — 105 km/h (43 — 65 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	Low-Speed	High-Speed	High-Speed
106 km/h (66 MPH) or more	OFF	OFF	OFF	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	OFF	Low-Speed	High-Speed

B: COMPONENT

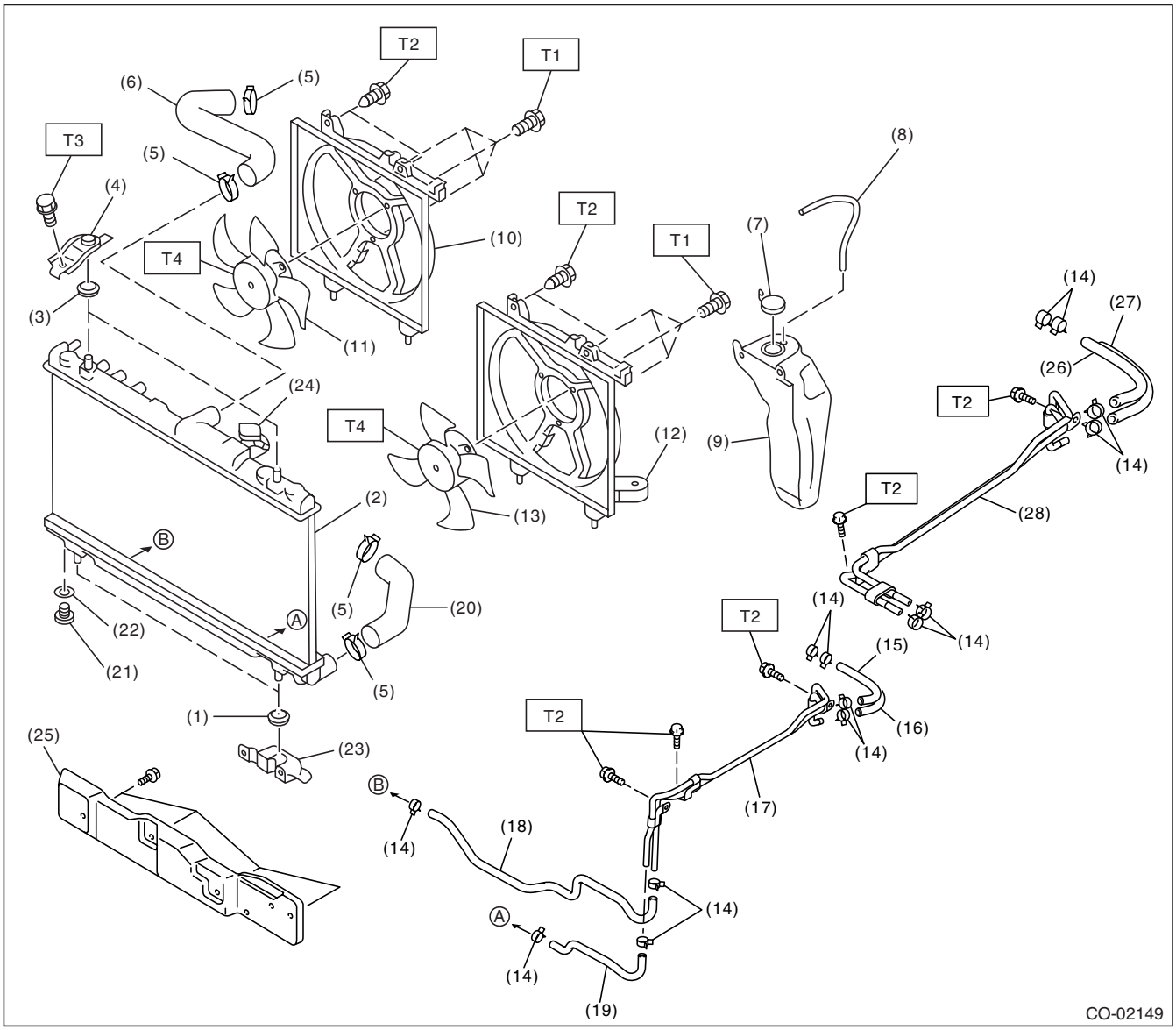
1. WATER PUMP



(1) Water pump ASSY
(2) Gasket
(3) Heater by-pass hose
(4) ATF warmer by-pass hose (Model with ATF warmer)
(5) Thermostat
(6) Gasket
(7) Thermostat cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: First 12 (1.2, 8.9)
Second 12 (1.2, 8.9)
T2: 12 (1.2, 8.9)

2. RADIATOR AND RADIATOR FAN



(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Over flow hose
(9) Engine coolant reservoir tank
(10) Radiator sub fan shroud
(11) Radiator sub fan, radiator sub fan motor ASSY
(12) Radiator main fan shroud
(13) Radiator main fan, radiator main fan motor ASSY
(14) ATF hose clamp (AT model)
(15) ATF hose A (Model without ATF warmer)
(16) ATF hose B (Model without ATF warmer)
(17) ATF pipe (Model without ATF warmer)
(18) ATF hose C (Model without ATF warmer)
(19) ATF hose D (Model without ATF warmer)
(20) Radiator outlet hose
(21) Radiator drain plug
(22) O-ring
(23) Radiator lower bracket
(24) Radiator cap
(25) Heat shield cover (Model without ATF warmer)
(26) ATF hose A (Model with ATF warmer)
(27) ATF hose B (Model with ATF warmer)
(28) ATF pipe (Model with ATF warmer)

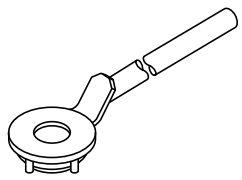
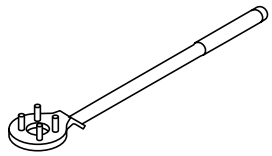
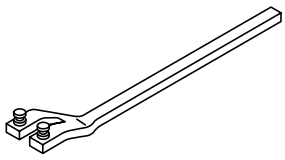
Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*5 (0.5, 3.7)*
T2:	*7.5 (0.76, 5.5)*
T3:	*12 (1.2, 8.9)*
T4:	*3.4 (0.35, 2.5)*

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

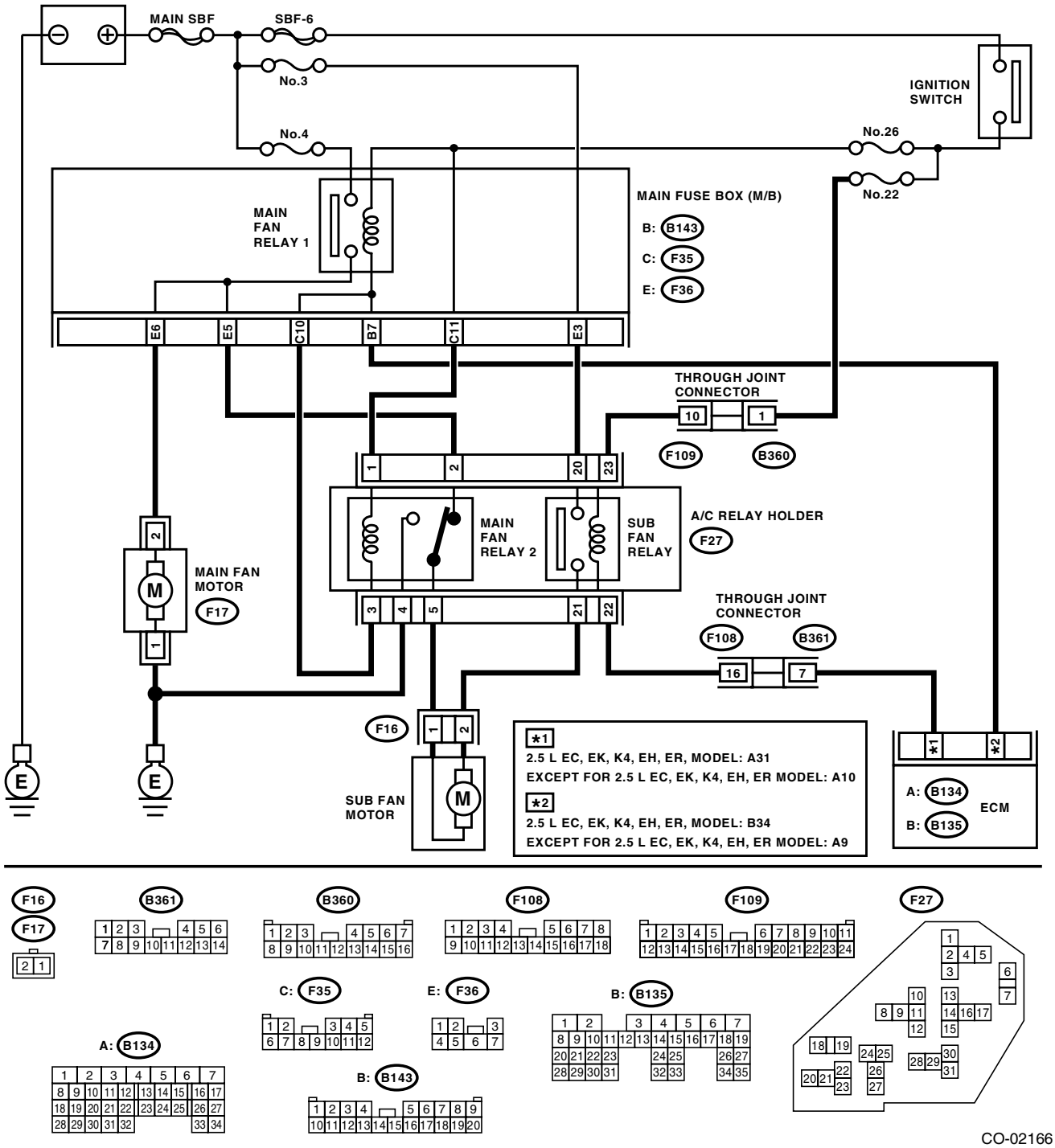
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.5 L model)
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. • CAM SPROCKET WRENCH (499207100) can also be used.

2. Radiator Fan System

A: WIRING DIAGRAM



CO-02166

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is more than 96°C (205°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOMS:

Radiator main and sub fan do not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> or <Ref. to EN(H4SO 2.5)(diag)-41, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at low speed?	Go to step **2.**	Go to step **3.**
2	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> or <Ref. to EN(H4SO 2.5)(diag)-41, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at high speed?	Radiator fan system is normal.	Go to step **27.**
3	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 20 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**

	Step	Check	Yes	No
4	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **6.**
5	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 3. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
6	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
7	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan relay terminals. ***Terminal*** ***No. 20 — No. 21:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Replace the sub fan relay.
8	**CHECK SUB FAN RELAY.** 1) Connect the terminals No. 22 and No. 23 of sub fan relay to battery. 2) Measure the resistance between sub fan relay terminals. ***Terminal*** ***No. 20 — No. 21:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the sub fan relay.
9	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** 1) Disconnect the connector from sub fan motor. 2) Measure the resistance of harness between sub fan relay terminal and sub fan motor connector. ***Connector & terminal*** ***(F16) No. 2 — (F27) No. 21:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness between sub fan relay terminal and sub fan motor connector.
10	**CHECK HARNESS BETWEEN SUB FAN MOTOR CONNECTOR AND MAIN FAN RELAY 2 CONNECTOR.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance of harness between sub fan motor connector and main fan relay 2 connector. ***Connector & terminal*** ***(F16) No. 1 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit of harness between sub fan motor connector and main fan relay 2 connector.
11	**CHECK POOR CONTACT.** Check the poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **12.**
12	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of sub fan motor, and the ground (–) terminal to terminal No. 1.	Does the sub fan rotate?	Go to step **13.**	Replace the sub fan motor.
13	**CHECK MAIN FAN RELAY 2.** Measure the resistance of main fan relay 2. ***Terminal*** ***No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the main fan relay 2.

Step		Check	Yes	No
14	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 2 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F27) No. 2:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness between main fan relay 2 terminal and main fan motor connector.
15	**CHECK MAIN FAN MOTOR AND GROUND CIRCUIT.** Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the open circuit of harness between main fan motor connector and chassis ground.
16	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **17.**
17	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of main fan motor, and the ground (−) terminal to terminal No. 1.	Does the main fan rotate?	Go to step **18.**	Replace the main fan motor.
18	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between sub fan relay terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4, EH, ER model*** ***(B134) No. 31 — (F27) No. 22:*** ***Except for 2.5 L EC, EK, K4, EH, ER model*** ***(B134) No. 10 — (F27) No. 22:***	Is the resistance less than 1 Ω?	Go to step **19.**	Repair the open circuit of harness between sub fan relay terminal and ECM.
19	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there a poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).> or <Ref. to EN(H4SO 2.5)(diag)-32, Read Diagnostic Trouble Code (DTC).>
20	**CHECK MAIN FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from main fuse box. 3) Measure the resistance of terminal in main fan relay 1 switch.	Is the resistance more than 1 MΩ?	Go to step **21.**	Replace the main fan relay 1.
21	**CHECK MAIN FAN RELAY 1.** 1) Connect the battery to terminal of main fan relay 1 coil. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω?	Go to step **22.**	Replace the main fan relay 1.

	Step	Check	Yes	No
22	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 1 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F36) No. 6:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit of harness between main fan relay 1 terminal and main fan motor connector.
23	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between main fan relay 1 terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4, EH, ER model*** ***(B135) No. 34 — (B143) No. 7:*** ***Except for 2.5 L EC, EK, K4, EH, ER model*** ***(B134) No. 9 — (B143) No. 7:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness between main fan relay 1 terminal and ECM.
24	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM.** Measure the resistance between main fan relay 2 terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4, EH, ER model*** ***(B135) No. 34 — (F27) No. 3:*** ***Except for 2.5 L EC, EK, K4, EH, ER model*** ***(B134) No. 9 — (F27) No. 3:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit of harness between main fan relay 2 terminal and ECM.
25	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 4 and No. 26. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **26.**
26	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there a poor contact in ECM connector?	Repair the poor contact in ECM connector.	Repair the power supply circuit for main fuse box.
27	**CHECK OPERATION OF RADIATOR FAN.** Check if the sub fan rotates when both fans do not rotate at high speed under the step 2.	Does the sub fan rotate?	Go to step **20.**	Go to step **28.**
28	**CHECK GROUND CIRCUIT OF MAIN FAN RELAY 2.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **29.**	Repair the open circuit of harness between main fan relay 2 and chassis ground.
29	**CHECK POWER SUPPLY TO MAIN FAN RELAY 2.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **30.**	Repair the power supply line.

Step		Check	Yes	No
30	**CHECK MAIN FAN RELAY 2.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 2. 3) Measure the resistance of main fan relay 2. ***Terminal*** ***(F27) No. 2 — (F27) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **31.**	Replace the main fan relay 2.
31	**CHECK MAIN FAN RELAY 2.** 1) Connect the battery to terminals No. 1 and No. 3 of main fan relay 2. 2) Measure the resistance of main fan relay 2. ***Terminal*** ***(F27) No. 4 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **23.**	Replace the main fan relay 2.

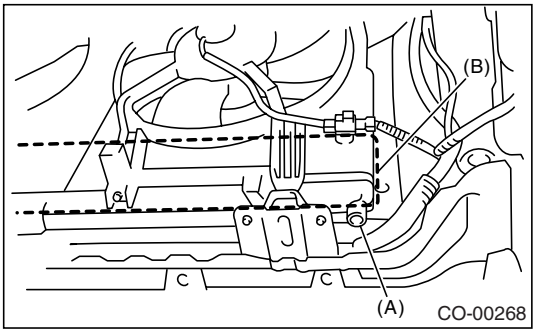
3. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain plug to drain engine coolant into container.

NOTE:
Remove the radiator cap so that engine coolant will drain faster.



(A) Drain plug
(B) Heat shield cover

4) Install the drain plug.

2. FILLING OF ENGINE COOLANT

1) Fill engine coolant into the radiator up to the filler neck position.

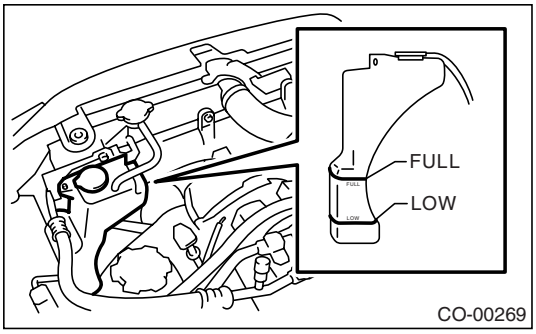
Engine coolant capacity (fill up to "FULL" level):

LHD
MT model
6.4 ℓ (6.8 US qt, 5.6 Imp qt)
AT model (Model without ATF warmer)
6.3 ℓ (6.7 US qt, 5.5 Imp qt)
AT model (Model with ATF warmer)
6.7 ℓ (7.0 US qt, 5.9 Imp qt)

RHD
MT model
6.5 ℓ (6.9 US qt, 5.7 Imp qt)
AT model (Model without ATF warmer)
6.4 ℓ (6.8 US qt, 5.6 Imp qt)
AT model (Model with ATF warmer)
6.8 ℓ (7.2 US qt, 6.0 Imp qt)

NOTE:
The SUBARU genuine coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU genuine coolant, since other coolant may cause corrosion.

2) Fill engine coolant into the reservoir tank up to "FULL" level.



3) Close the radiator cap and start the engine. Race 5 to 6 times at less than 3,000 rpm, then stop the engine. (Complete this operation within 40 seconds.)
4) Wait for one minute after the engine stops, open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
5) Perform the procedures 3) and 4) again.
6) Attach the radiator cap and reservoir tank cap properly.
7) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".
8) Run the engine at 2,000 rpm or less until ratiator fan starts and stops.

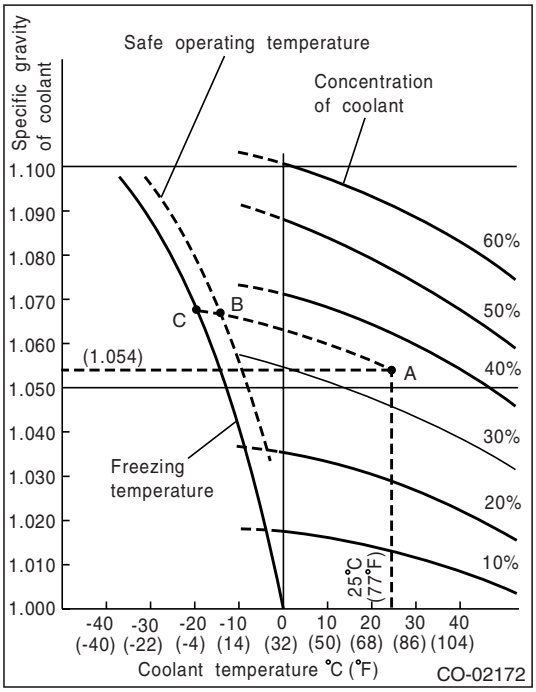
NOTE:
• Be careful with the engine coolant temperature gauge to prevent overheating.
• If the radiator hose becomes to harden by the pressure of engine coolant, air bleeding operation seems to be almost completed.

9) Stop the engine and wait until engine coolant temperature lowers to 30°C (86°F).
10) Open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position and reservoir tank to "FULL" level.
11) Attach the radiator cap and reservoir tank cap properly.
12) Operate the heater at maximum hot position and the blower speed setting to "LO" and start the engine. Race at less than 3,000 rpm. If the flowing sound is heard at this time, perform the procedures from 8) again.

B: INSPECTION

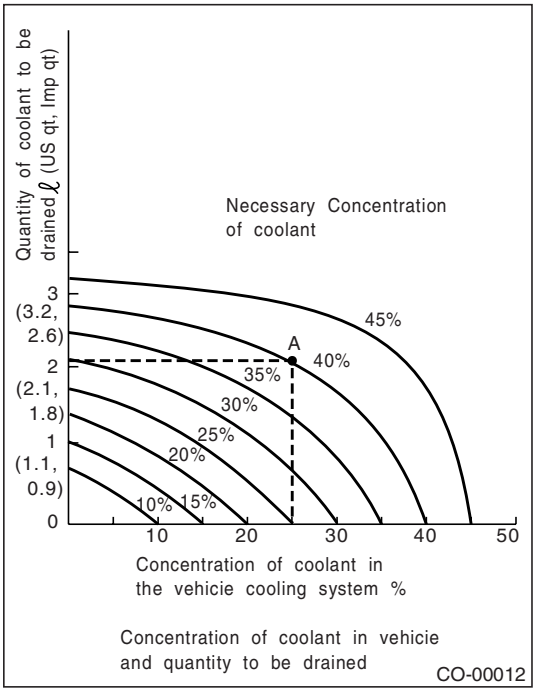
1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERTAURE

The concentration and safe operating temperature of SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F), its specific gravity is 1.054 and the concentration is 35% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

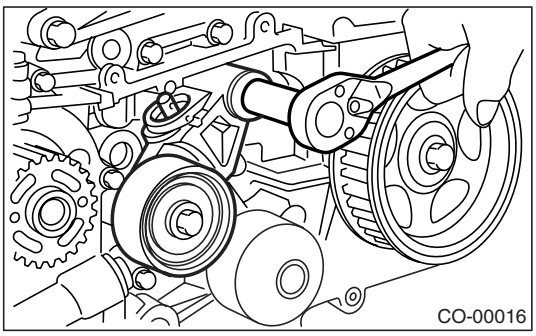
To adjust the concentration of coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



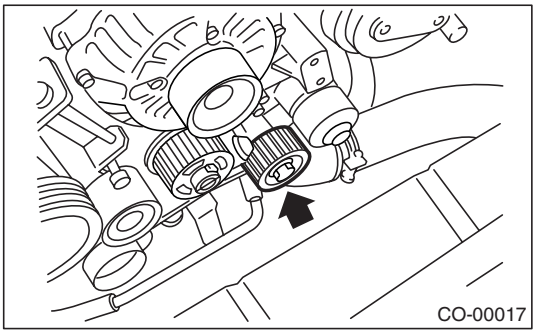
4. Water Pump

A: REMOVAL

1) Remove the radiator. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
2) Remove the V-belt. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
3) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, TIMING BELT, REMOVAL, Timing Belt.>
4) Remove the automatic belt tension adjuster.

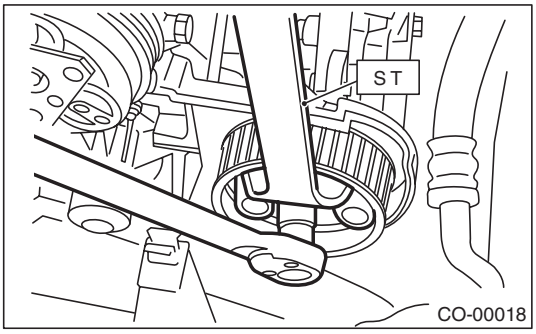

CO-00016

5) Remove the belt idler No. 2.


CO-00017

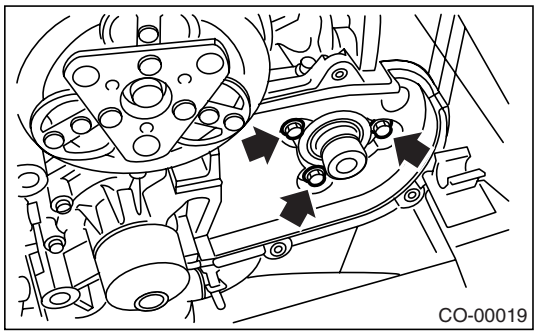
6) Remove the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

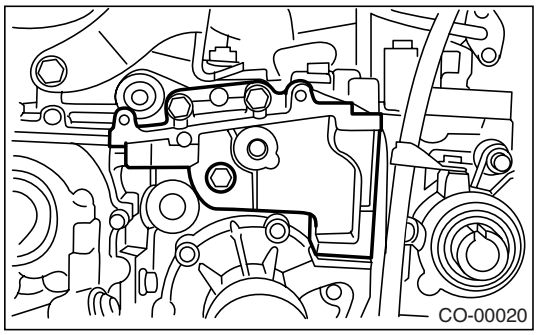


CO-00018

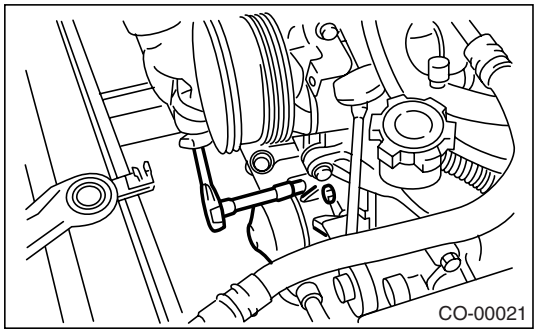
7) Remove the belt cover No. 2 (LH).


CO-00019

8) Remove the tensioner bracket.


CO-00020

9) Disconnect the hose from water pump.
10) Remove the water pump.

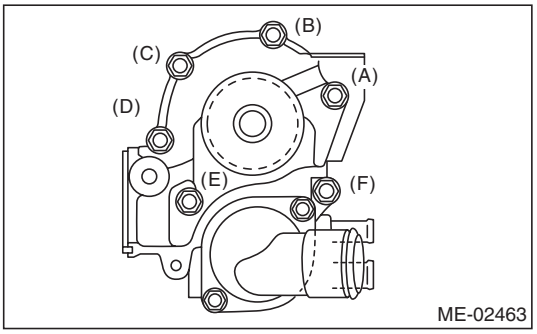

CO-00021

B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

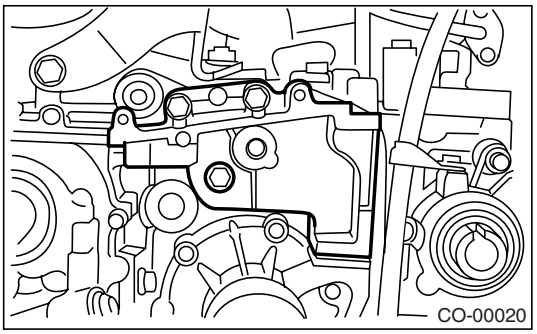
NOTE:
- Use a new gasket.
- When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in figure.

Tightening torque:
First
12 N·m (1.2 kgf-m, 8.9 ft-lb)
Second
12 N·m (1.2 kgf-m, 8.9 ft-lb)



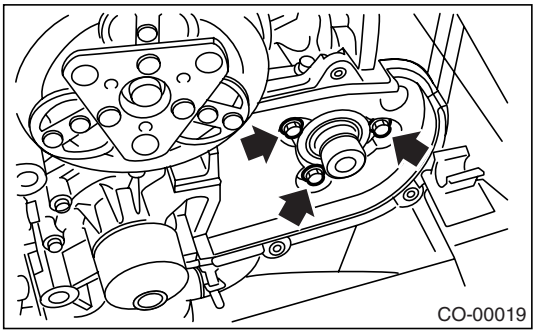
2) Connect the hose to the water pump.
3) Install the tensioner bracket.

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



4) Install the belt cover No. 2 (LH).

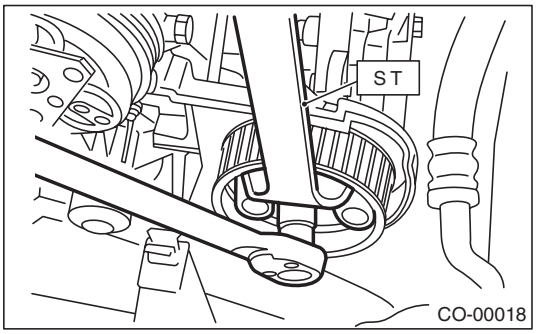
Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



5) Install the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

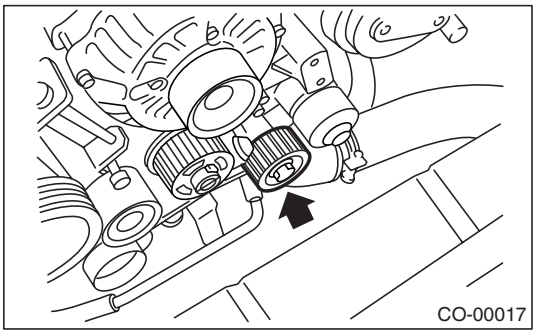
NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



6) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

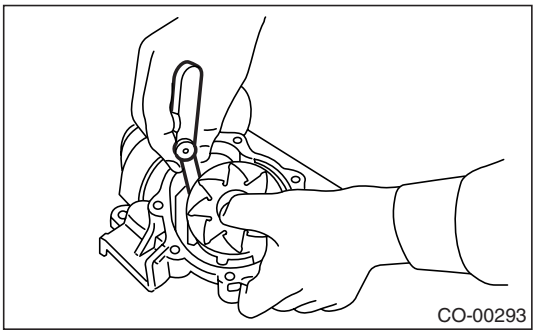


7) Install the automatic belt tension adjuster which tension rod is held with pin. <Ref. to ME(H4SO 2.0)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>
8) Install the timing belt. <Ref. to ME(H4SO 2.0)-45, TIMING BELT, INSTALLATION, Timing Belt.>
9) Install the V-belts. <Ref. to ME(H4SO 2.0)-37, INSTALLATION, V-belt.>
10) Install the radiator. <Ref. to CO(H4SO 2.0)-21, INSTALLATION, Radiator.>

C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Make sure the impeller is not deformed or damaged.
4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:
Specification
0.5 — 1.5 mm (0.020 — 0.059 in)

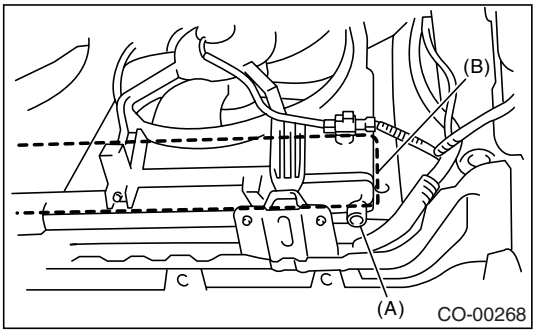


5) After water pump installation, check the pulley shaft for engine coolant leaks and noise. If leaks or noise are noted, replace the water pump assembly.

5. Thermostat

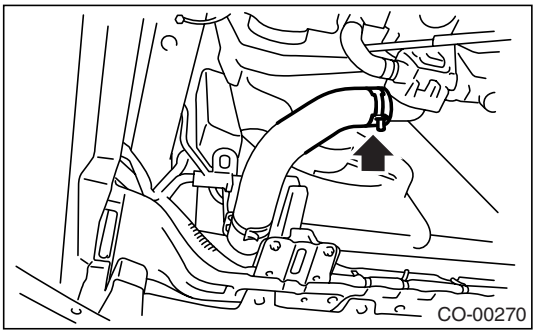
A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain engine coolant completely. <Ref. to CO(H4SO 2.0)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

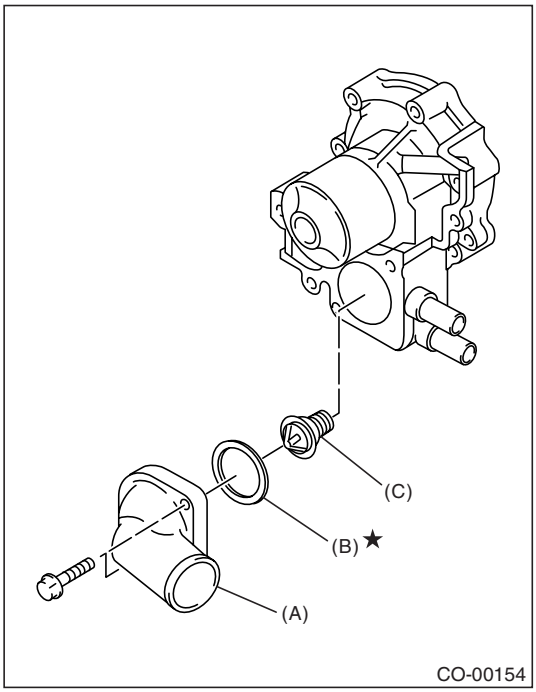


(A) Drain plug
(B) Heat shield cover

5) Disconnect the radiator outlet hose from thermostat cover.



6) Remove the thermostat cover and gasket, and then remove the thermostat.



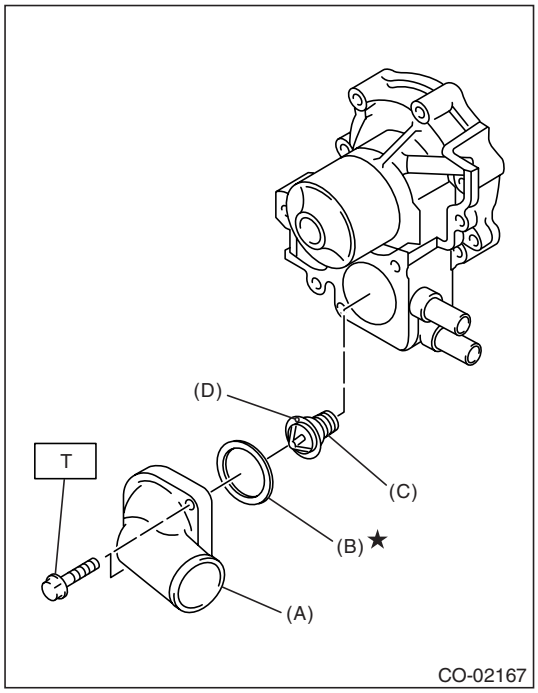
(A) Thermostat cover
(B) Gasket
(C) Thermostat

B: INSTALLATION

1) Install a gasket to thermostat, and install the thermostat and gasket to water pump as a unit. Then, install the thermostat cover.

NOTE:
• When reinstalling the thermostat, use a new gasket.
• The thermostat must be installed with the jiggle pin facing to the up side.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



(A) Thermostat cover
(B) Gasket
(C) Thermostat
(D) Jiggle pin

2) Connect the radiator outlet hose to thermostat cover.
3) Install the under cover.
4) Lower the vehicle.
5) Fill with engine coolant. <Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

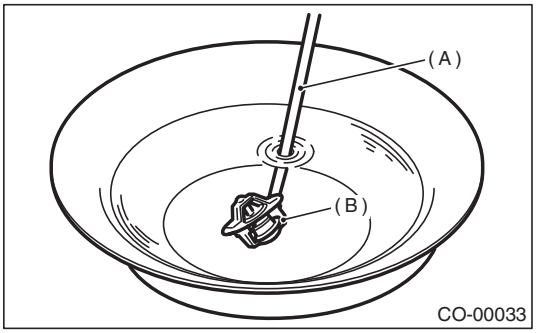
Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
• Inspection method
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

NOTE:
• Leave the thermostat in the boiling water for more than five minutes before measuring the valve lift.
• Hold the thermostat with a wire or the like to avoid contacting with container bottom.

Starting temperature to open:
80 — 84°C (176 — 183°F)

Fully opens:
95°C (203°F)

Valve lift:
9.0 mm (0.354 in) or more



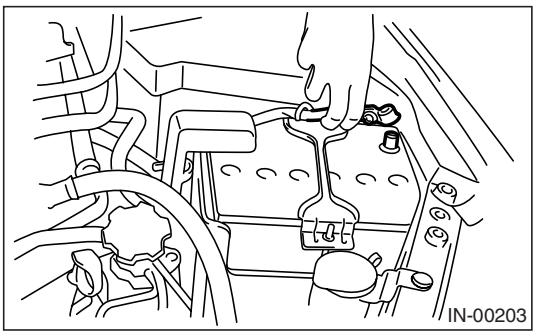
(A) Thermometer
(B) Thermostat

6. Radiator

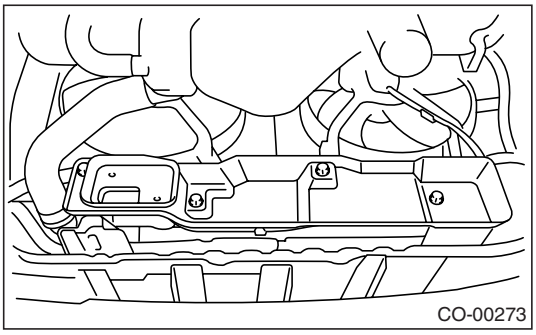
A: REMOVAL

CAUTION:
Wait until the engine cools down before working since the radiator is pressurized.

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.

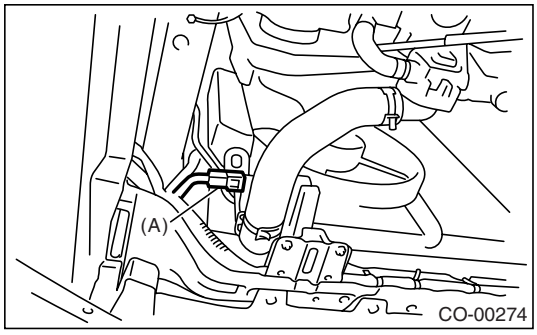


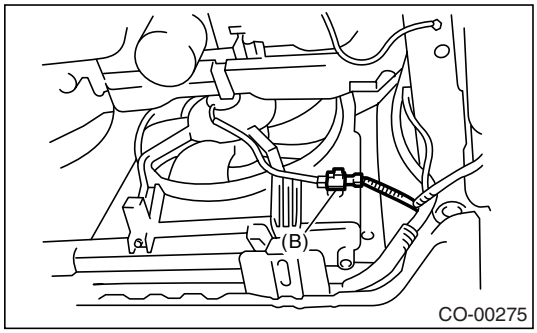
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the heat shield cover from radiator. (Model without ATF warmer)



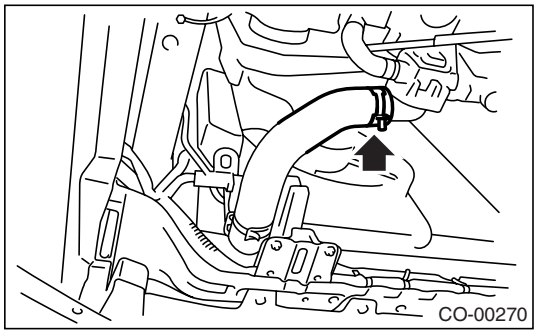
6) Drain engine coolant completely. <Ref. to CO(H4SO 2.0)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

7) Disconnect the connector (A) of radiator main fan motor and connector (B) of sub fan motor.

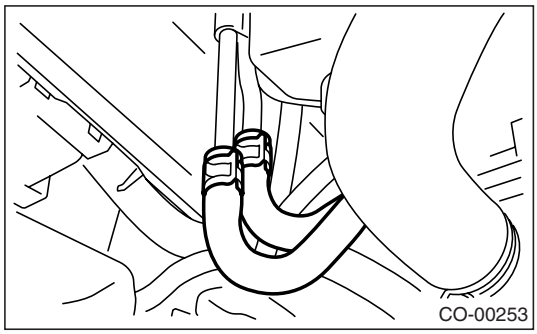




8) Disconnect the radiator outlet hose from thermostat cover.

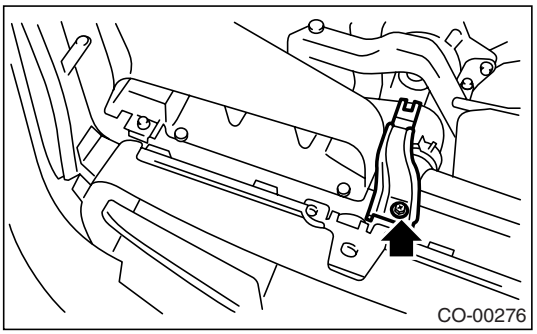


9) Disconnect the ATF hoses from ATF pipes. (Model without ATF warmer)
Plug the ATF pipe to prevent ATF leaks.

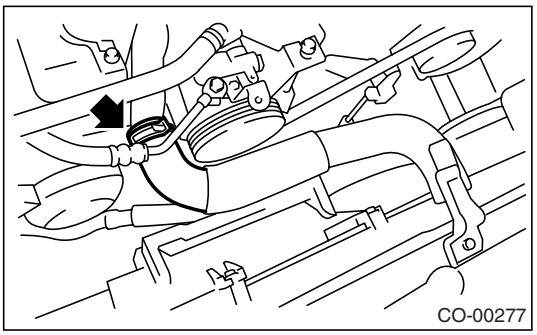


10) Lower the vehicle.
11) Disconnect the over flow hose.
12) Remove the reservoir tank. <Ref. to CO(H4SO 2.0)-29, REMOVAL, Reservoir Tank.>

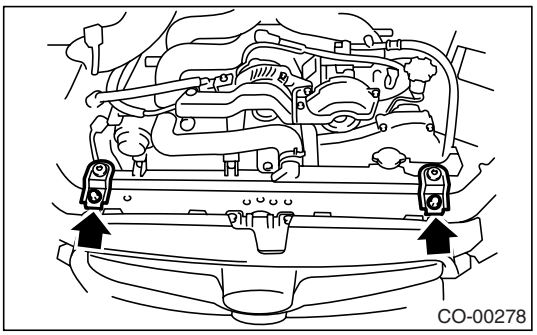
13) Remove the hood stay holder.



14) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.>
15) Disconnect the radiator inlet hose from engine.



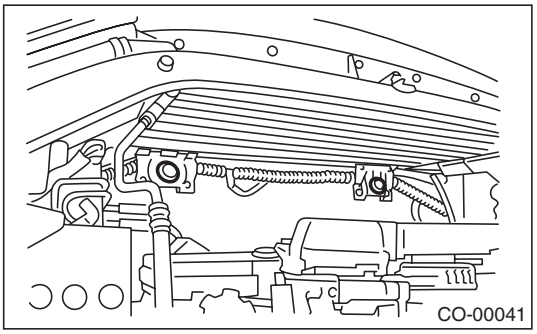
16) Remove the radiator upper brackets.



17) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to holes on the radiator lower bracket.

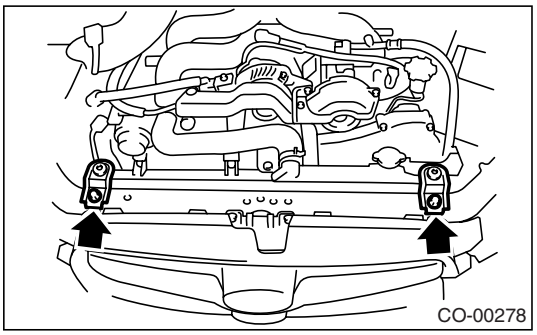


2) Install the radiator to vehicle.

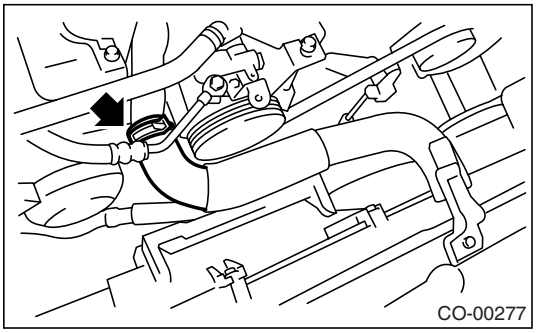
NOTE:
Make pins on the lower side of radiator be fitted into the radiator lower cushions on body side.

3) Install the radiator upper brackets and tighten the bolts.

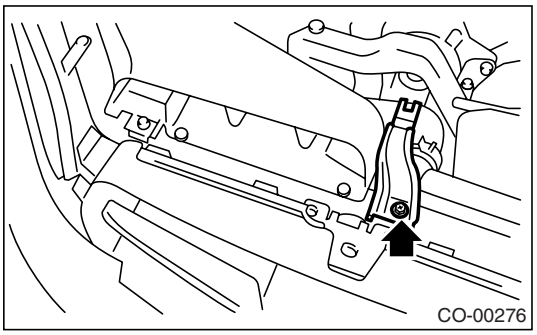
Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



4) Connect the radiator inlet hose.

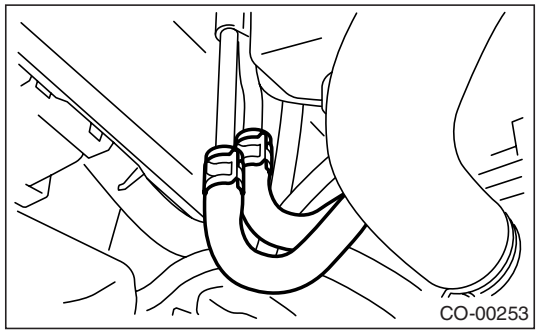


5) Install the air intake duct. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Duct.>
6) Install the hood stay holder.

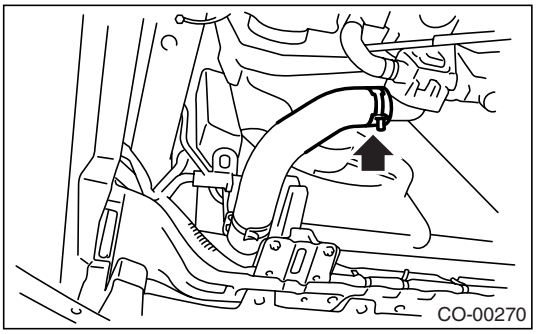


7) Install the reservoir tank. <Ref. to CO(H4SO 2.0)-29, INSTALLATION, Reservoir Tank.>
8) Connect the over flow hose.
9) Lift-up the vehicle.

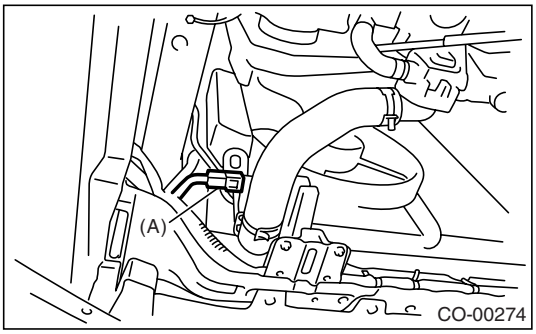
10) Connect the ATF hoses. (Model without ATF warmer)

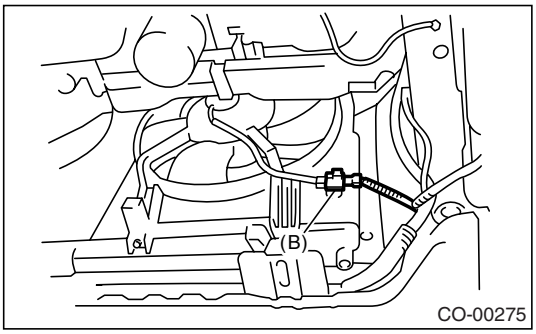


11) Connect the radiator outlet hose.

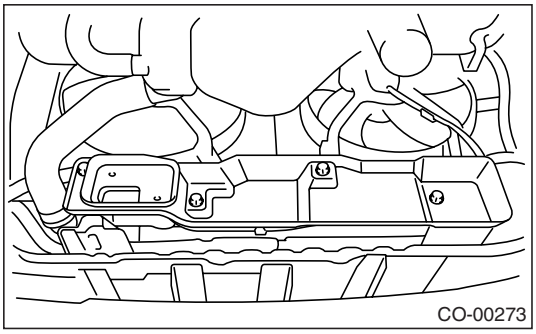


12) Connect the connector (A) to radiator main fan motor and connector (B) to sub fan motor.

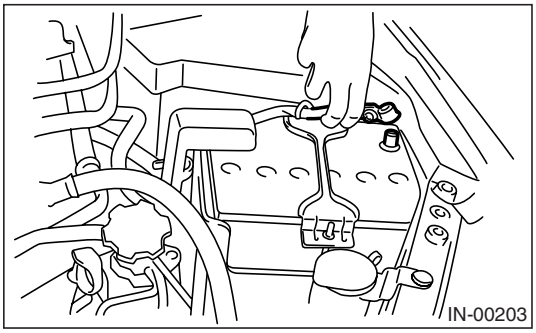




13) Install the heat shield cover. (Model without ATF warmer)



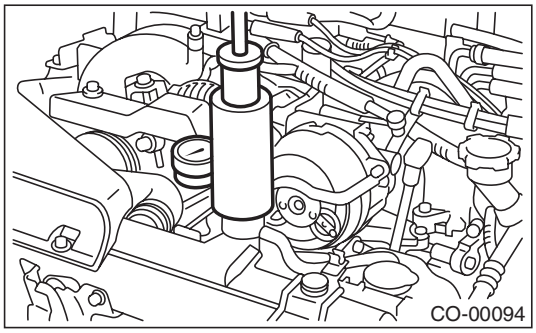
14) Install the under cover.
15) Lower the vehicle.
16) Connect the ground cable to battery.



17) Fill with engine coolant. <Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
18) Check the ATF level. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

1) Remove the radiator cap, top off the radiator with coolant, and then attach the tester in place of cap.



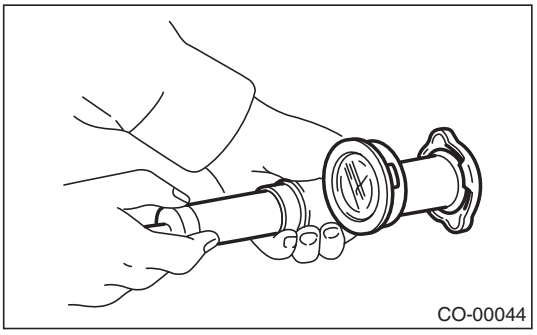
2) Apply a pressure of 157 kPa (1.6 kgf/cm^2, 23 psi) to the radiator to check if the following cases occur.
- Engine coolant leaks at/around radiator.
- Engine coolant leaks at/around hoses or connections.

CAUTION:
- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful not to deform the filler neck of radiator when installing or removing the tester.**

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Specified pressure:
93 — 123 kPa (0.95 — 1.25 kgf/cm^2, 14 — 18 psi)

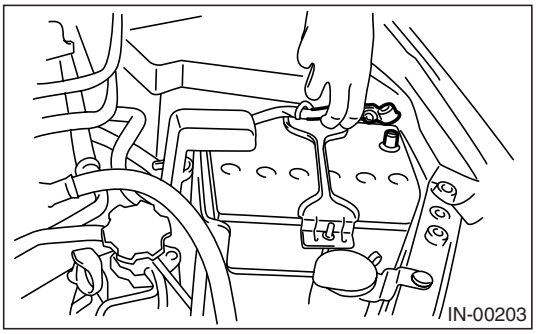
Service limit pressure:
83 kPa (0.85 kgf/cm^2, 12 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance, otherwise results of pressure test will be incorrect.

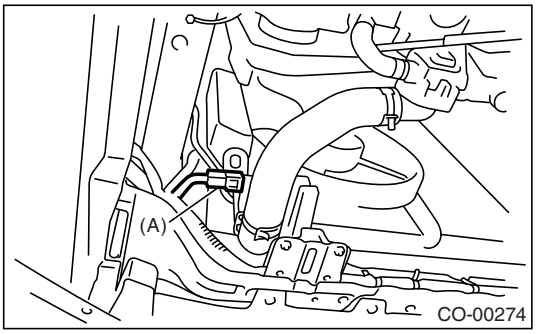
8. Radiator Main Fan and Fan Motor

A: REMOVAL

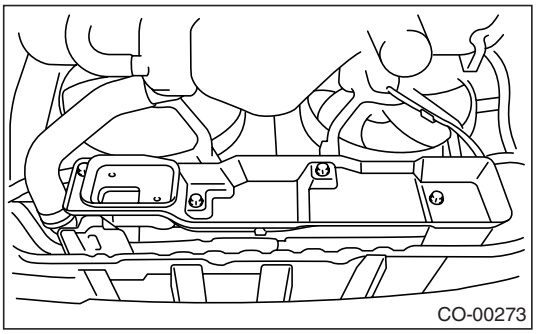
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



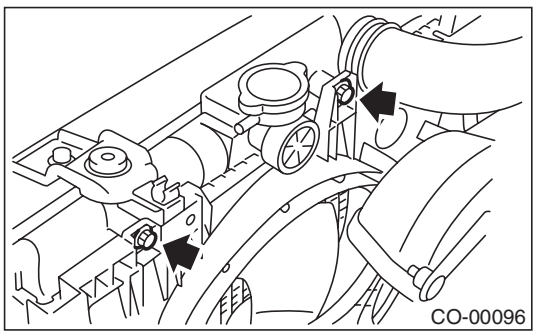
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector (A) of main fan motor.



6) Remove the heat shield cover. (Model without ATF warmer)



7) Remove the ATF hose from the clip of radiator main fan motor assembly. (Model without ATF warmer)
8) Lower the vehicle.
9) Disconnect the over flow hose.
10) Remove the reservoir tank. <Ref. to CO(H4SO 2.0)-29, REMOVAL, Reservoir Tank.>
11) Remove the bolts which hold the radiator main fan shroud to radiator.



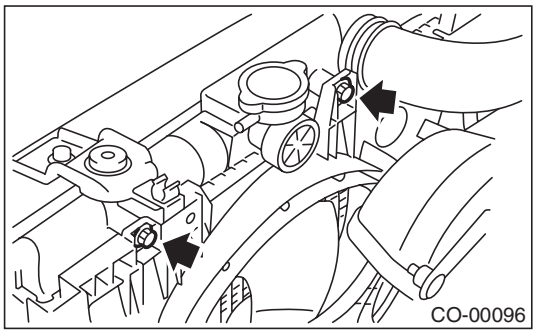
12) Remove the radiator main fan motor assembly.

B: INSTALLATION

Install in the reverse order of removal.

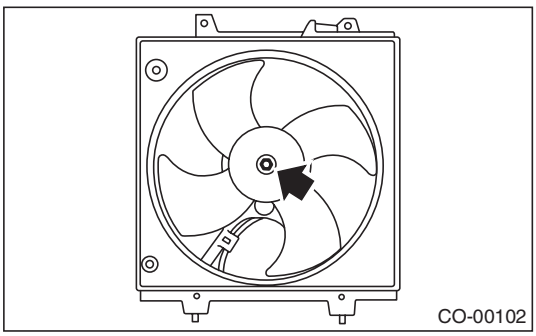
NOTE:
When the radiator main fan motor assembly cannot be installed, loosen the bolts which secure radiator sub fan motor assembly.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

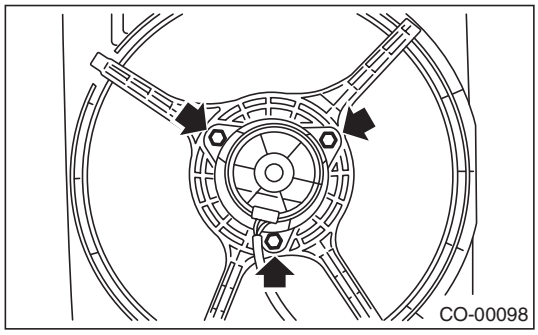


C: DISASSEMBLY

1) Remove the clip which holds motor connector onto the shroud.
2) Remove the nut which holds the fan onto fan motor and shroud.



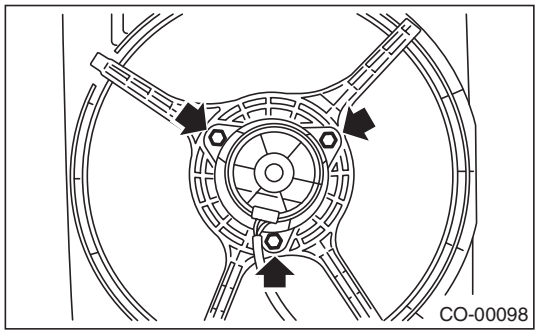
3) Remove the bolts which install fan motor onto the shroud.



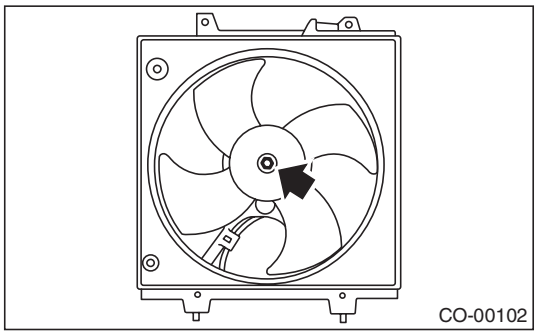
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



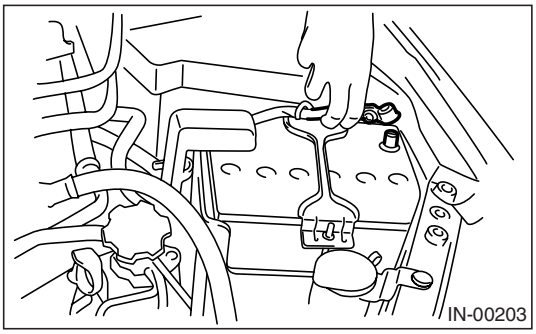
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



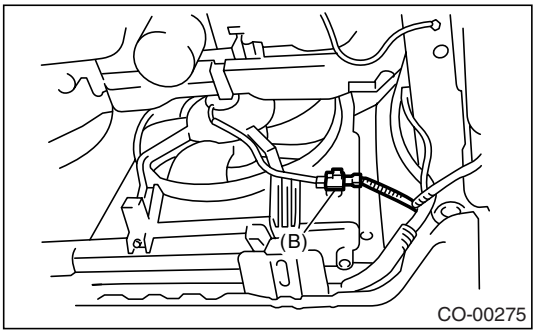
9. Radiator Sub Fan and Fan Motor

A: REMOVAL

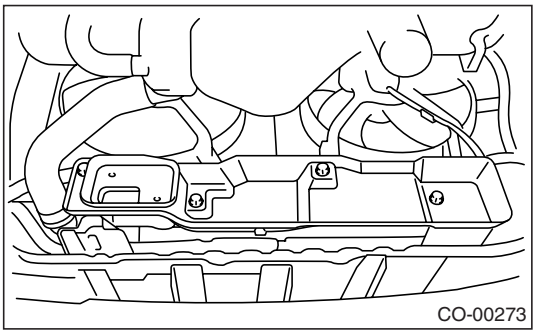
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



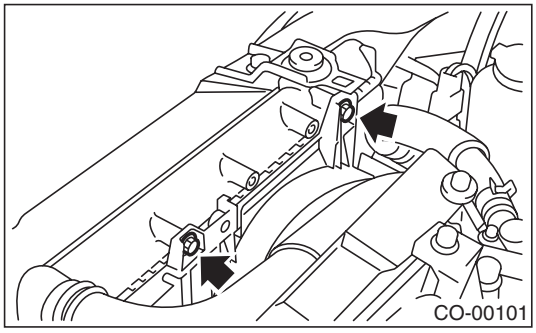
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector (B) of sub fan motor.



6) Remove the heat shield cover. (Model without ATF warmer)



7) Remove the ATF hose from the clip of radiator sub fan motor assembly. (Model without ATF warmer)
8) Lower the vehicle.
9) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.>
10) Remove the bolts which hold the radiator sub fan shroud to radiator.

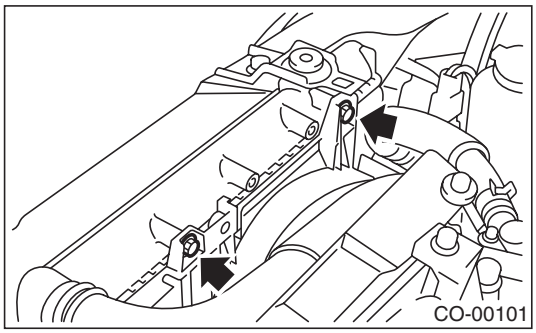


11) Remove the radiator sub fan motor assembly from the lower side of vehicle.

B: INSTALLATION

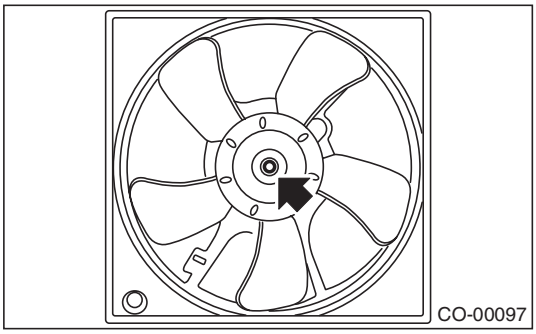
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

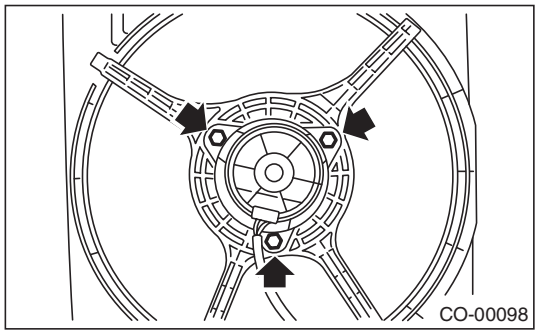


C: DISASSEMBLY

1) Remove the clip which holds the fan motor connector onto shroud.
2) Remove the nut which holds fan onto the fan motor and shroud assembly.



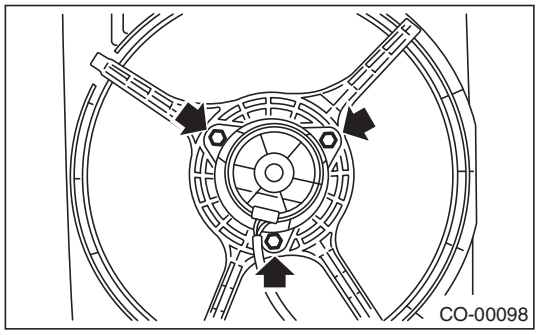
3) Remove the bolts which install fan motor onto the shroud.



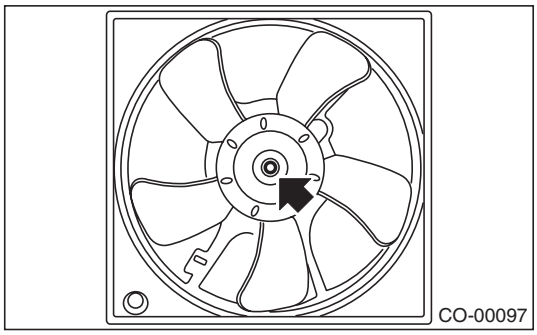
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



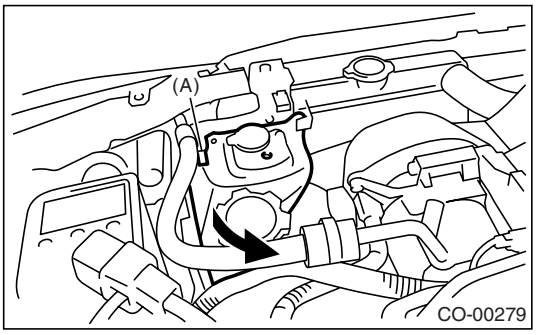
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



10.Reservoir Tank

A: REMOVAL

1) Disconnect the over flow hose.
2) Pull out the reservoir tank to the direction of arrow while pushing the pawl (A).



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the engine coolant level is between “FULL” and “LOW”.

11.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Overheating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on timing belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean, repair or replace.
	i. Improper engine oil in engine coolant	Check, repair or replace the parts around engine.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Correct or replace.
	n. Dragging brake	Adjust.
	o. Defective radiator fan	Inspect radiator fan relay, engine coolant temperature sensor or fan motor and replace them.
Over-cooling	a. Ambient temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Correct or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Correct or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Correct or replace.
	f. Damaged or cracked thermostat case	Correct or replace.
	g. Leakage from radiator	Correct or replace.
Strange noise	a. Defective timing belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

LUBRICATION

LU(H4SO 2.0)

		Page
1.	General Description	2
2.	Oil Pressure System	7
3.	Engine Oil	9
4.	Oil Pump	11
5.	Oil Pan and Strainer	15
6.	Oil Pressure Switch	18
7.	Engine Oil Filter	19
8.	Engine Lubrication System Trouble in General	20

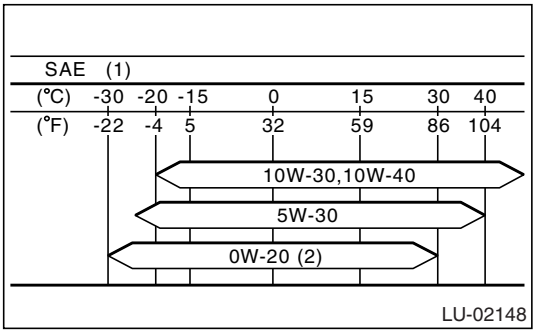
1. General Description

A: SPECIFICATION

Lubrication method					Forced lubrication
Oil Pump	Pump type				Trochoid type
	Number of teeth	Inner rotor			9
		Outer rotor			10
	Outer rotor diameter × thickness			mm (in)	78 × 7 (3.07 × 0.28)
	Tip clearance between inner and outer rotors		Specification	mm (in)	0.04 — 0.14 (0.0016 — 0.0055)
	Side clearance between inner rotor and pump case		Specification	mm (in)	0.02 — 0.07 (0.0008 — 0.0028)
	Case clearance between outer rotor and pump case		Specification	mm (in)	0.10 — 0.175 (0.0039 — 0.0069)
	Performance at 80°C (176°F)	600 rpm	Discharge pressure	kPa (kgf/cm^2, psi)	98 (1.0, 14)
			Discharge rate	ℓ US qt, Imp qt)/ min.	3.2 (3.4, 2.8)
		5,000 rpm	Discharge pressure	kPa (kgf/cm^2, psi)	294 (3.0, 43)
			Discharge rate	ℓ US qt, Imp qt)/ min.	32.6 (34.4, 28.7)
	Relief valve working pressure			kPa (kgf/cm^2, psi)	490 (5.0, 71)
Oil filter	Filter type				Full-flow filter type
	Filtration area cm^2 (sq in)		Outer diameter 68 mm		800 (124)
			Outer diameter 65 mm		470 (73)
	By-pass valve opening pressure			kPa (kgf/cm^2, psi)	160 (1.63, 23.2)
	Outer diameter × width mm (in)		Outer diameter 68 mm		68 × 65 (2.68 × 2.56)
			Outer diameter 65 mm		65 × 74.4 (2.56 × 2.93)
	Installation screw specifications				M20 × 1.5
Oil pressure switch	Type				Immersed contact point type
	Working voltage — wattage				12 V — 3.4 W or less
	Warning light activation pressure			kPa (kgf/cm^2, psi)	14.7 (0.15, 2.1)
	Proof pressure			kPa (kgf/cm^2, psi)	981 (10, 142) or more
Engine oil	Capacity (at overhaul)			ℓ (US qt, Imp qt)	4.5 (4.8, 4.0)
	When replacing engine oil and oil filter			ℓ (US qt, Imp qt)	4.2 (4.4, 3.7)
	When replacing engine oil only			ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)

Recommended oil

For the API standard SL and SJ, use the logo mark with "Energy Conserving" (If the SL, SJ grade is not available, use SH grade).
ACEA standard A1, A2 or A3
ILSAC standard GF-3 "Star burst mark" is on the container.

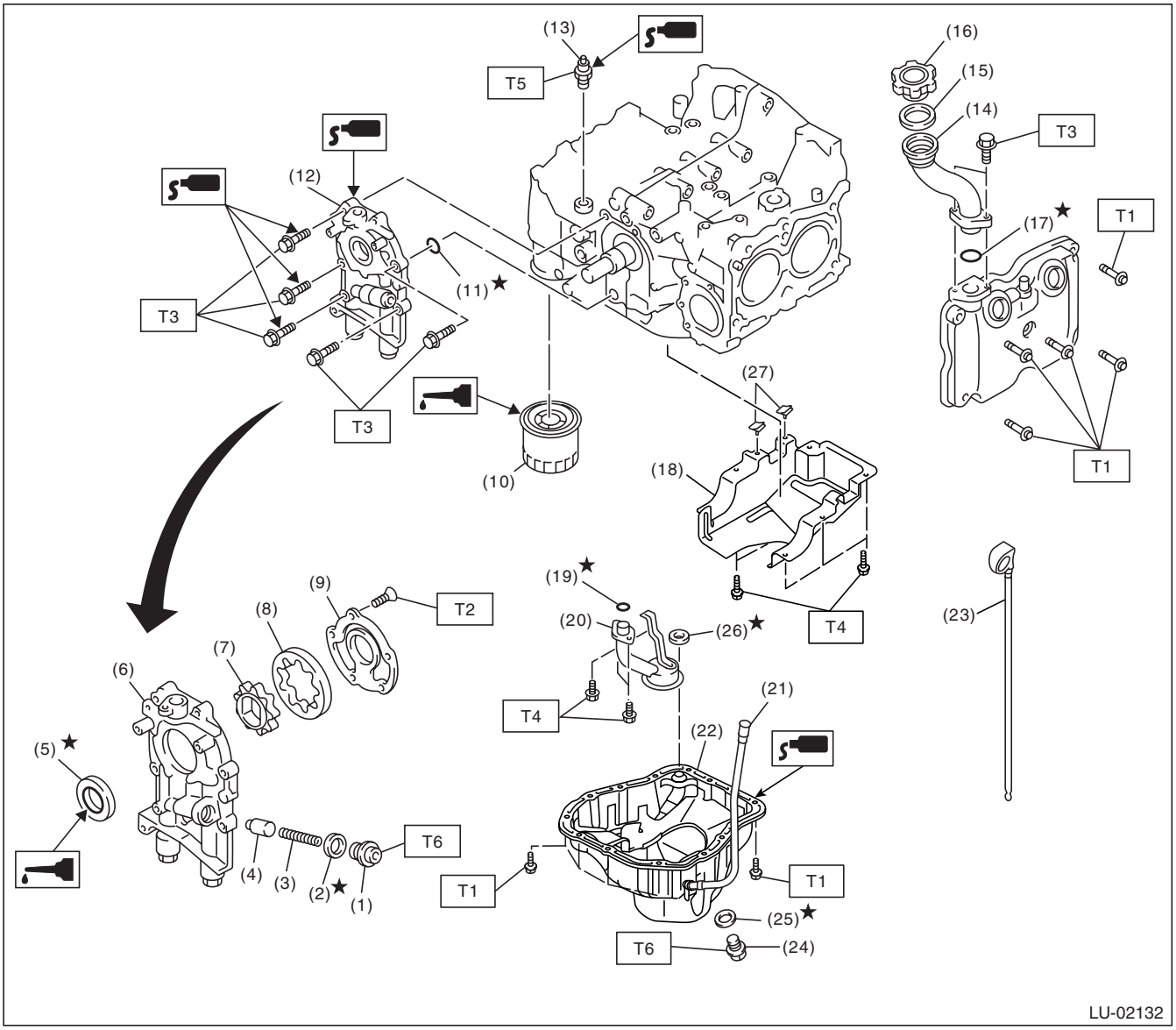


(1) SAE viscosity No. and applicable temperature
(2) Recommended

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API standard and SAE viscosity No. designated by SUBARU.

NOTE:
If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils must be used. API standard: SL or SJ
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50

B: COMPONENT



(1) Plug
(2) Gasket
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) O-ring
(16) Oil filler cap
(17) O-ring
(18) Baffle plate
(19) O-ring
(20) Oil strainer
(21) Oil level gauge guide
(22) Oil pan
(23) Oil level gauge
(24) Drain plug
(25) Metal gasket
(26) Gasket
(27) Seal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 5.4 (0.55, 4.0)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.2)
T5: 25 (2.5, 18.4)
T6: 44 (4.5, 32.5)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOL

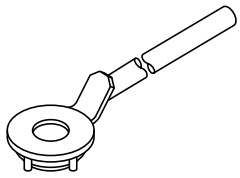
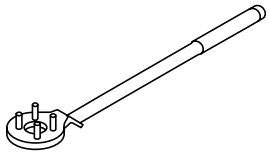
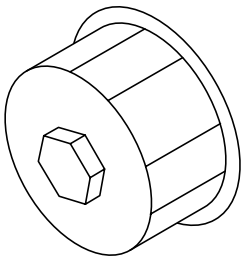
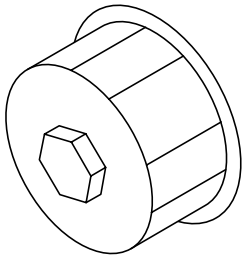
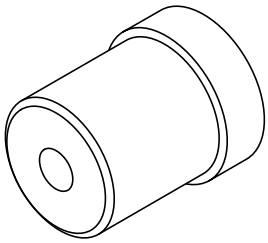
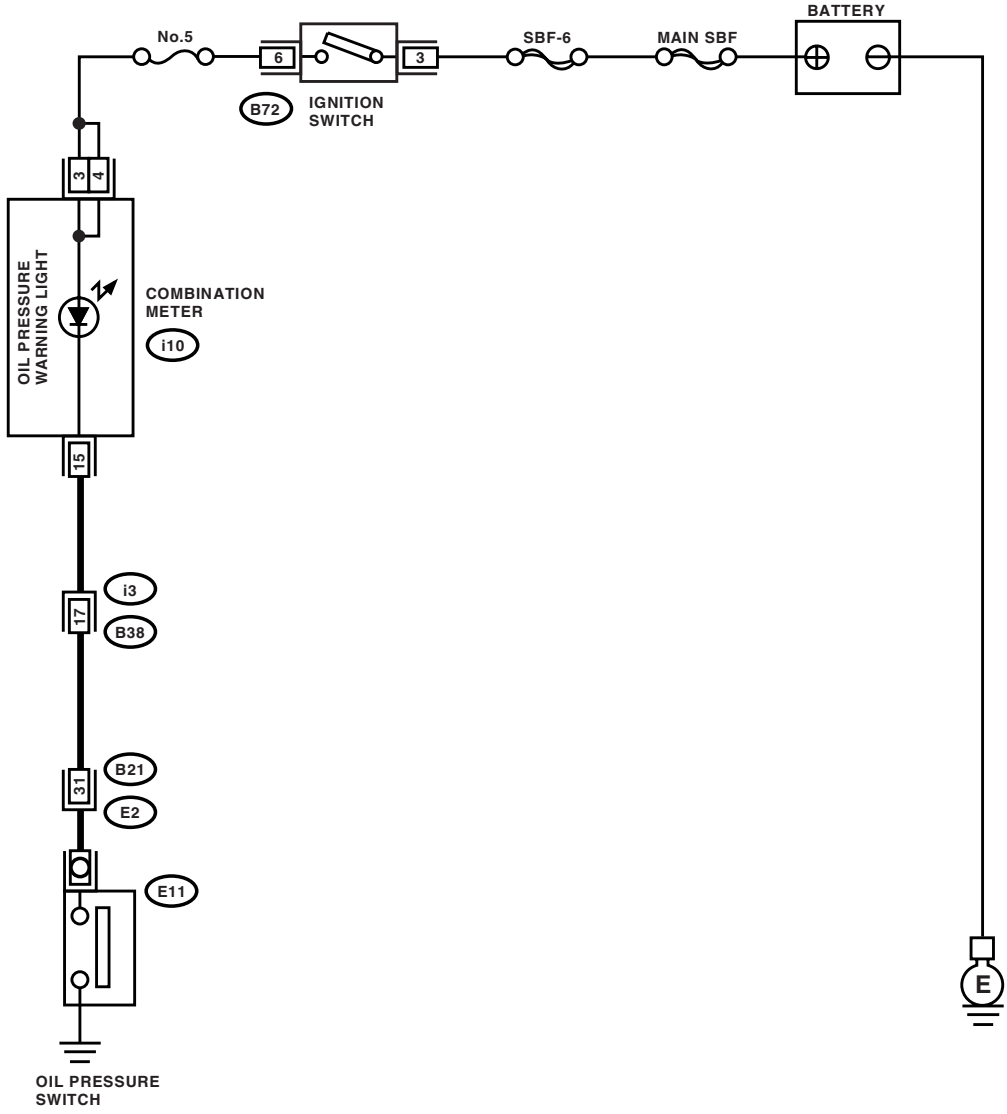
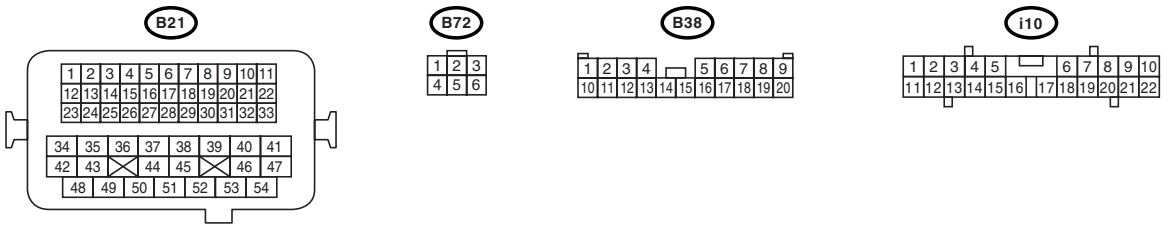
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.5 L model)
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter 68 mm (2.68 in))

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter 65 mm (2.56 in))
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil seal into oil pump.

2. Oil Pressure System

A: WIRING DIAGRAM





LU-02155

B: INSPECTION

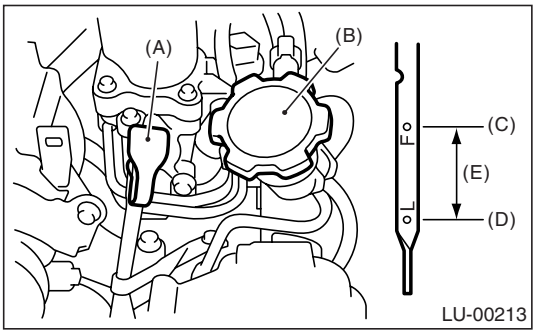
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1) Turn the ignition switch to ON. (engine OFF) 2) Check the warning light of combination meter.	Does the warning light illuminate?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between oil pressure switch connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of the combination meter. ***Connector & terminal*** ***(i10) No. 3 — (i10) No. 15:*** ***(i10) No. 4 — (i10) No. 15:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted and properly orientated.
4) Remove the oil level gauge again and check the engine oil level. If the engine oil level is below the "L" line, add oil to bring the level up to the "F" line.
5) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level shows in the range between "F" line and notch mark. This is caused by thermal expansion of engine oil.

NOTE:
To prevent overfilling of engine oil, do not add oil above the "F" line when the engine is cold.

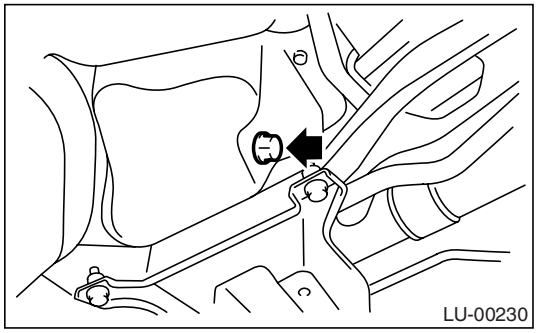


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

B: REPLACEMENT

1) Open the engine oil filler cap for quick draining of engine oil.
2) Lift-up the vehicle.
3) Drain the engine oil by loosening the engine oil drain plug.

NOTE:
Prepare the container for draining of engine oil.



4) Tighten the engine oil drain plug after draining engine oil.

NOTE:
Use a new drain plug gasket.

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

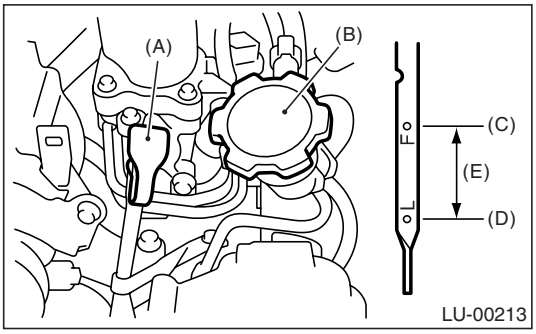
5) Use the engine oil of proper quality and viscosity, fill the engine oil through oil filler duct to upper level on oil level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

Recommended oil:
Refer to "SPECIFICATION" for the recommended oil. <Ref. to LU(H4SO 2.0)-2, SPECIFICATION, General Description.>

Engine oil capacity (when replacing engine oil):
4.0 ℓ (4.2 US qt, 3.5 Imp qt)

6) Close the engine oil filler cap.
7) Start the engine and warm it up for a time.

8) After the engine stops, recheck the oil level. If necessary, add the engine oil up to the upper level on oil level gauge.

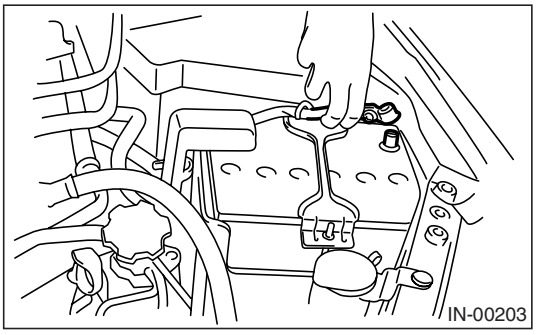


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

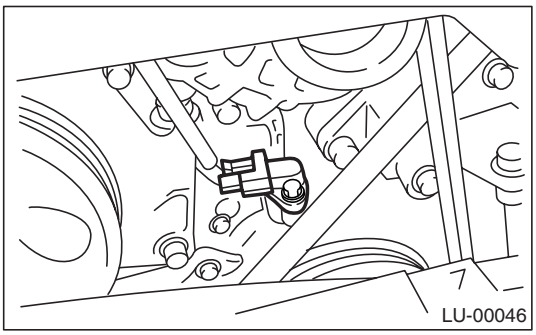
4. Oil Pump

A: REMOVAL

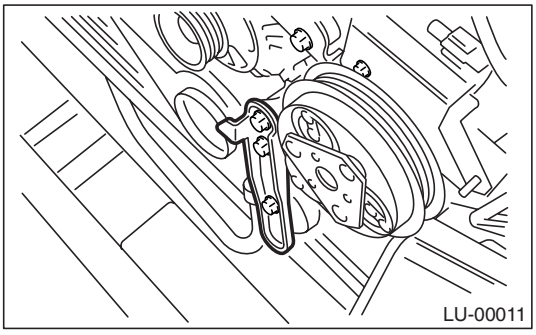
1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Remove the radiator. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
6) Remove the crankshaft position sensor.

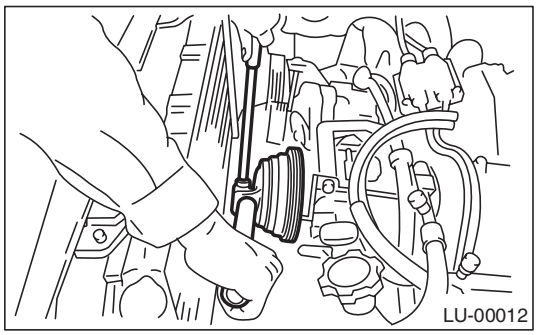


7) Remove the V-belt. <Ref. to ME(H4SO 2.0)-37, REMOVAL, V-belt.>
8) Remove the belt tensioner.

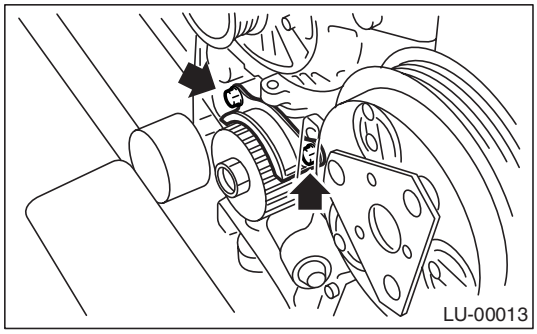


9) Remove the crank pulley using ST.

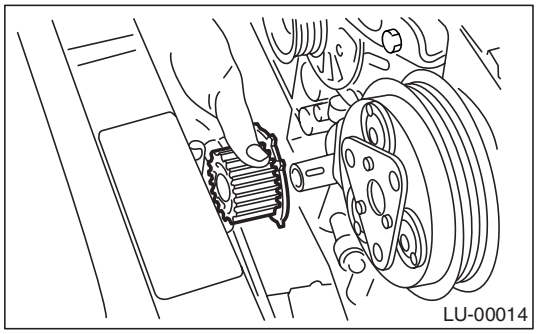
ST	499977400	CRANK PULLEY WRENCH (2.0 L model)
ST	499977100	CRANK PULLEY WRENCH (2.5 L model)



10) Remove the water pump. <Ref. to CO(H4SO 2.0)-15, REMOVAL, Water Pump.>
11) Remove the timing belt guide. (MT model)

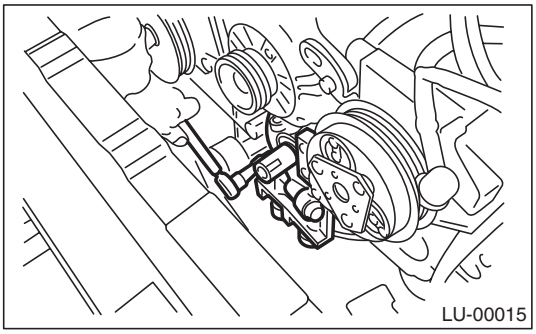


12) Remove the crank sprocket.



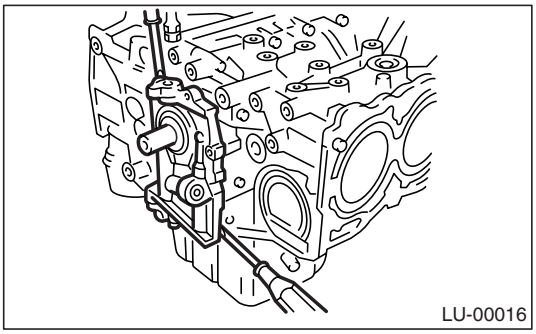
13) Remove the bolt which installs oil pump to cylinder block.

NOTE:
When disassembling and checking the oil pump, loosen the relief valve plug before removing oil pump.


LU-00015

14) Remove the oil pump by using flat tip screwdriver.

CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.

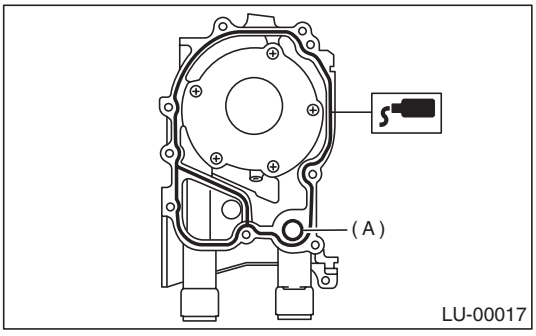

LU-00016

B: INSTALLATION

Install in the reverse order of removal.
Perform the following.
1) Apply liquid gasket to mating surfaces of oil pump.

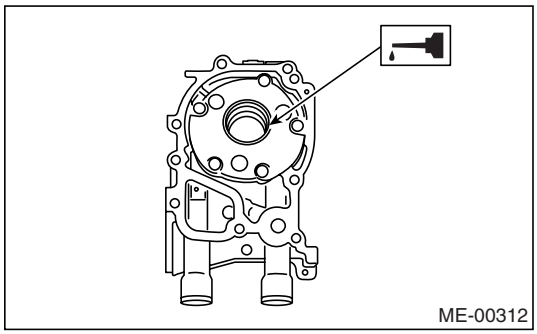
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

2) Replace the O-ring (A) with a new one.



LU-00017

3) Apply a coat of engine oil to the inside of oil seal.


ME-00312

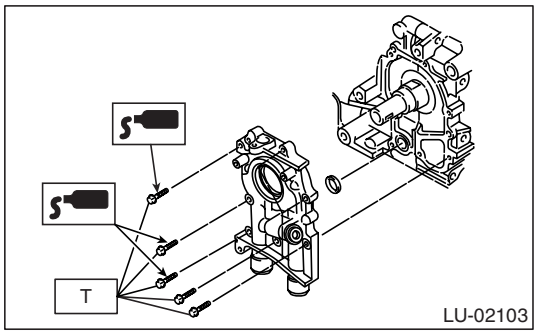
4) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
• Make sure the oil seal lip is not folded.
• Do not forget to install the O-ring and seal when installing the oil pump.

5) Install the oil pump.
6) Apply liquid gasket to the threaded portion of three bolts. (if reusing the bolts)

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

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

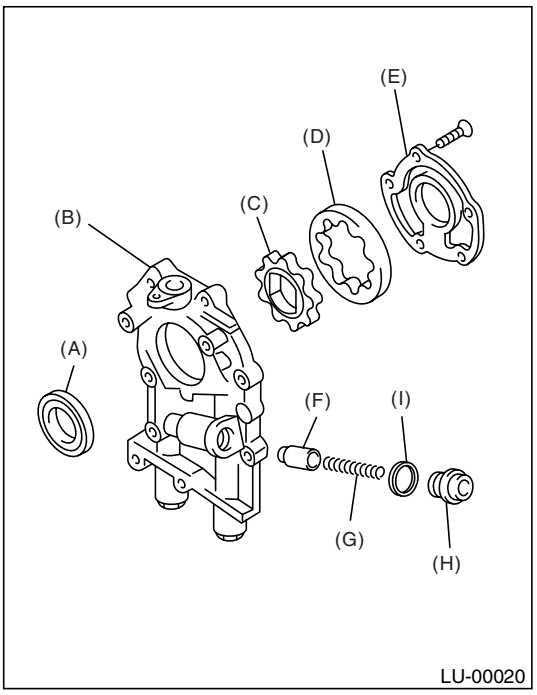


LU-02103

C: DISASSEMBLY

Remove the screw which secures oil pump cover and then disassemble oil pump. Inscribe alignment marks on inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before disassembling the oil pump, remove the relief valve.

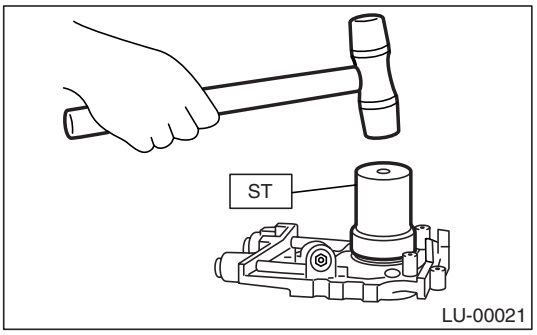


(A) Oil seal
(B) Oil pump case
(C) Inner rotor
(D) Outer rotor
(E) Oil pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

D: ASSEMBLY

1) Install the front oil seal using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.



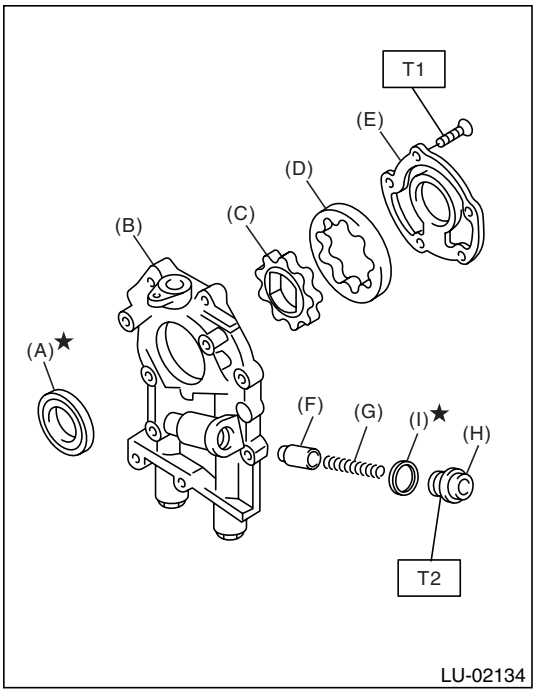
2) Apply a coat of engine oil to inner and outer rotors.

3) Install the inner and outer rotors in their original positions.
4) Install the oil relief valve and relief valve spring and plug.

NOTE:
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:
T1: 5.4 N·m (0.55 kgf-m, 4.0 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



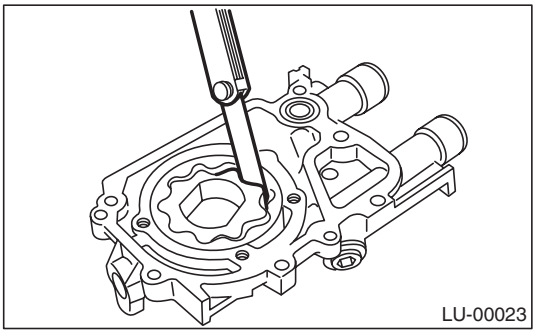
(A) Oil seal
(B) Oil pump case
(C) Inner rotor
(D) Outer rotor
(E) Oil pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance is out of the specification, replace rotors as a matched set.

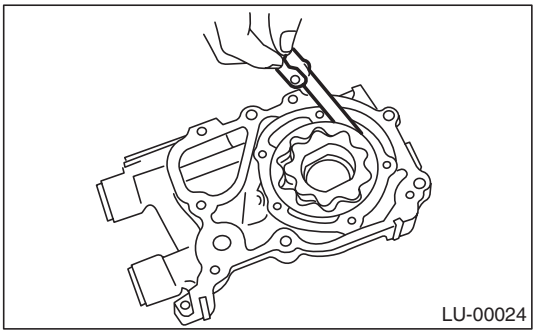
Tip clearance:
Specification
0.04 — 0.14 mm (0.0016 — 0.0055 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and oil pump rotor housing. If the clearance is out of the specification, replace the oil pump case.

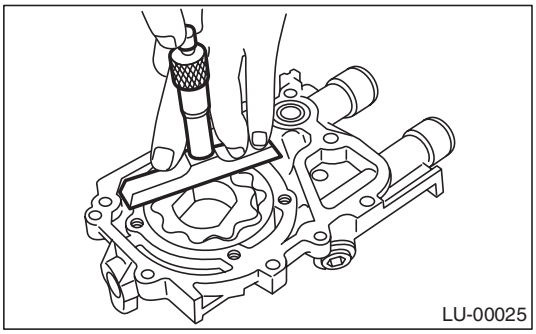
Case clearance:
Specification
0.10 — 0.175 mm (0.0039 — 0.0069 in)



3. SIDE CLEARANCE

Measure the clearance between oil pump inner rotor and pump cover. If the clearance is out of the specification, replace rotor or oil pump case.

Side clearance:
Specification
0.02 — 0.07 mm (0.0008 — 0.0028 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
72.8 mm (2.866 in)
Installed length
54.7 mm (2.154 in)
Load when installed
81.3 N (8.29 kgf, 18.24 lbf)

5. OIL PUMP CASE

Check the worn shaft hole, clogged oil passage, worn rotor chamber, cracks and other faults.

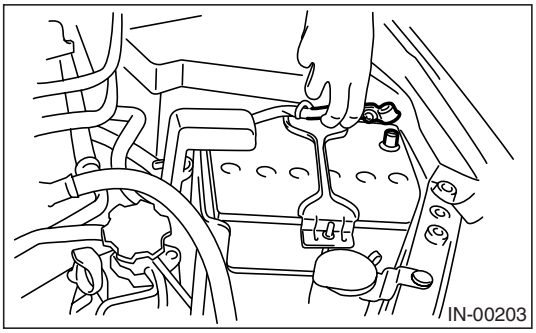
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc., and replace if defective.

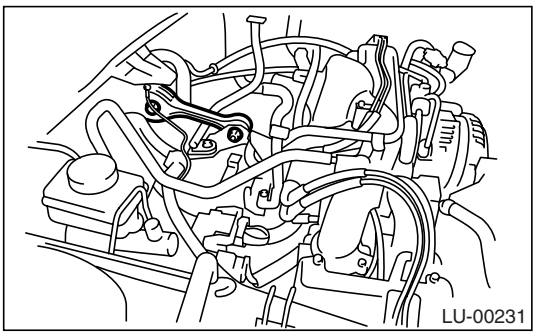
5. Oil Pan and Strainer

A: REMOVAL

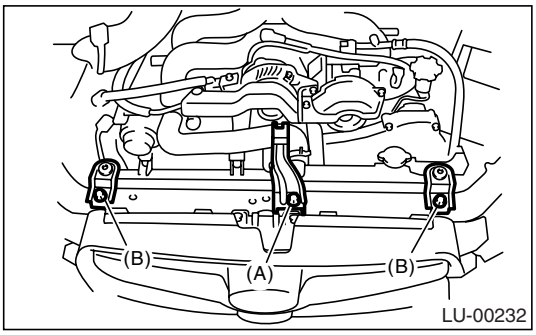
1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Disconnect the ground cable from battery.



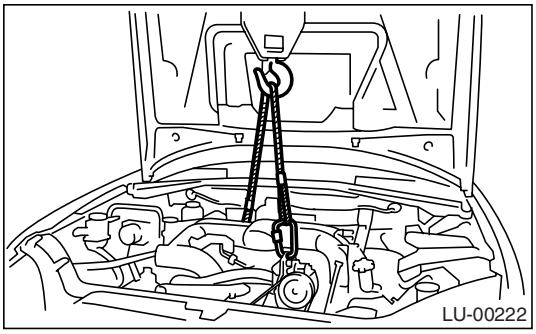
4) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>
5) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
6) Remove the pitching stopper.



7) Remove the hood stay holder (A) and radiator upper brackets (B).



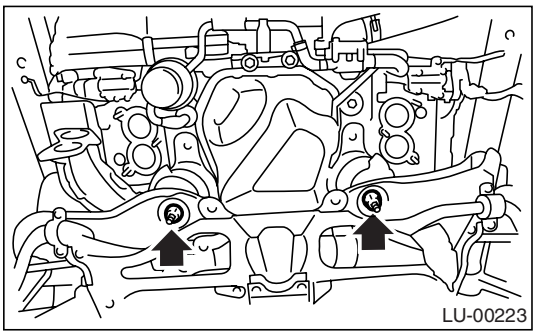
8) Support the engine with a lifting device and wire ropes.



9) Lift-up the vehicle.

CAUTION:
When lifting up the vehicle, raise up wire ropes at the same time.

10) Remove the under cover.
11) Drain the engine oil. <Ref. to LU(H4SO 2.0)-9, REPLACEMENT, Engine Oil.>
12) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-9, REMOVAL, Center Exhaust Pipe.>
13) Remove the nuts which install front cushion rubber onto front crossmember.

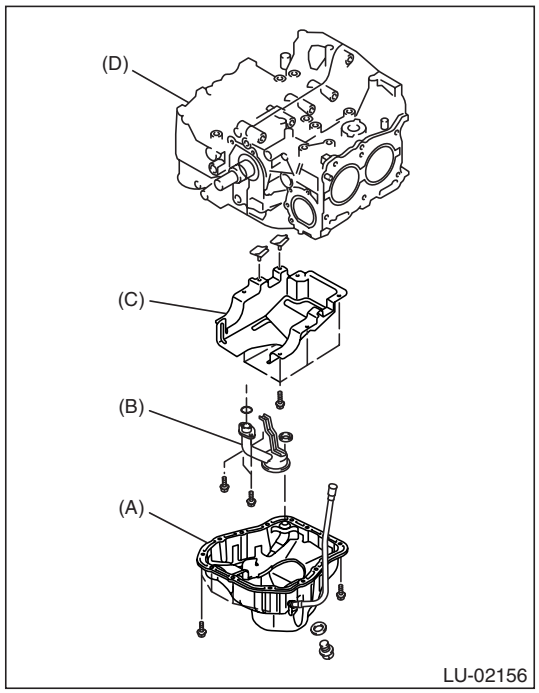


14) Remove the bolts which install oil pan on cylinder block with engine raised up.
15) Insert the oil pan cutter blade into the clearance between cylinder block and oil pan.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

16) Remove the oil strainer.

17) Remove the baffle plate.

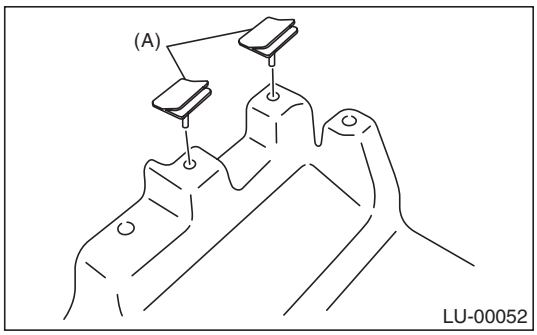


(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

B: INSTALLATION

CAUTION:
Before installing the oil pan, clean the mating surface of oil pan and cylinder block.

1) Make sure that the seal (A) is installed securely on the buffle plate in a direction as shown in the figure below.



2) Install the baffle plate.

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

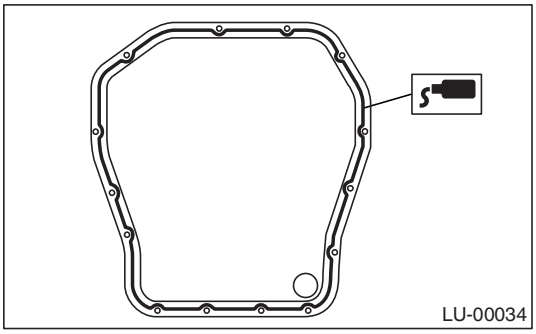
3) Install the oil strainer onto baffle plate.

NOTE:
Replace the O-ring with a new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

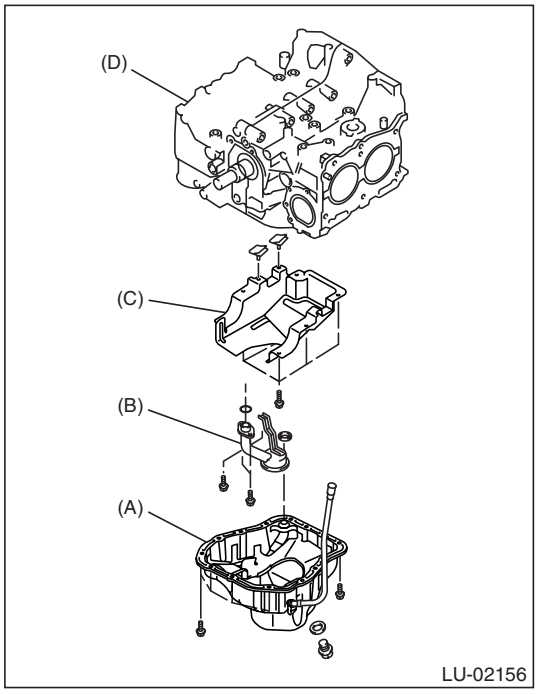
4) Apply liquid gasket to mating surfaces and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



5) Tighten the bolt which installs oil pan to engine block.

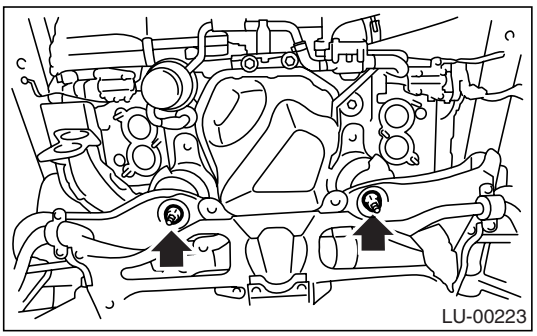
Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

6) Lower the engine onto front crossmember.
7) Tighten the nuts which install front cushion rubber onto front crossmember.

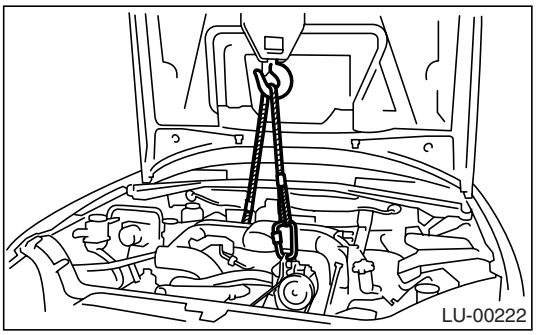
Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)


LU-00223

8) Install the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-9, INSTALLATION, Center Exhaust Pipe.>
9) Install the under cover.
10) Lower the vehicle.

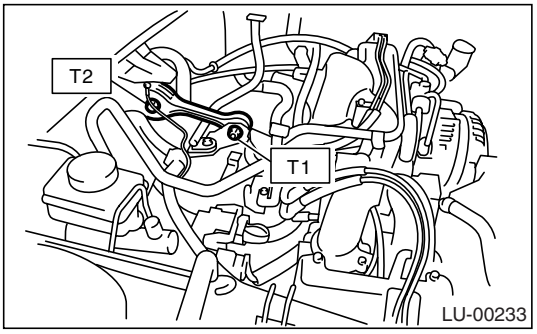
CAUTION:
When lowering the vehicle, lower the lift-up device and wire ropes at the same time.

11) Remove the lifting device and wire ropes.


LU-00222

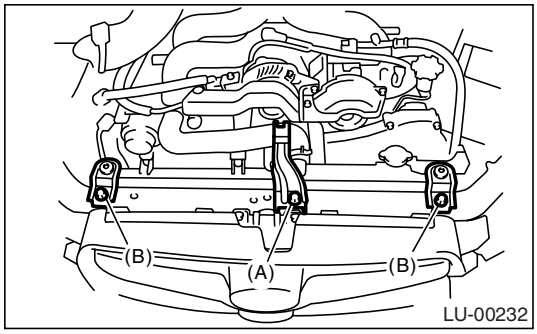
12) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



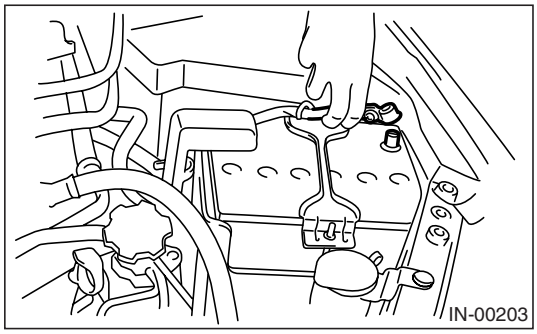
LU-00233

13) Install the hood stay holder (A) and radiator upper brackets (B).



LU-00232

14) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Intake Chamber.>
15) Install the air intake duct and air cleaner case. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.>
16) Install the front wheels.
17) Connect the ground cable to battery.


IN-00203

18) Fill the engine oil. <Ref. to LU(H4SO 2.0)-9, INSPECTION, Engine Oil.>

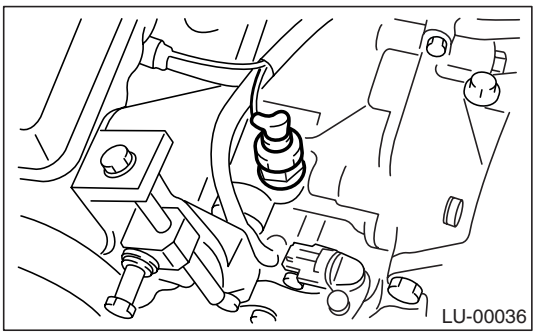
C: INSPECTION

Visually check that the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

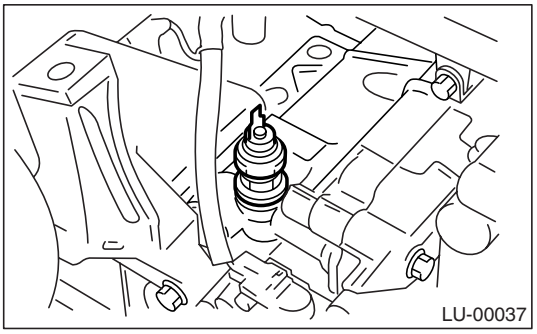
6. Oil Pressure Switch

A: REMOVAL

1) Remove the generator from bracket.
<Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
2) Disconnect the terminal from oil pressure switch.



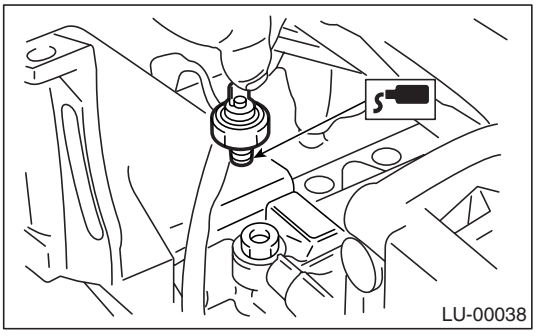
3) Remove the oil pressure switch.



B: INSTALLATION

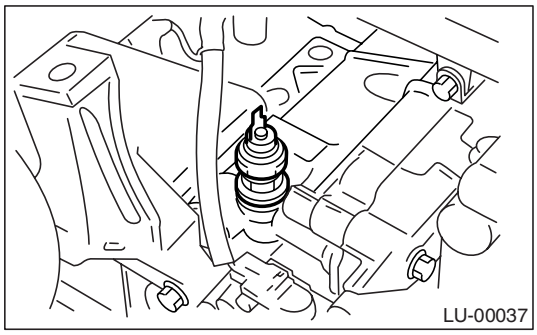
1) Apply liquid gasket to oil pressure switch threads.

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

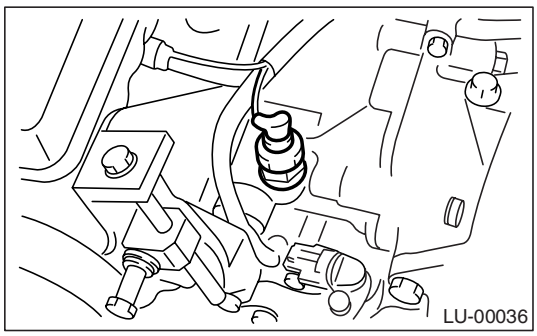


2) Install the oil pressure switch onto engine block.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



3) Connect the terminal to oil pressure switch.



4) Install the generator to bracket.
<Ref. to SC(H4SO 2.0)-14, INSTALLATION, Generator.>

C: INSPECTION

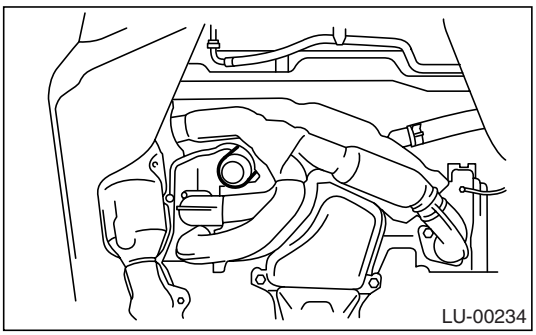
Check the oil pressure switch installation portion for oil leakage and oil seepage.

7. Engine Oil Filter

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the oil filter using ST.

ST	18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))



B: INSTALLATION

1) Clean the oil filter installing surface on cylinder block.
2) Apply a thin coat of engine oil to the seal rubber of new oil filter.
3) Install the oil filter turning it by hand, being careful not to damage the seal rubber.
4) Tighten more after the seal rubber contacts cylinder block.

NOTE:
- In case of oil filter in outer diameter 68 mm (2.68 in), tighten by approx. one turn.
- In case of oil filter in outer diameter 65 mm (2.56 in), tighten by approx. 2/3 to 3/4 turn.
- Do not tighten excessively because oil may leak.

C: INSPECTION

1) After installing the oil filter, run engine and make sure that no oil is leaking around the seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H4SO 2.0)-9, INSPECTION, Engine Oil.>

8. Engine Lubrication System Trouble in General

A: INSPECTION

Before performing diagnosis, make sure that the engine oil level is correct and no oil leakage exists.

Symptom	Possible cause		Corrective action
1. Warning light does not go off.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogging of oil filter	Replace.
		Malfunction of oil by-pass valve in oil filter	Clean or replace.
		Malfunction of oil relief valve in oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not turn on.	1) Malfunction of combination meter.		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1) — 2).

SPEED CONTROL SYSTEMS

SP(H4SO 2.0)

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1. General Description 2
2. Accelerator Pedal.....4

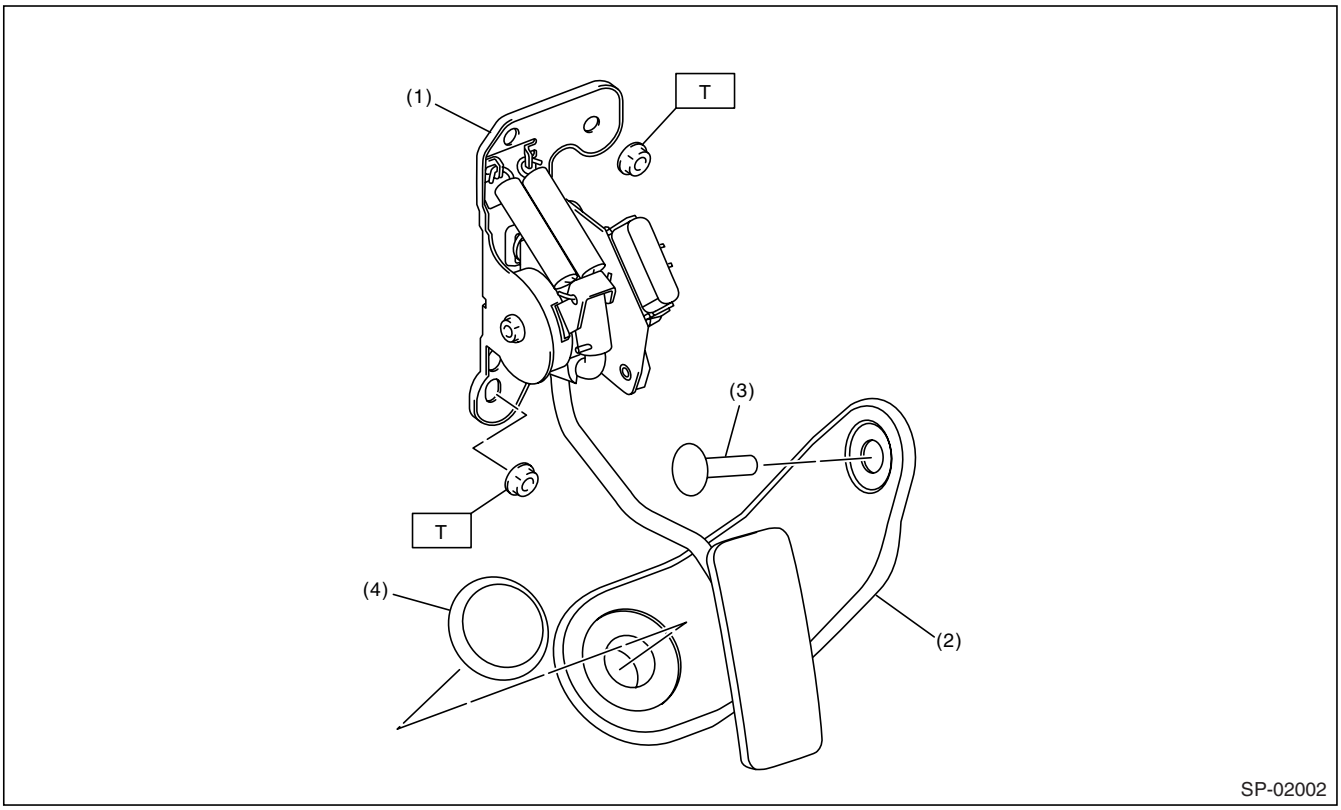
1. General Description

A: SPECIFICATION

Accelerator pedal	Stroke	At pedal pad	LHD model	50 — 63 mm (1.97 — 2.48 in)
			RHD model	53 — 65 mm (2.09 — 2.56 in)

B: COMPONENT

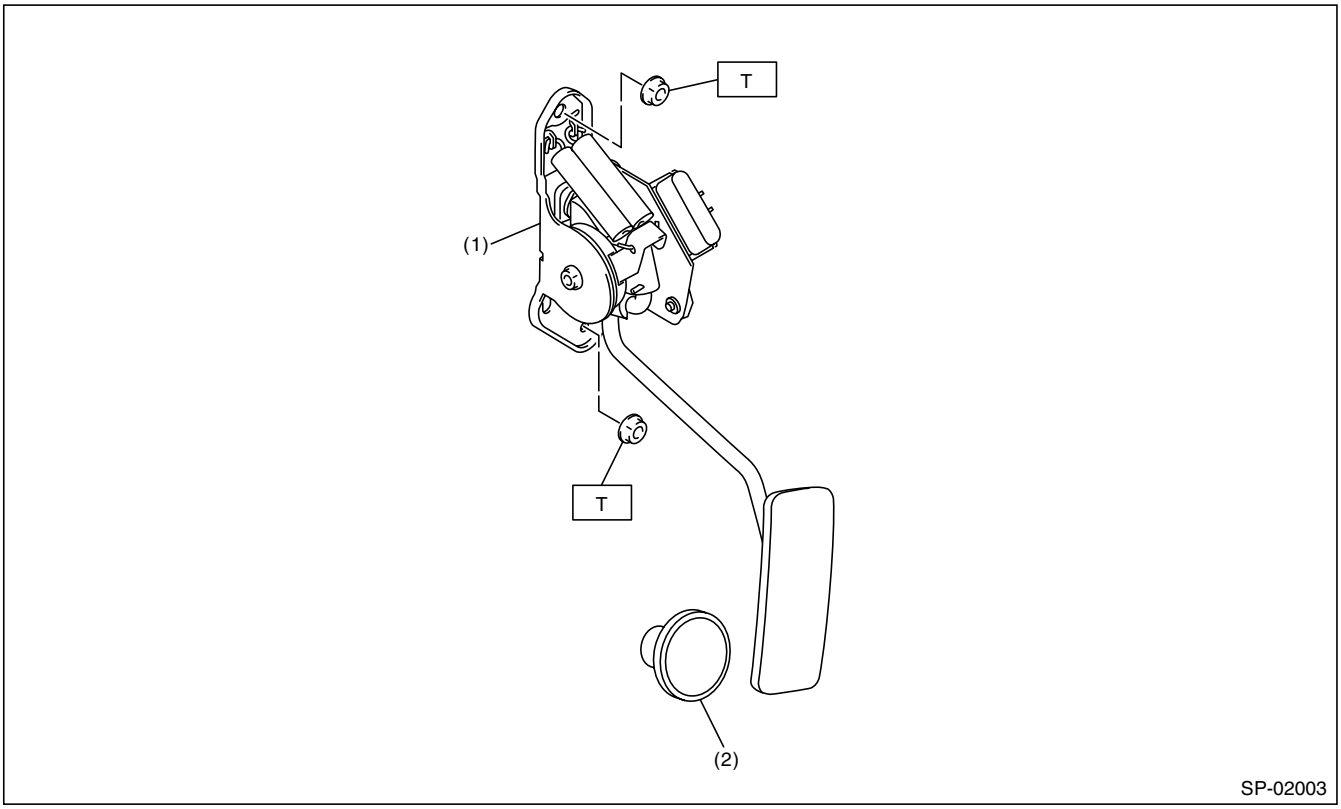
• LHD model



(1) Accelerator pedal ASSY
(2) Accelerator plate
(3) Clip
(4) Stopper

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

• RHD model



(1) Accelerator pedal ASSY
(2) Stopper

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

C: CAUTION

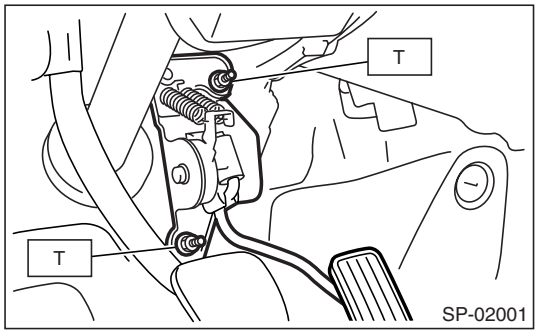
• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Accelerator Pedal

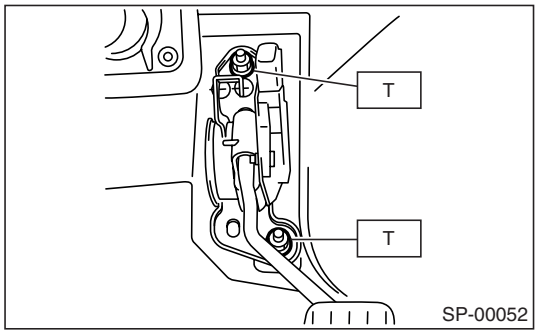
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the connector.
3) Remove the nut securing accelerator pedal assembly.

- LHD model



- RHD model



B: INSTALLATION

Install in the reverse order of removal.

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

C: DISASSEMBLY

NOTE:
Accelerator pedal cannot be disassembled.

IGNITION

IG(H4SO 2.0)

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1. General Description 2
2. Spark Plug....5
3. Ignition Coil and Ignitor Assembly....8
4. Spark Plug Cord....10

1. General Description

A: SPECIFICATION

1. 2.0 L MODEL

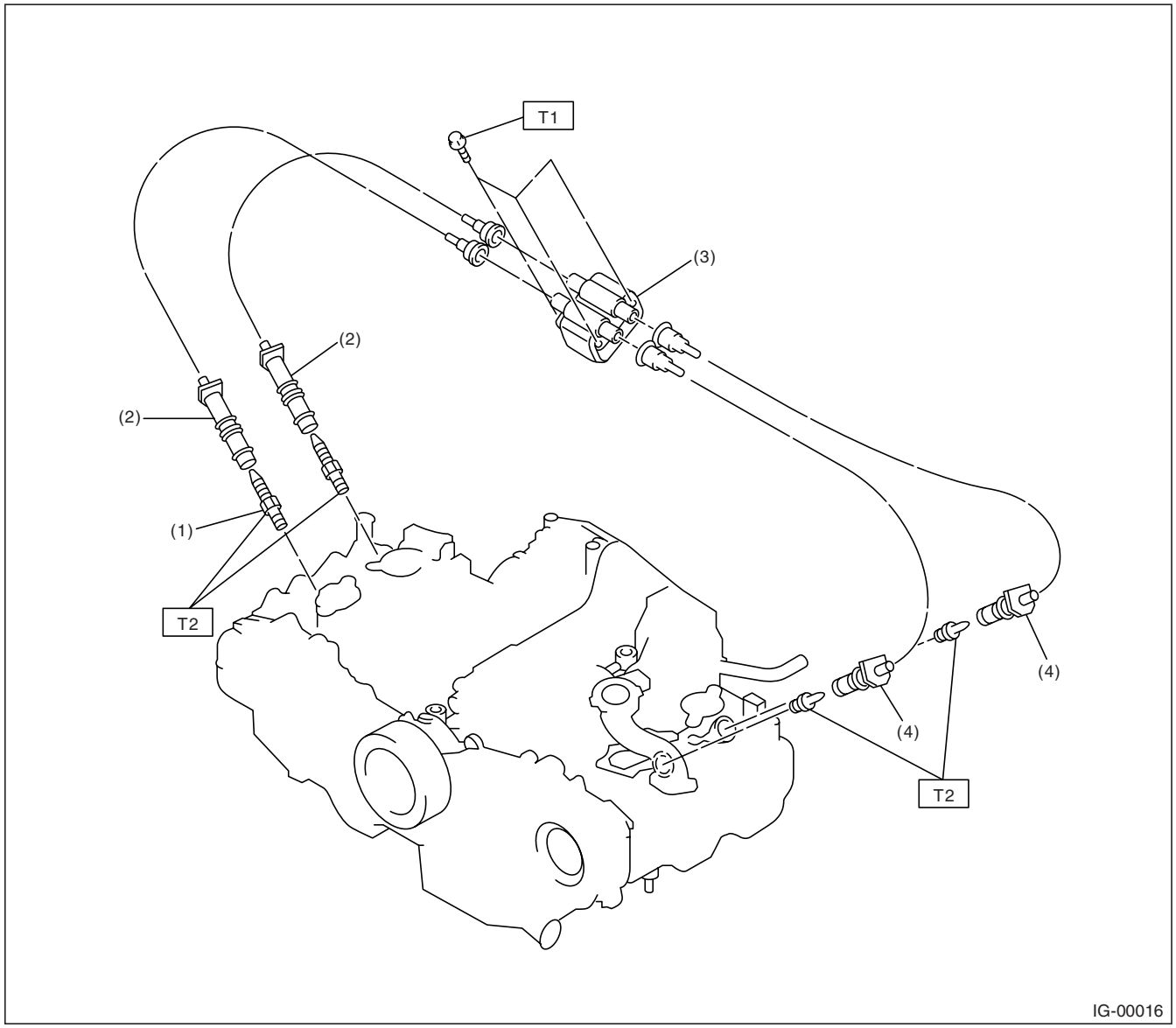
Item			Specifications
Ignition coil and ignitor ASSY	Model		CM12-100C
	Manufacturer		HITACHI
	Secondary coil resistance		18.0 kΩ±20%
Spark plug	Manufacturer and type		CHAMPION: RC10YC4
	Thread size (diameter, pitch, length)	mm	14, 1.25, 19
	Spark plug gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)
	Electrode		Nickel

2. 2.5 L MODEL

Item			Specifications
Ignition coil and ignitor ASSY	Model		FH 0286
	Manufacturer		Diamond Electric
	Secondary coil resistance		11.7 kΩ±15%
Spark plug	Manufacturer and type	EC, EK, K4, EH, ER model	NGK: PFR5B-11
		KA, KS model	CHAMPION: RC10YC4
	Thread size (diameter, pitch, length)	mm	14, 1.25, 19
	Spark plug gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)
	Electrode	EC, EK, K4, EH, ER model	Platinum
		KA, KS model	Nickel

B: COMPONENT

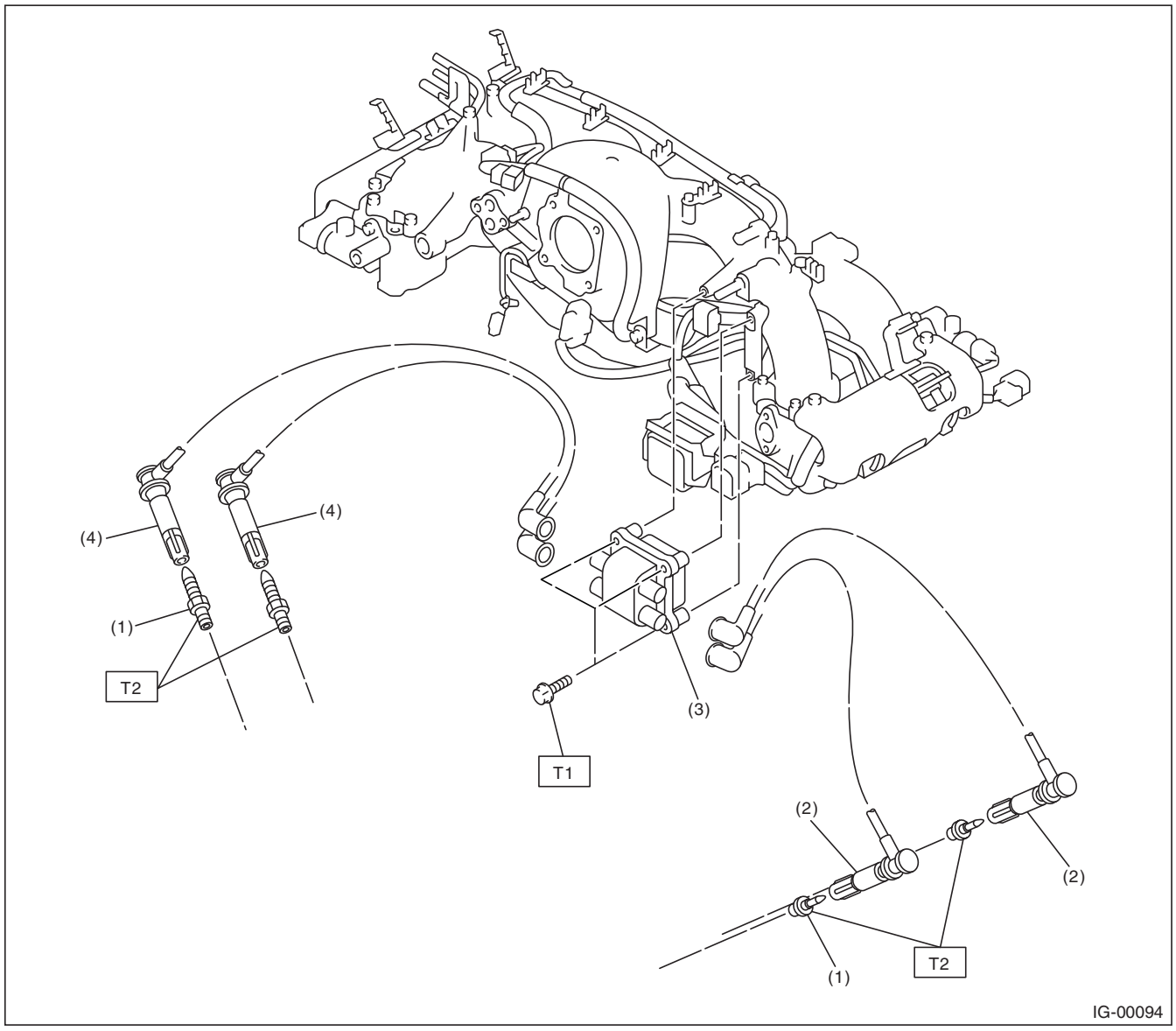
- 2.0 L model



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil and ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.2)

• 2.5 L model



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil and ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.2)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

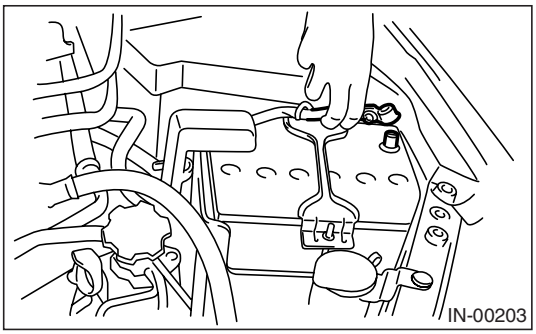
A: REMOVAL

CAUTION:
All spark plugs installed on an engine must be of the same heat range.

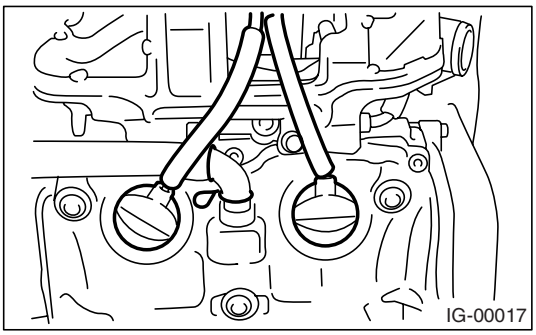
Spark plug:
<Ref. to IG(H4SO 2.0)-2, SPECIFICATION, General Description.>

1. RH SIDE

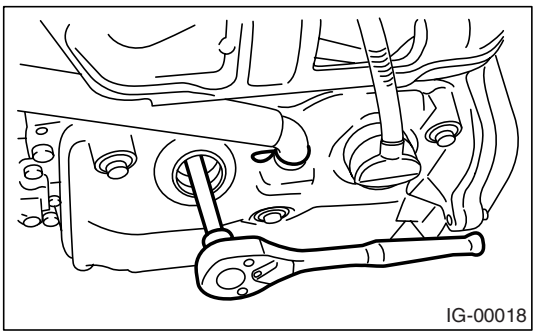
1) Disconnect the ground cable from battery.


IN-00203

2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>
3) Remove the spark plug cords by pulling the boot. (Do not pull the cord itself.)

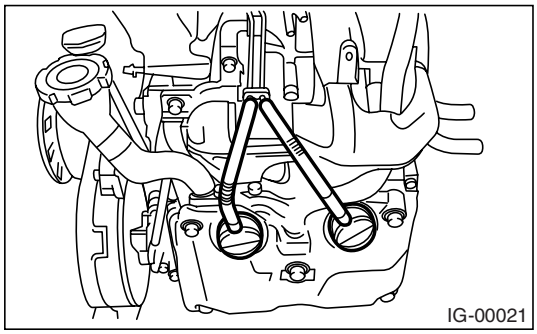

IG-00017

4) Remove the spark plug with a spark plug socket.

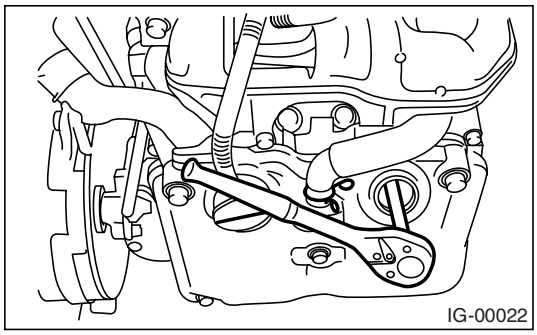

IG-00018

2. LH SIDE

1) Remove the battery.
2) Remove the spark plug cords by pulling the boot. (Do not pull the cord itself.)


IG-00021

3) Remove the spark plug with a spark plug socket.


IG-00022

B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

NOTE:
The above torque should only be applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

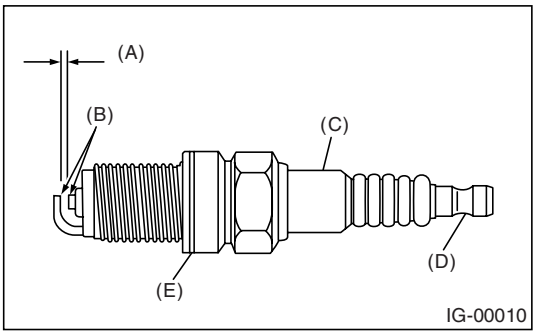
Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

NOTE:
The above torque should only be applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

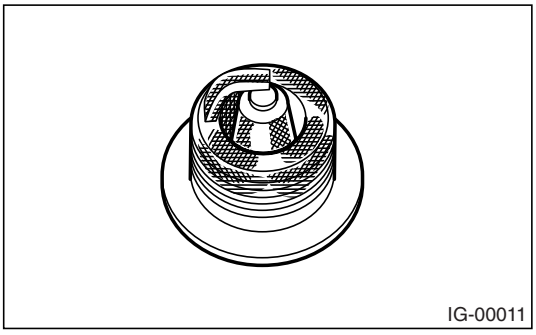
C: INSPECTION

Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.

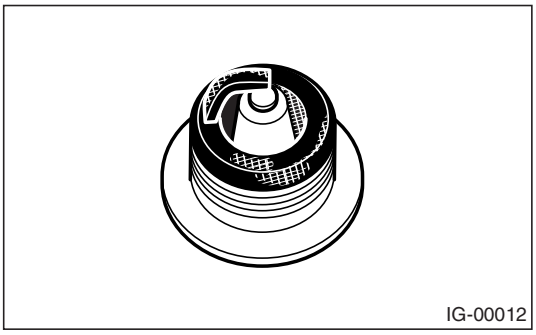


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Crack
(D) Damage
(E) Damaged gasket

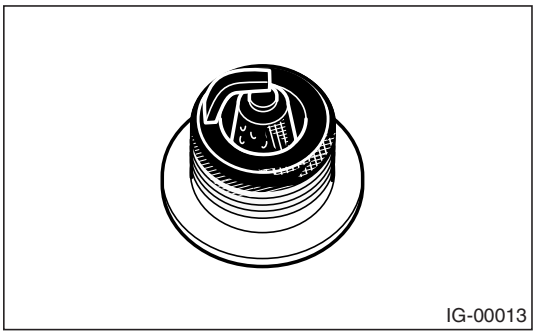
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



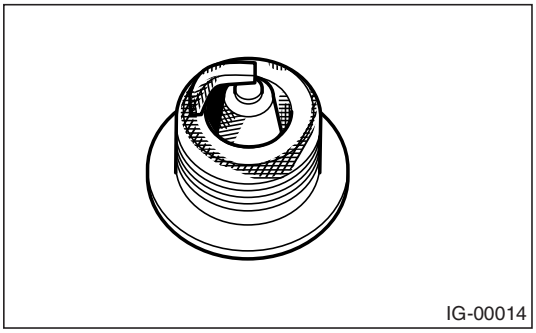
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in the city, weak ignition, too rich fuel mixture and dirty air cleaner.



3) Oil fouled:
Wet black deposits show oil entrance into the combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems.



4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, etc.

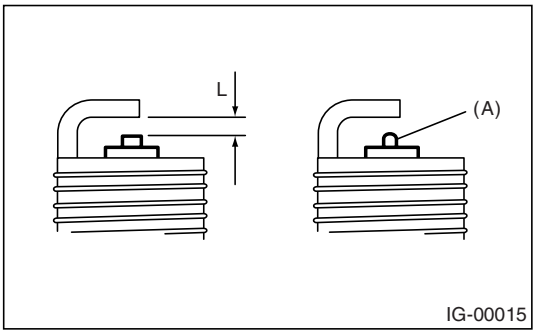


D: ADJUSTMENT

Clean the spark plugs using a wire brush.
Clean and remove the carbon or oxide deposits. But do not wear away porcelain.
If deposits are too stubborn, replace the spark plugs.
After cleaning the spark plugs, correct the spark plug gap using a gap gauge.

NOTE:
• For 2.5 L EC, EK, EH, ER and K4 models, do not use a plug cleaner because the spark plugs are applied with platinum tip.
• For 2.0 L model and 2.5 L KA, KS model, replace with a new spark plug if the area (A) shown in the figure is worn to “ball” shape.

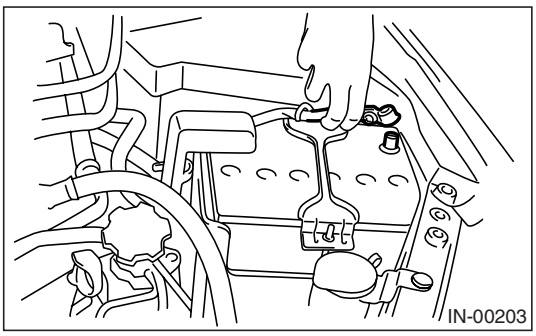
Spark plug gap L:
1.0 — 1.1 mm (0.039 — 0.043 in)



3. Ignition Coil and Ignitor Assembly

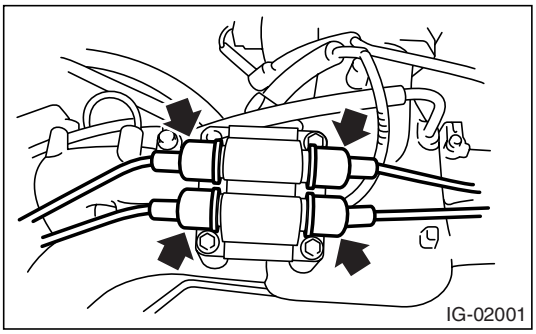
A: REMOVAL

1) Disconnect the ground cable from battery.

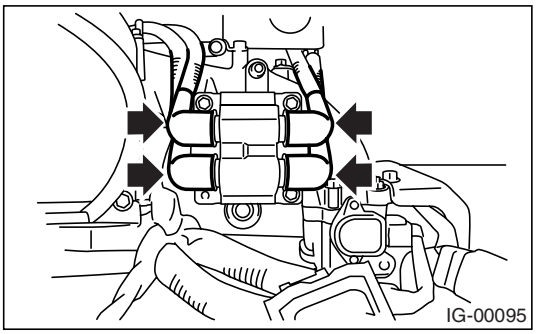


2) Disconnect the spark plug cords from ignition coil and ignitor assembly.

- 2.0 L model



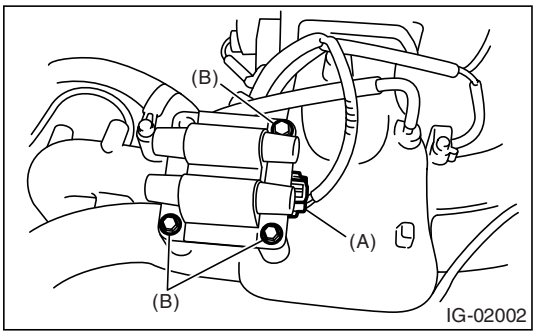
- 2.5 L model



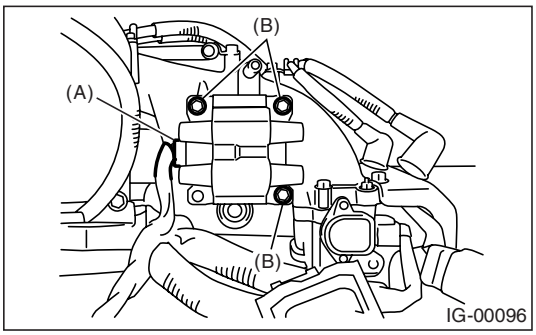
3) Disconnect the connector (A) from ignition coil and ignitor assembly.

4) Remove the bolt (B) which secures the ignition coil and ignitor assembly to intake manifold.

- 2.0 L model



- 2.5 L model



B: INSTALLATION

Install in the reverse order of removal.

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

CAUTION:
Connect the spark plug cords to correct positions. Failure to do so will damage the unit.

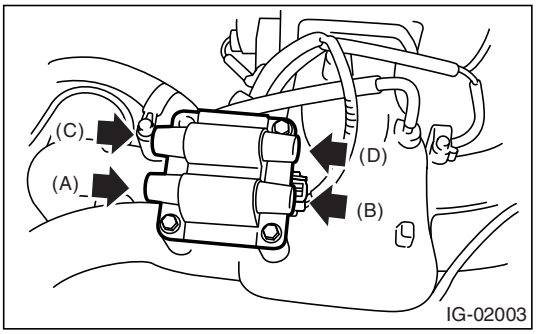
C: INSPECTION

Check the secondary coil resistance using a tester.

CAUTION:
• If the resistance is extremely low, it indicates the presence of a short-circuit.
• Ignitor is integrated with the coil. Therefore the resistance of primary side coil cannot be measured.

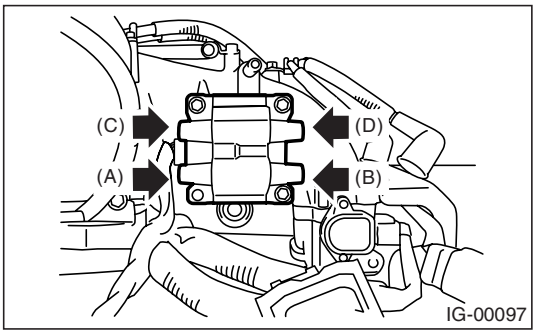
Specified resistance (2.0 L model):

[Secondary side]
Between (A) and (B)
18.0 kΩ±20%
Between (C) and (D)
18.0 kΩ±20%



Specified resistance (2.5 L model):

[Secondary side]
Between (A) and (B)
11.7 kΩ±15%
Between (C) and (D)
11.7 kΩ±15%



4. Spark Plug Cord

A: INSPECTION

Check the following items.

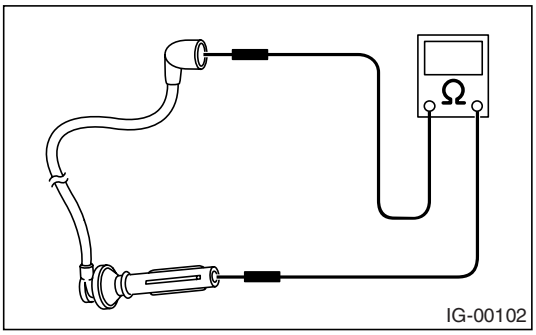
- Damage to cords, deformation, burning or rust formation of terminals
- Resistance value of cords

Resistance value (2.0 L model):

#1 cord: 5.9 — 11.1 kΩ
#2 cord: 8.8 — 14.8 kΩ
#3 cord: 6.8 — 11.7 kΩ
#4 cord: 8.8 — 14.8 kΩ

Resistance value (2.5 L model):

#1 cord: 7.1 — 12.1 kΩ
#2 cord: 12.1 — 19.9 kΩ
#3 cord: 7.7 — 13.0 kΩ
#4 cord: 12.3 — 20.2 kΩ



STARTING/CHARGING SYSTEMS

SC(H4SO 2.0)

Page

1. General Description 2
2. Starter 6
3. Generator 14
4. Battery 20

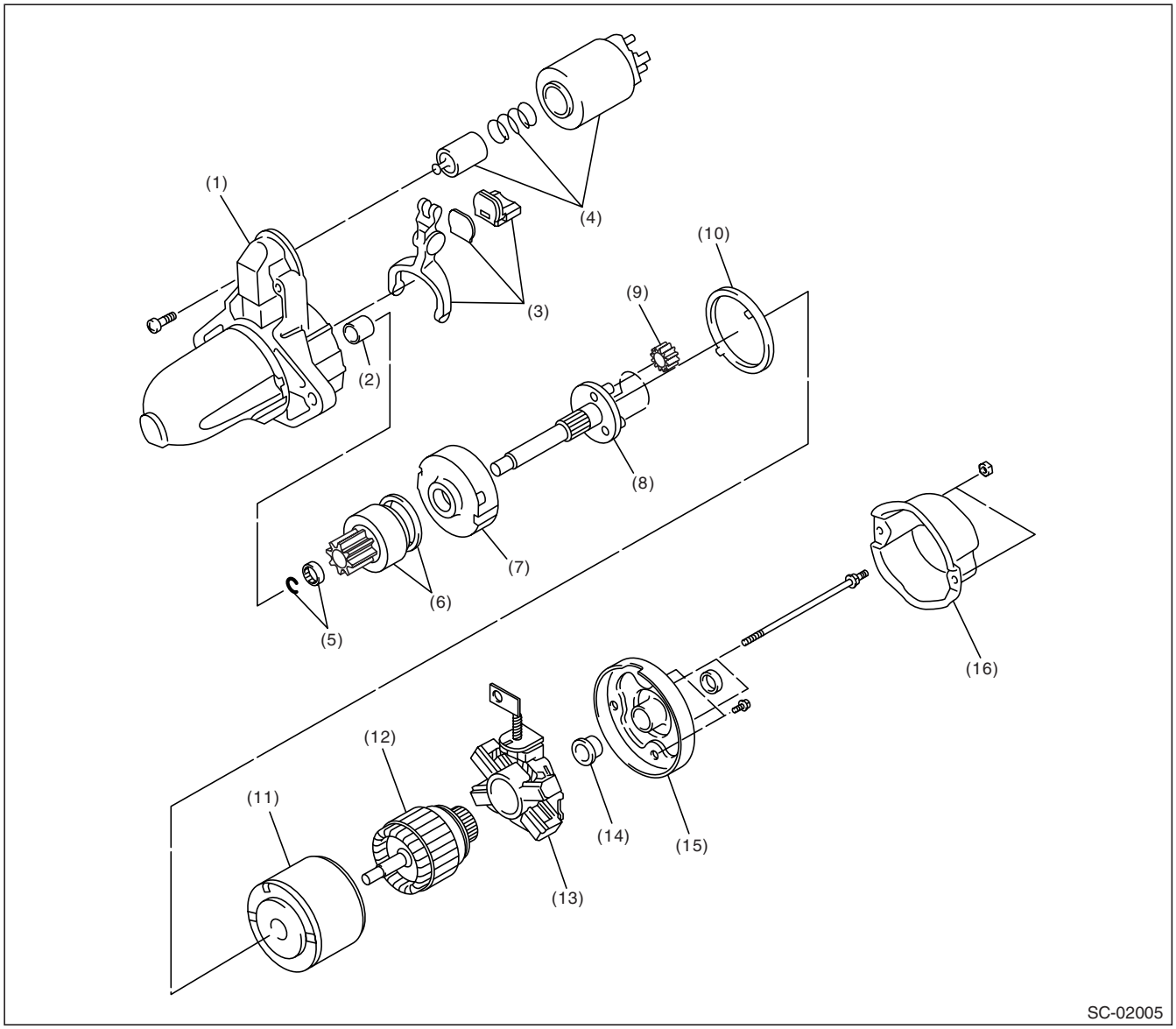
1. General Description

A: SPECIFICATION

Item			Specifications	
Vehicle model			MT	AT
Starter	Model		Reduction type	
	Model		M000T30471	M000T20171
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Revolving direction		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	95 A or less	90 A or less
		Rotating speed	More than 2,500 rpm	More than 2,000 rpm
	Load characteristics	Voltage	7.5 V	7.7 V
		Current	300 A	400 A
		Torque	8.84 N·m (0.90 kgf-m, 6.5 ft-lb) or more	16.7 N·m (1.70 kgf-m, 12.3 ft-lb) or more
		Rotating speed	More than 870 rpm	More than 710 rpm
	Lock characteristics	Voltage	4 V	3.5 V
		Current	680 A or less	960 A or less
		Torque	17 N·m (1.73 kgf-m, 12.5 ft-lb) or more	31 N·m (3.16 kgf-m, 22.9 ft-lb) or more
Generator	Model		Rotating-field three-phase type, voltage regulator built-in type, with load response control system	
	Model	2.0 L and 2.5 L non-turbo	A3TG0491	
		3.0 L non-turbo	A3TG0591	
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 110 A	
	Polarity on ground side		Negative	
	Revolving direction		Clockwise (when observed from pulley side)	
	Armature connection		3-phase Y-type	
	Output current		1,500 rpm — 50 A or more 2,500 rpm — 91 A or more 5,000 rpm — 105 A or more	
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]	
Battery	Type and capacity	EC, EK, K4, EH, ER model	12V — 48AH (55D23L)	2.0 L non-turbo : 12V — 52 AH (65D23L) 2.5 L non-turbo and 3.0 L non-turbo : 12V — 52 AH (75D23L)
		KS, KA model	2.0 L non-turbo and 2.5 L non-turbo : 12V — 27 AH (34B19L) Turbo and 3.0 L non-turbo : 12V — 48 AH (55D23L)	

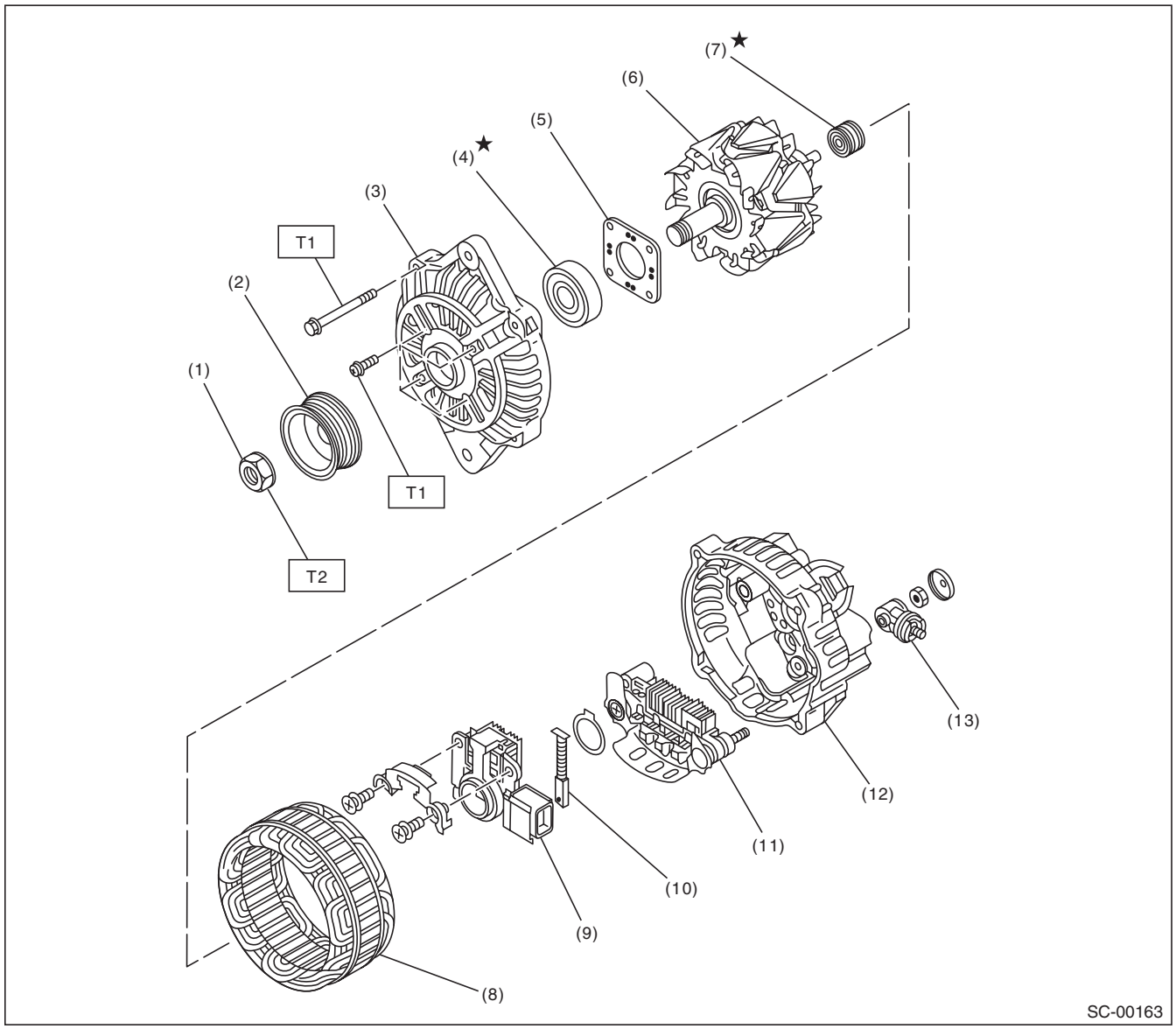
B: COMPONENT

1. STARTER



(1) Front bracket
(2) Sleeve bearing
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Overrunning clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Packing
(11) Yoke ASSY
(12) Armature
(13) Brush holder ASSY
(14) Sleeve bearing
(15) Rear cover
(16) Rear cover set

2. GENERATOR



(1) Pulley nut
(2) Pulley
(3) Front cover
(4) Ball bearing
(5) Bearing retainer
(6) Rotor
(7) Bearing
(8) Stator coil
(9) IC regulator with brush
(10) Brush
(11) Rectifier
(12) Rear cover
(13) Terminal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.7 (0.48, 3.5)
T2: 108 (11.0, 80)

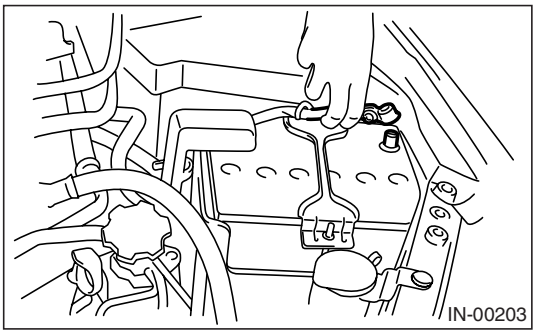
C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Starter

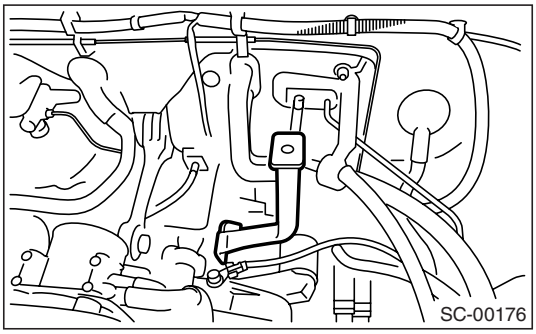
A: REMOVAL

1) Remove the collector cover. (Turbo model and 3.0 L Non-turbo model).
2) Disconnect the ground cable from battery.

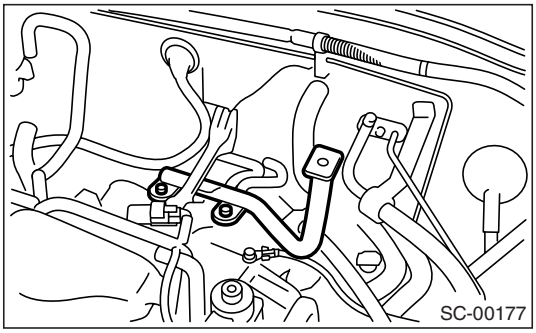


3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.> <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the air intake chamber stay LH. (SOHC non-turbo model)

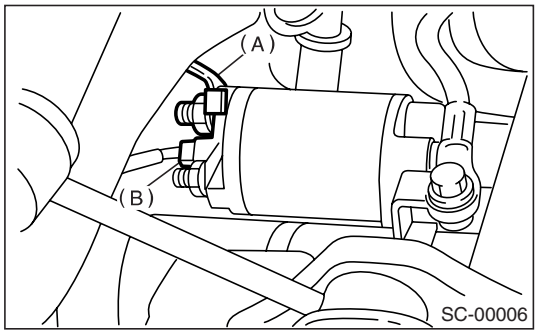
- MT model



- AT model



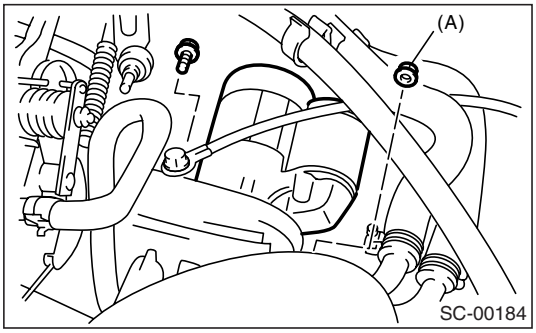
6) Disconnect the connector and terminal from starter.



(A) Terminal
(B) Connector

7) Remove the starter from transmission.

NOTE:
For MT model, the bolt is used in place (A).

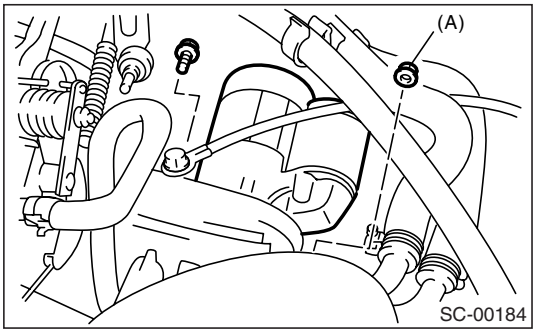


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
For MT model, the bolt is used in place (A).

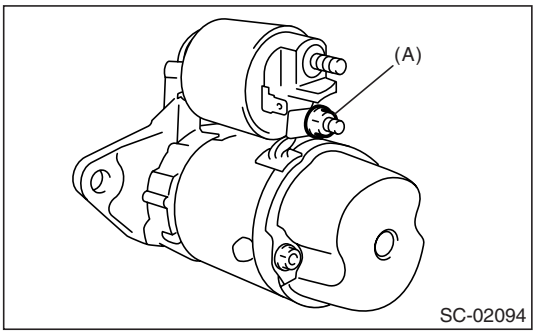
Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



C: DISASSEMBLY

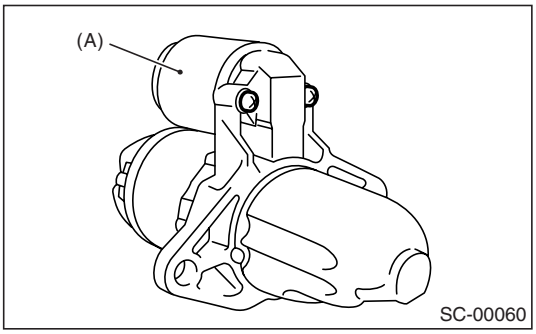
1. STARTER ASSEMBLY

1) Loosen the nut which holds terminal M of switch assembly, and then disconnect the connector.



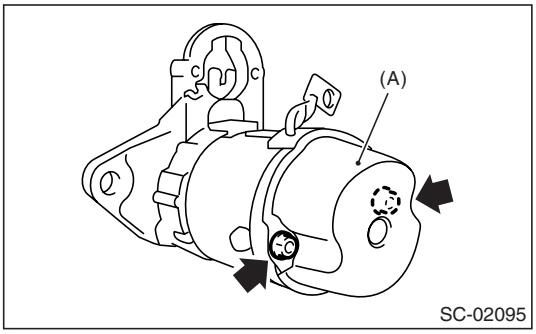
(A) Terminal M

2) Remove the bolts which hold switch assembly, and then remove the switch assembly, plunger and plunger spring from starter as a unit.



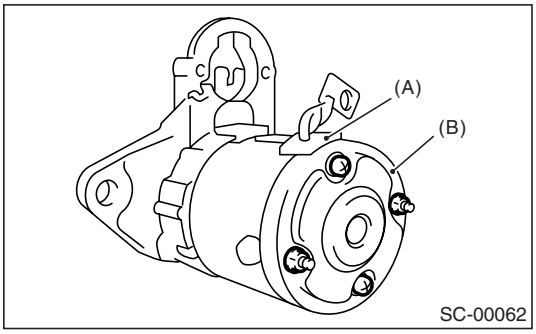
(A) Switch ASSY

3) Remove the nuts of both sides, and then remove rear cover set.



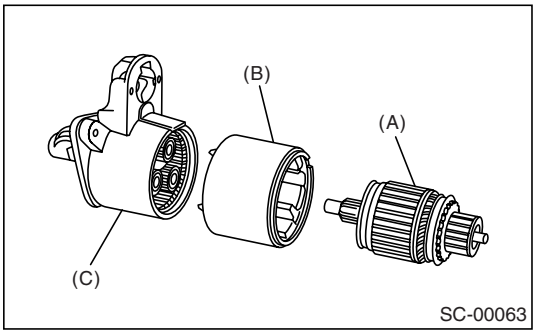
(A) Rear cover set

4) Remove the through-bolts and brush holder screws of both sides, and then detach the rear cover and brush holder assembly.



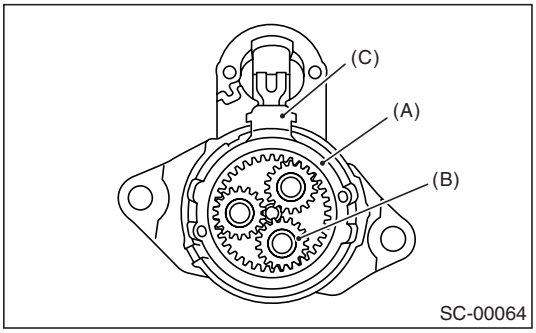
(A) Brush holder ASSY
(B) Rear cover

5) Remove the armature and yoke assembly from front bracket.



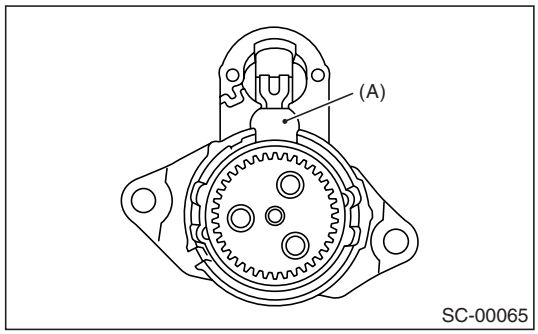
(A) Armature
(B) Yoke ASSY
(C) Front bracket

6) Remove the packing A, planetary gear and packing B.



(A) Packing A
(B) Planetary gear
(C) Packing B

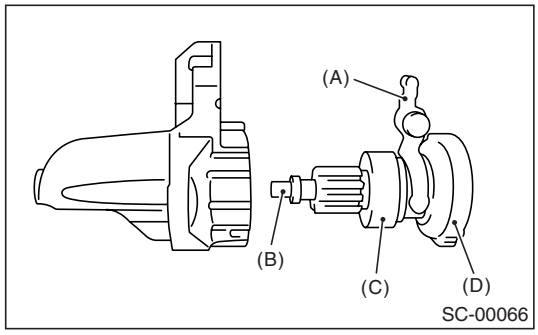
7) Remove the plate.



(A) Plate

8) Remove the shaft assembly and overrunning clutch from front bracket as a unit.

NOTE:
Check the following points before removal.
- Lever direction
- Position of internal gear assembly

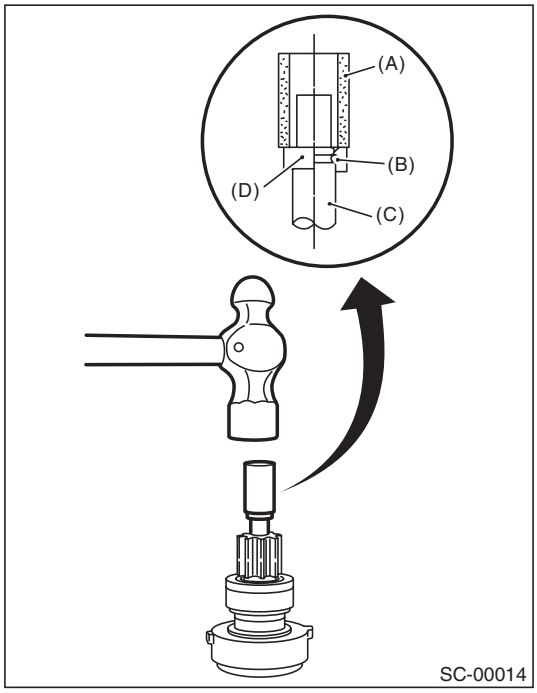


(A) Lever
(B) Shaft ASSY
(C) Overrunning clutch
(D) Internal gear ASSY

9) Remove the overrunning clutch from shaft assembly as follows:

(1) Remove the stopper from ring by lightly tapping the stopper with an appropriate tool (such as a fit socket wrench).

(2) Remove the ring, stopper and clutch from shaft.



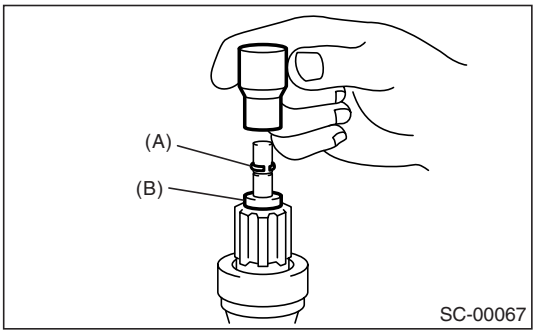
(A) Socket wrench
(B) Ring
(C) Shaft
(D) Stopper

D: ASSEMBLY

NOTE:
Apply grease to the following parts at assembly.
- Sleeve bearing
- Pinion shaft rotating part
- Shaft spline portion
- Inside of reduction system
- Lever fulcrum/Clutch rotating part

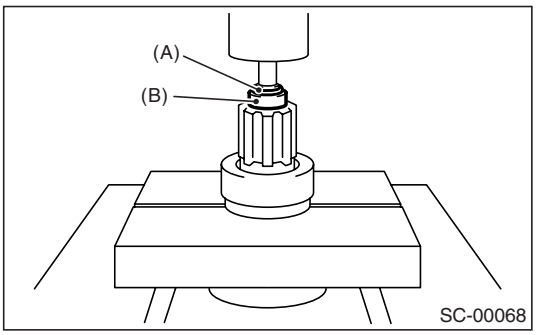
1) Install the overrunning clutch to shaft assembly.
2) Install the stopper to shaft assembly as follows.

(1) Insert the ring into the shaft groove by lightly tapping it with an appropriate tool (such as a fit socket wrench).



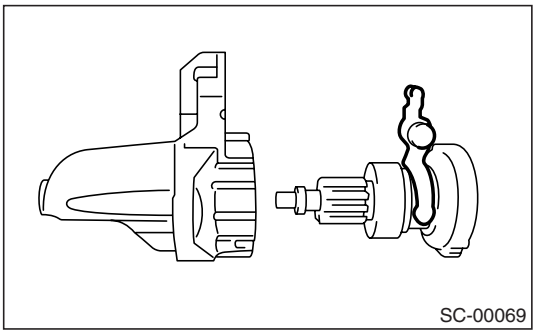
(A) Ring
(B) Stopper

(2) Install the stopper to ring using a press.

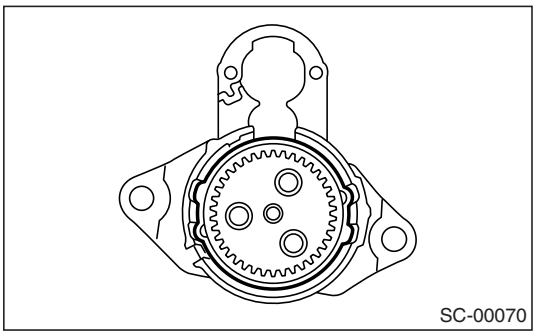


(A) Ring
(B) Stopper

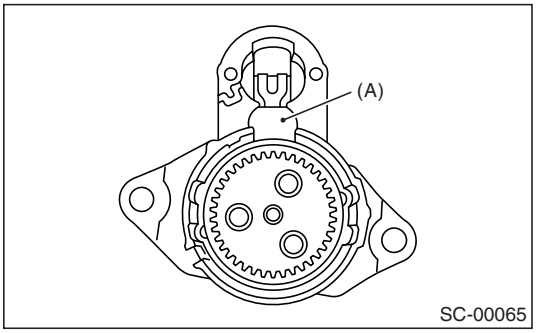
3) Install the shaft assembly to front bracket while taking care of the following points.
(1) Lever direction



(2) Internal gear position

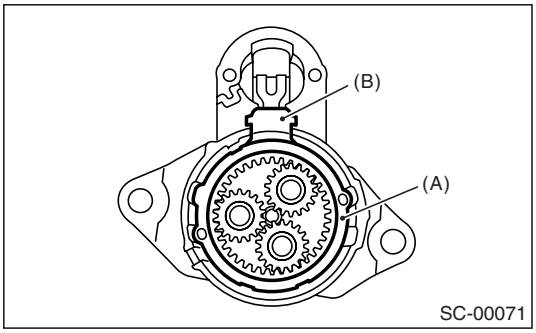


4) Install the plate.



(A) Plate

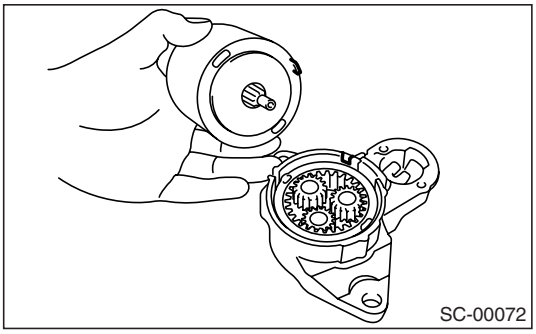
5) Install the planetary gear.
6) Install the packing A and B while taking care of installing positions.



(A) Packing A
(B) Packing B

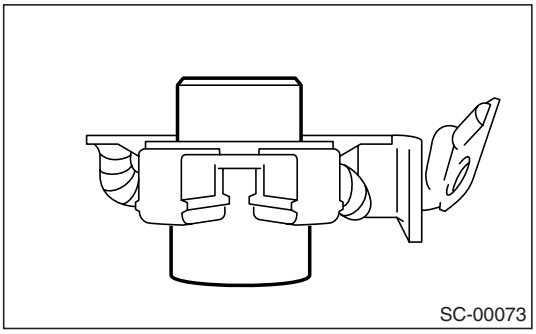
7) Install the armature to yoke assembly.

8) Install the yoke assembly to front bracket in matching to the groove.

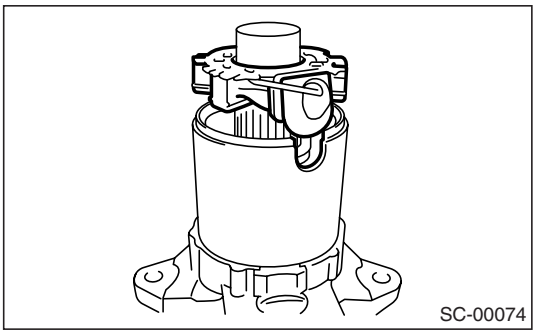


9) Install the brush holder to yoke assembly as follows.

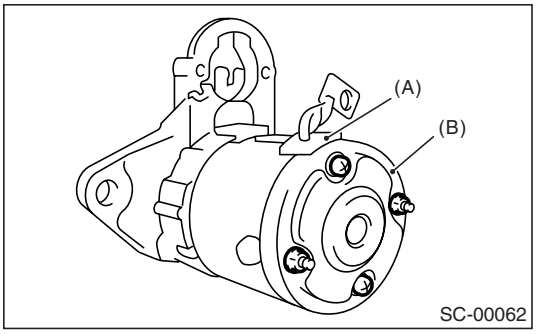
(1) Press the brush down into brush holder, and then fix the brush in that position using an appropriate tool (such as a fit socket wrench).



(2) Match the brush holder to groove of yoke assembly, and then slide the brush holder into yoke assembly to install.

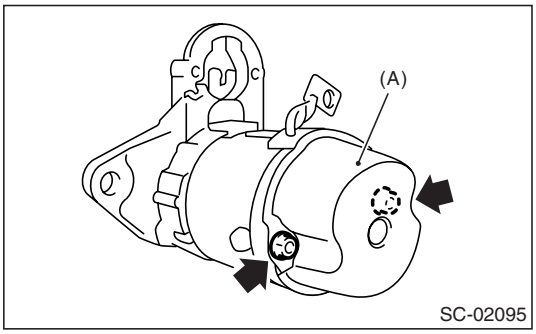


10) Install the rear cover matching it's groove to brush holder assembly.



(A) Brush holder ASSY
(B) Rear cover

11) Install rear cover set.

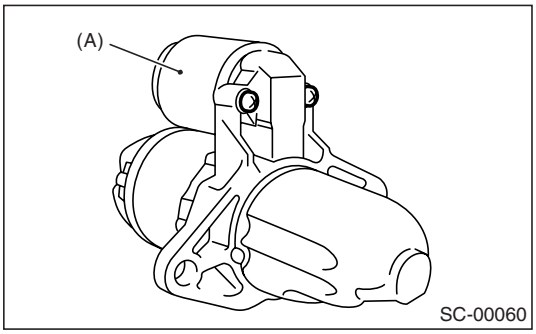


(A) Rear cover set

12) Install the switch assembly to front bracket as follows.

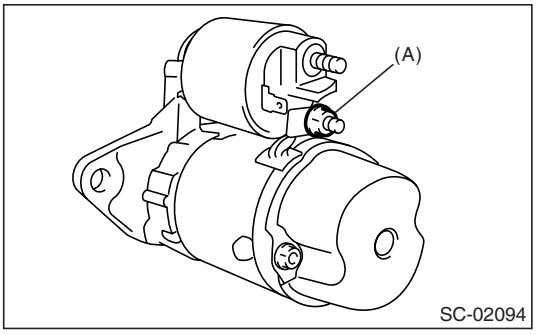
(1) Insert the plunger and plunger spring into switch assembly.

(2) Hook the plunger protrusion on lever edge to install plunger to front bracket.



(A) Switch ASSY

13) Connect the connector to terminal M of switch assembly.



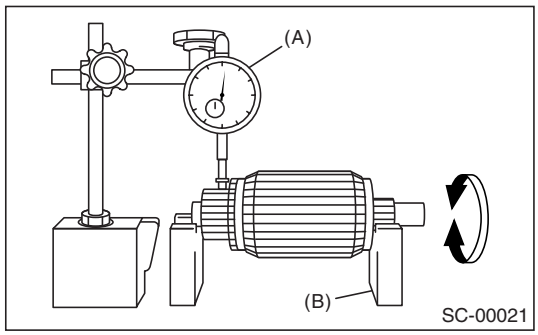
(A) Terminal M

E: INSPECTION

1. ARMATURE

1) Check the commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator for run-out, and then replace if it exceeds the limit.

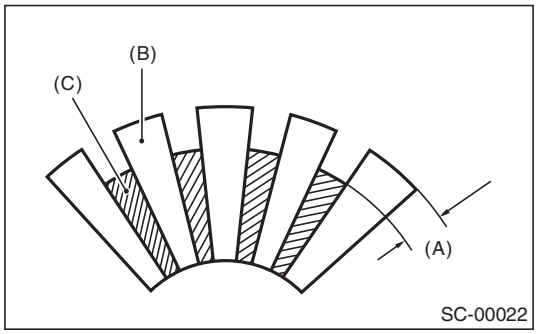
Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)



(A) Dial gauge
(B) V-block

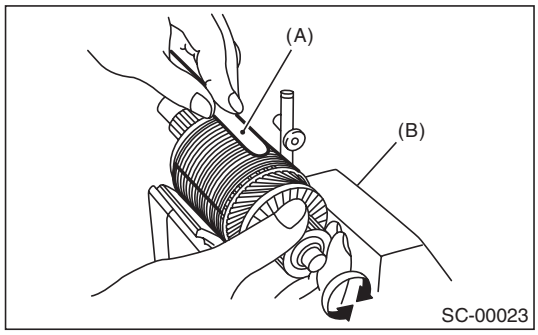
3) Depth of segment mold
Check the depth of segment mold.

Depth of segment mold:
0.5 mm (0.020 in)



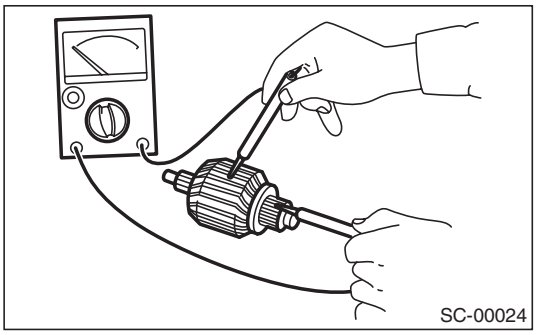
(A) Depth of mold
(B) Segment
(C) Mold

4) Armature short-circuit test
Check the armature for short-circuit by placing it on growler tester. Hold an iron sheet against the armature core while slowly rotating the armature. A short-circuited armature will cause the iron sheet to vibrate and to be attracted to core. If the iron sheet is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



(A) Iron sheet
(B) Growler tester

5) Armature ground test
Using a circuit tester, touch one probe to the commutator segment and the other to shaft. No continuity is normal. If there is continuity, the armature is grounded.
Replace the armature if it is grounded.



2. YOKE

Make sure the pole is set in position.

3. OVERRUNNING CLUTCH

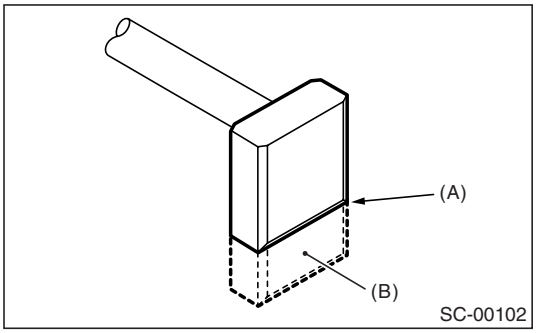
Inspect the teeth of pinion for wear and damage. Replace if it is damaged. Rotate the pinion in the right direction of rotation (counterclockwise). It should rotate smoothly. But in the opposite direction, it should be locked.

CAUTION:
Do not clean the overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER

1) Brush length
Measure the brush length, and then replace if it exceeds the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
12.3 mm (0.484 in)
Service limit
7.0 mm (0.276 in)



(A) Service limit line
(B) Brush

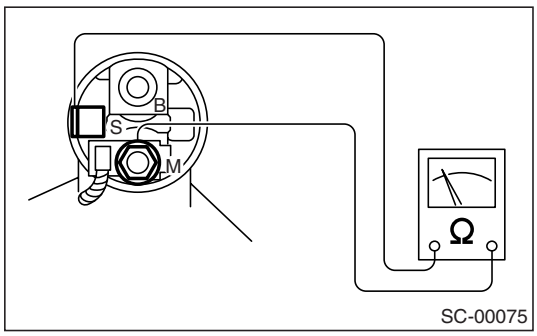
2) Brush movement
Be sure the brush moves smoothly inside brush holder.
3) Brush spring force
Measure the brush spring force with a spring scale. If it is less than the service limit, replace the brush holder.

Brush spring force:
Standard
15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lbf) (when new)
Service limit
2.5 N (0.25 kgf, 18.24 lbf)

5. SWITCH ASSEMBLY

Be sure there is continuity between the terminals S and M, and between terminal S and ground. Use a circuit tester (set in “ohm”).
Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:
S — M / Less than 1 Ω
S — Ground / Less than 1 Ω
M — B / More than 1 MΩ

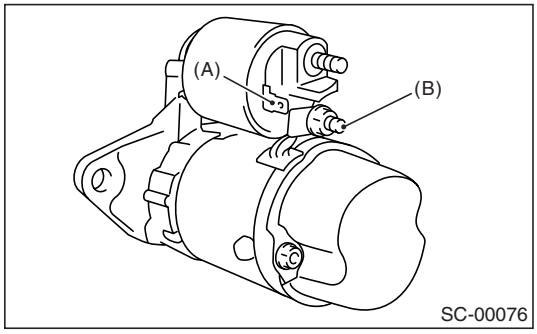


6. SWITCH ASSEMBLY OPERATION

1) Using a lead wire, connect the terminal S of switch assembly to positive terminal of battery, and starter body to ground terminal of battery. The pinion should be forced endwise on shaft.

CAUTION:
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.

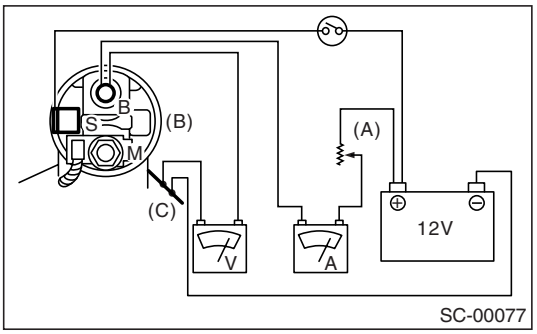
2) Disconnect the connector from terminal M. Then using a lead wire, connect the positive terminal of battery and terminal M and ground terminal to starter body.
In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



(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 resistor
(B) Starter body
(C) Magnetic switch

1) No-load test
With switch on, adjust the variable resistance for the voltage to obtain 11 V, read the ammeter and measure the starter speed. Compare these values with the standard.

No-load test (standard):

Voltage / Current
MT model
11 V / 95 A or less
AT model
11 V / 90 A or less

Rotating speed
MT model
More than 2,500 rpm
AT model
More than 2,000 rpm

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within standard.

Load test (standard):

Voltage / Load
MT model
7.5 V / 8.84 N·m (0.90 kgf-m, 6.5 ft-lb)
AT model
7.7 V / 16.7 N·m (1.70 kgf-m, 12.3 ft-lb)

Current / Speed
MT model
More than 300 A / 870 rpm
AT model
More than 400 A / 710 rpm

3) Lock test
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):

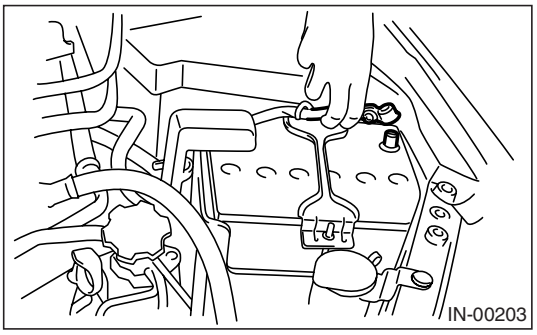
Voltage / Current
MT model
4 V / 680 A or less
AT model
3.5 V / 960 A or less

Torque
MT model
17 N·m (1.73 kgf-m, 12.5 ft-lb)
AT model
31 N·m (3.16 kgf-m, 22.9 ft-lb)

3. Generator

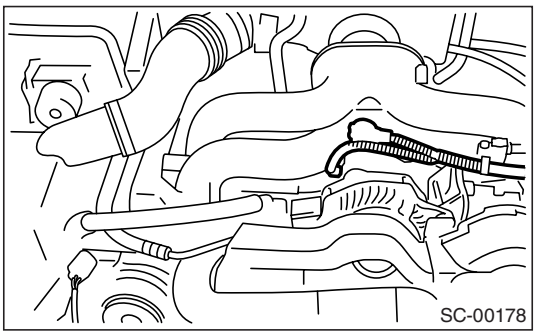
A: REMOVAL

1) Remove the collector cover. (Turbo model and 3.0 L Non-turbo model).
2) Disconnect the ground cable from battery.

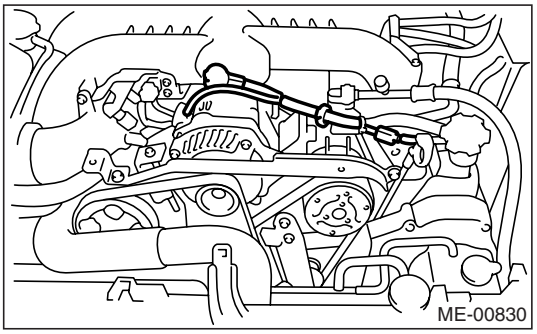


3) Disconnect the connector and terminal from generator.

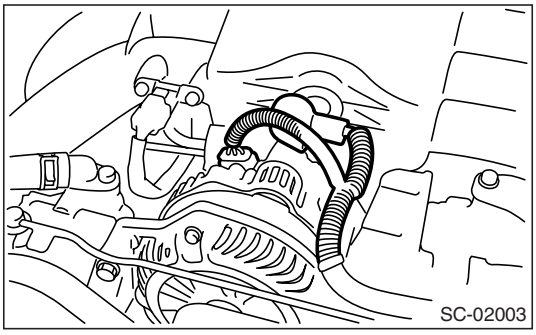
- SOHC non-turbo model



- Turbo model

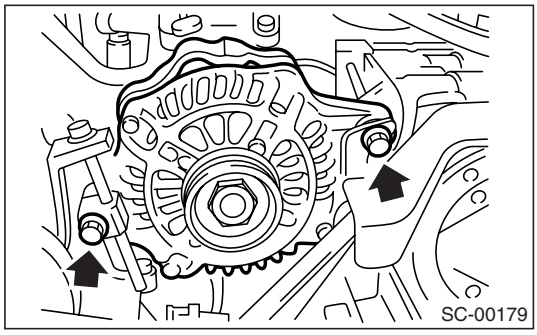


- 3.0 L non-turbo model

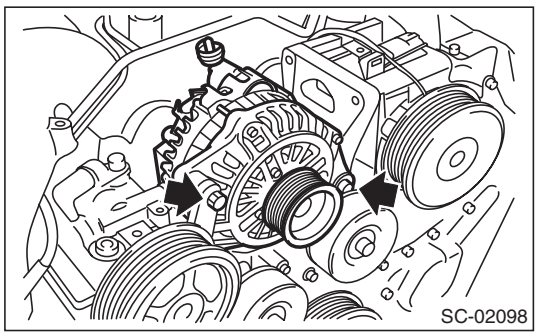


4) Remove the V-belt.
<Ref. to ME(H4SO 2.0)-37, FRONT SIDE BELT, REMOVAL, V-belt.> <Ref. to ME(H4DOTC)-40, FRONT SIDE BELT, REMOVAL, V-belt.> <Ref. to ME(H6DO)-33, REMOVAL, V-belt.>
5) Remove the bolts which install the generator onto bracket.

- 2.0 L model and 2.5 L non-turbo model



- 3.0 L non-turbo model



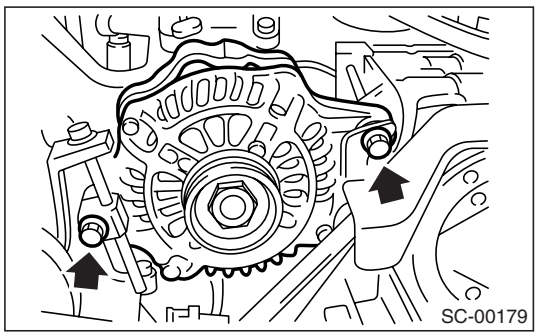
B: INSTALLATION

Install in the reverse order of removal.

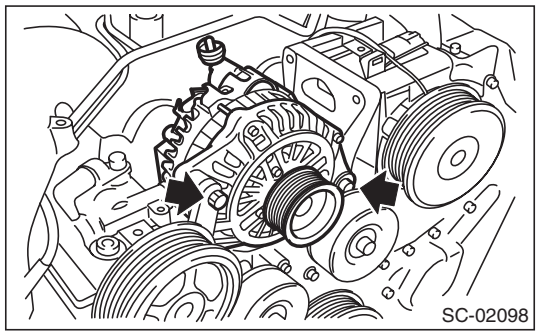
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

CAUTION:
Check and adjust the V-belt tension.
<Ref. to ME(H4SO 2.0)-38, INSPECTION, V-belt.> <Ref. to ME(H4DOTC)-41, INSPECTION, V-belt.> <Ref. to ME(H6DO)-33, INSPECTION, V-belt.>

- 2.0 L model and 2.5 L non-turbo model

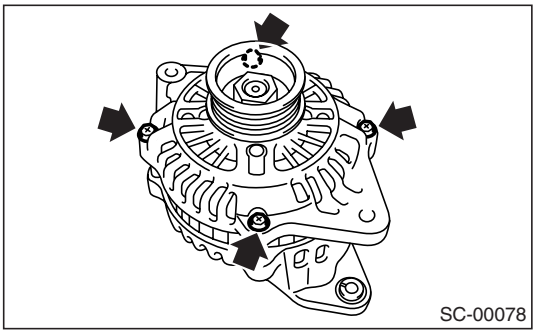


• 3.0 L non-turbo model

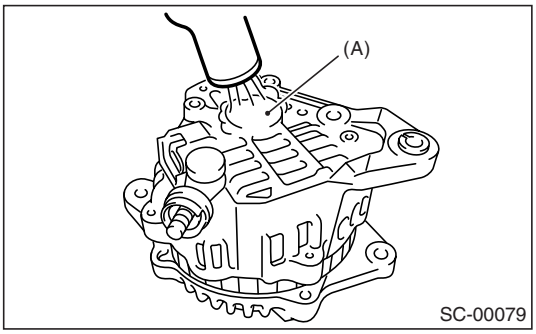


C: DISASSEMBLY

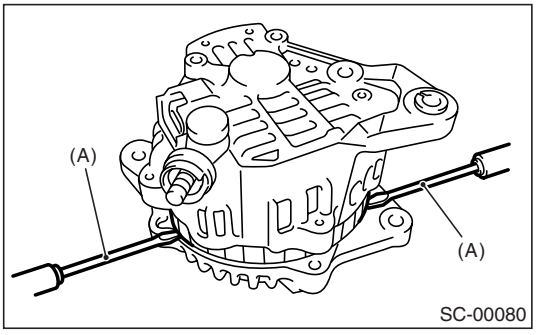
1) Remove the four through-bolts.



2) Heat the portion (A) of rear cover to 50°C (122°F) with a heater drier.

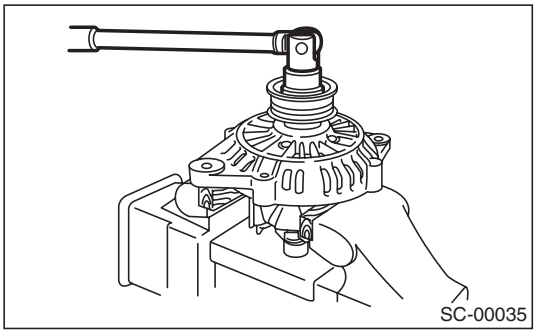


3) Insert the tip of a flat tip screwdriver into the gap between stator core and front cover to disassemble.

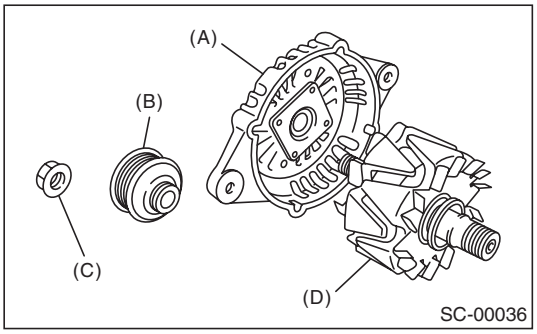


(A) Screwdriver

4) Hold the rotor with a vise and remove pulley nut.

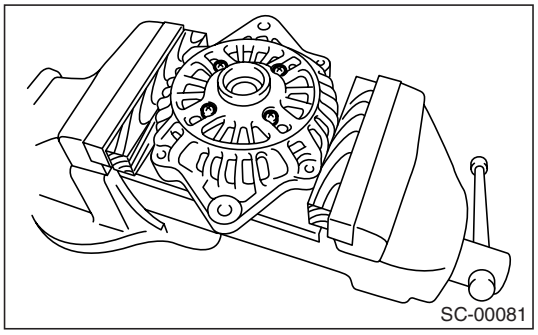


CAUTION:
When holding the rotor with a vise, place aluminum plates or wooden pieces on the vise jaws to prevent rotor from damage.

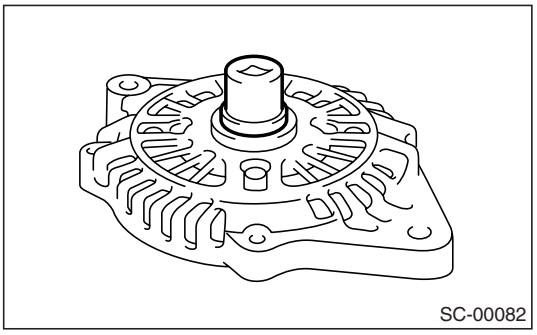


(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

5) Remove the ball bearing as follows.
(1) Remove the bolt, and then remove the bearing retainer.

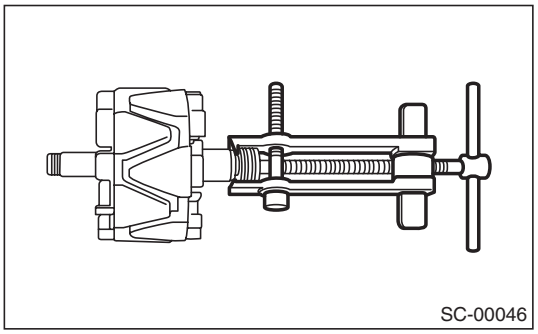


(2) Firmly install an appropriate tool (such as a fit socket wrench) to bearing inner race.


SC-00082

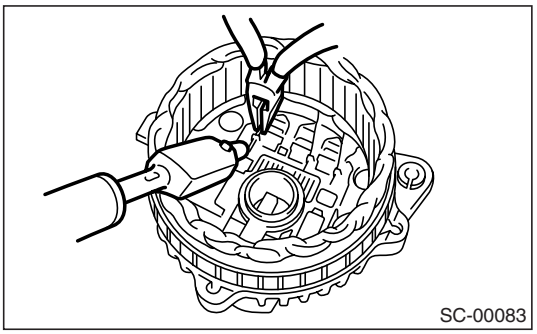
(3) Push the ball bearing off the front cover using a press.

6) Remove the bearing from rotor using a bearing puller.


SC-00046

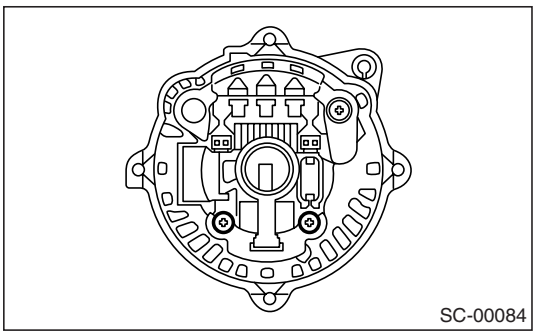
7) Unsolder the connection between rectifier and stator coil to remove stator coil.

CAUTION:
Do not allow a 180 — 270 W soldering iron to contact the terminals for more than 5 seconds at once because the rectifier cannot withstand so much heat.

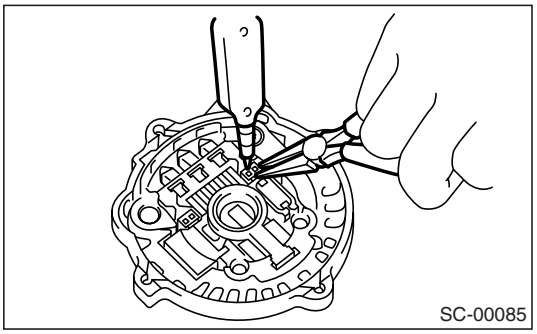

SC-00083

8) Remove the IC regulator as follows.

(1) Remove the screws which secure IC regulator to rear cover.

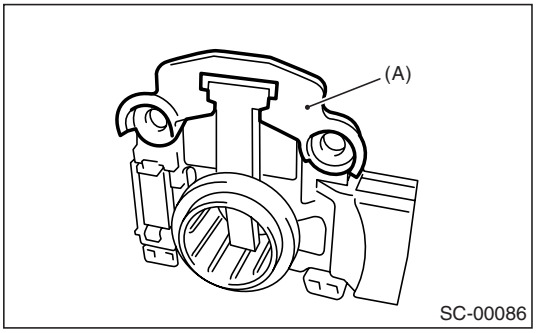

SC-00084

(2) Unsolder the connection between IC regulator and rectifier to remove IC regulator.


SC-00085

9) Remove the brush as follows.

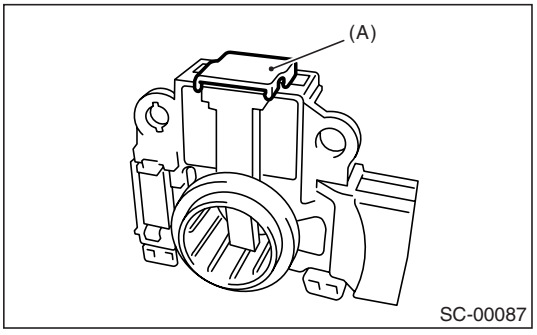
(1) Remove the cover A.



SC-00086

(A) Cover A

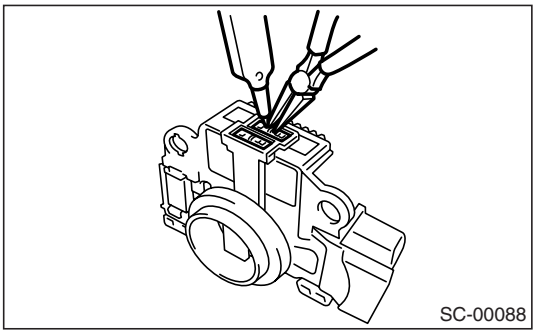
(2) Remove the cover B.



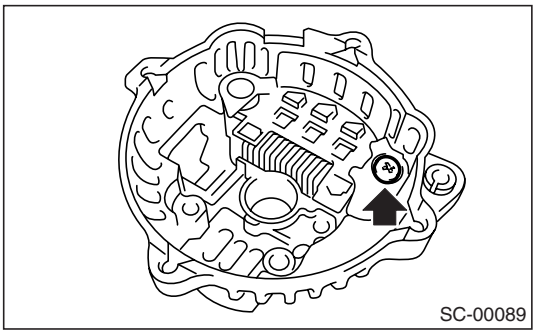
SC-00087

(A) Cover B

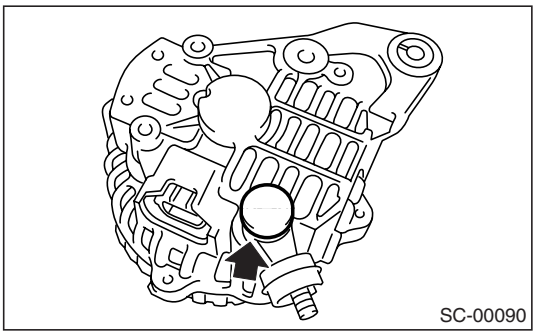
(3) Separate the brush from connection to remove.


SC-00088

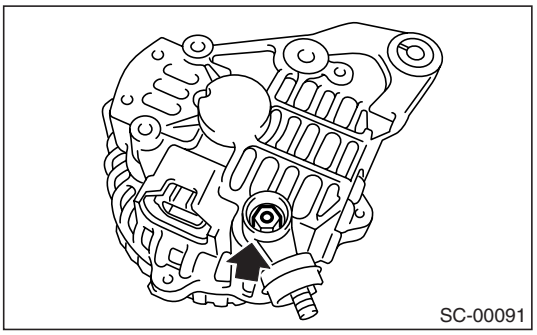
10) Remove the rectifier as follows.
(1) Remove the bolts which secure rectifier.


SC-00089

(2) Remove the cover of terminal B.


SC-00090

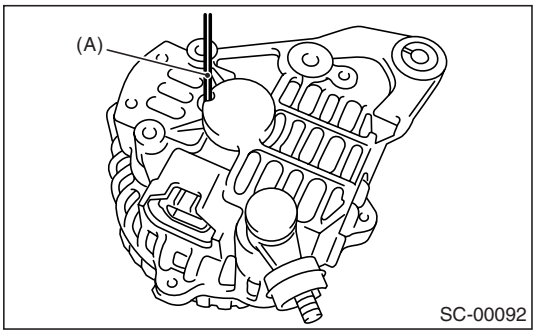
(3) Remove the nut of terminal B, and then remove the rectifier.


SC-00091

D: ASSEMBLY

Assemble in the reverse order of disassembly.
1) Pulling up brush
Before assembling, press the brush down into brush holder, and then fix them in that position by passing a [1 mm (0.08 in) dia. 40 to 50 mm (1.6 to 2.0 in) long] wire through the hole as shown in the figure.

CAUTION:
Be sure to remove the wire after reassembly.



SC-00092

(A) Wire

2) Install the ball bearing.
(1) Set the ball bearing on the front cover, and then securely install an appropriate tool (such as a fit socket wrench) to the bearing outer race.
(2) Press the ball bearing into the specified position using a press.
(3) Install the bearing retainer.
3) Press the bearing (rear side) into the rotor shaft using a press to install.
4) Heat the bearing box in rear cover [50 to 60°C (122 to 140°F)], and then press the rear bearing into rear cover.

CAUTION:
Grease should not be applied to rear bearing.
Remove the oil completely if it is found on bearing box.

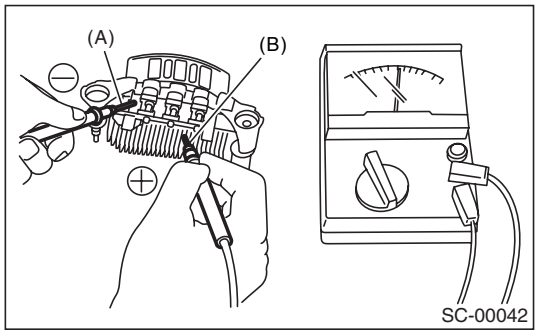
5) After reassembly, turn the pulley by hand to check that rotor turns smoothly.

E: INSPECTION

1. DIODE

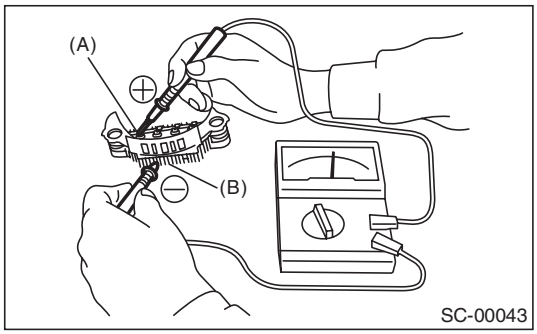
CAUTION:
Never use a mega tester (designed for reading high voltage) or any other similar instrument for this test; otherwise, the diodes may be damaged.

1) Checking positive diode
Check for continuity between the diode lead and positive side heat sink. The positive diode is in good condition if resistance is 1 Ω or less only in the direction from the diode lead to heat sink.



(A) Diode lead
(B) Heat sink (positive side)

2) Checking negative diode
Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if resistance is 1 Ω or less only in the direction from the heat sink to diode lead.



(A) Diode lead
(B) Heat sink (negative side)

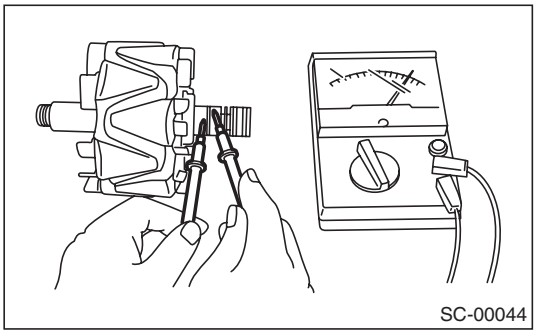
2. ROTOR

1) Slip ring surface
Inspect the slip rings for contamination or any roughness on the sliding surface. Repair the slip ring surface using a lathe or sand paper.
2) Slip ring outer diameter
Measure the slip ring outer diameter. If the slip ring is worn, replace the rotor assembly.

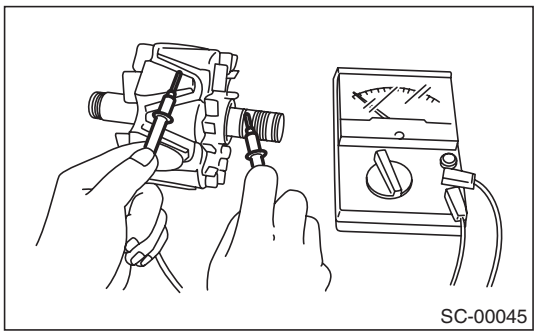
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check the resistance between slip rings using circuit tester.
If the resistance is not within the standard, replace the rotor assembly.

Resistance value:
Approx. 1.8 — 2.2 Ω



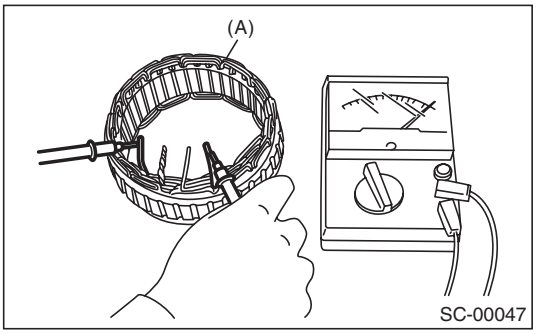
4) Insulation test
Check the continuity between slip ring and rotor core or shaft. If resistance is 1 Ω or less, the rotor coil is grounded, and so replace the rotor assembly.



5) Ball bearing (rear side)
Check the rear ball bearing. Replace if it is noisy or if the rotor does not turn smoothly.

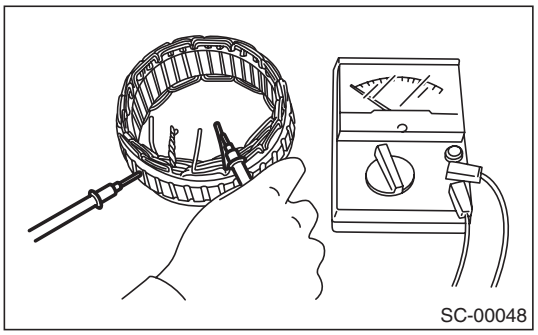
3. STATOR

1) Continuity test
Inspect the stator coil for continuity between each end of the lead wires. If resistance is 1 MΩ or more, the lead wire is broken, and so replace the stator assembly.



(A) Stator

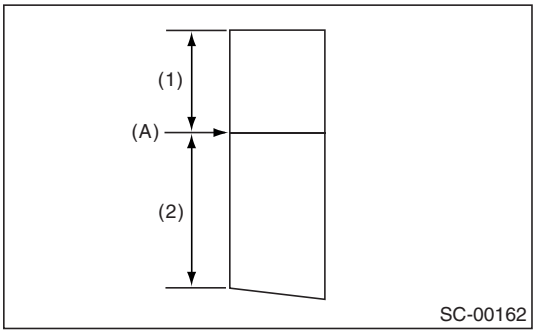
2) Insulation test
Inspect the stator coil for continuity between stator core and each end of lead wire. If resistance is 1 Ω or less, the stator coil is grounded, and so replace the stator assembly.



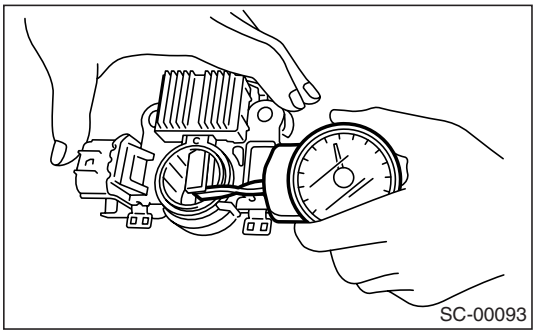
4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Service limit (1)
5.0 mm (0.197 in)
Standard (2)
18.5 mm (0.728 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of brush spring. If the pressure is less than 2.648 N (270 gf, 9.52 ozf), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 gf, 16.58 to 20.810 ozf).



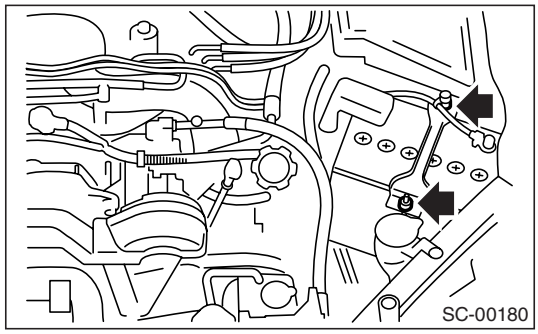
5. BEARING (FRONT SIDE)

Check the front ball bearing. If the resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing

4. Battery

A: REMOVAL

1) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
2) Remove the battery cable holder from battery rod.
3) Remove the flange nuts from battery rods and take off battery holder.



4) Remove the battery.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

NOTE:
• Clean the battery cable terminals and apply grease to retard the formation of corrosion.
• Connect the positive (+) terminal, and then connect the negative (–) terminal of battery.
• Initial diagnosis of electronic throttle control is performed after battery installation. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.

C: INSPECTION

WARNING:
• Electrolyte has toxicity; be careful of handling the fluid.
• Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.
• Batteries produce explosive gases. Keep sparks, flame, cigarettes away.
• Ventilate when charging or using in enclosed space.
• For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
• Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
• To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle. This may cause short circuit.

1. EXTERNAL PARTS

Check the battery case, top cover, vent plugs, and terminal posts for dirt or cracks. If necessary, clean with water and wipe with a dry cloth.
Apply a thin coat of grease on the terminal posts to prevent corrosion.

2. ELECTROLYTE LEVEL

Check the electrolyte level in each cell. If the level is below MIN level, bring the level to MAX level by pouring distilled water into the battery cell. Do not fill beyond MAX level.

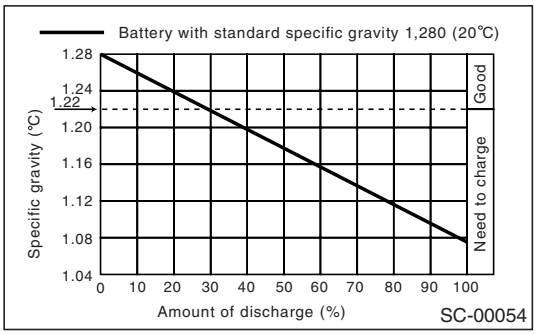
3. SPECIFIC GRAVITY OF ELECTROLYTE

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

S_{20}: Specific gravity corrected at electrolyte temperature of 20°C (68°F)
St: Measured specific gravity
t: Measured temperature (°C)
Determine whether or not battery must be charged, according to corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [20°C (68°F)

2) 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.



D: MEASUREMENT

WARNING:
Do not bring an open flame close to the battery at this time.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.
• Be careful since battery electrolyte overflows while charging the battery.
• 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. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte should be held within the specific range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell should be held at a specific value in a range from 2.5 to 2.8 V for more than one hour.

2. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	Charge battery	Corrective action
Green	Above 65%	Load test
Dark	65% or less	Charge battery
Clear	Low electrolyte	Replace battery* (If cranking is difficult)
* Check electrical system before replacement.		

3. NORMAL CHARGING

Charge the battery at the current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

4. QUICK CHARGING

Quick charging is a method that the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
Also the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:
• Observe the items in 3. NORMAL CHARGING.
• Never use more than 10 A when charging the battery because it will shorten the battery life.

ENGINE (DIAGNOSTICS)

EN(H4SO 2.0)(diag)

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1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	3
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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(H4SO 2.0)(diag)-3, 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(H4SO 2.0)(diag)-50, 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(H4SO 2.0)(diag)-224, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON. 4) Read DTC using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "Read Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4SO 2.0)(diag)-41, Malfunction Indicator Light.>
4	**PERFORM DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SO 2.0)(diag)-32, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-69, 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 items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
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 ❑ 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	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

Check List for Interview

2. CHECK LIST No. 2

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

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on.❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure warning light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experience of 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 of other parts except 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:
• All airbag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these 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.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will be damaged.

3) Do not disconnect the battery terminals 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.

4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the clear memory mode after connecting the connectors.

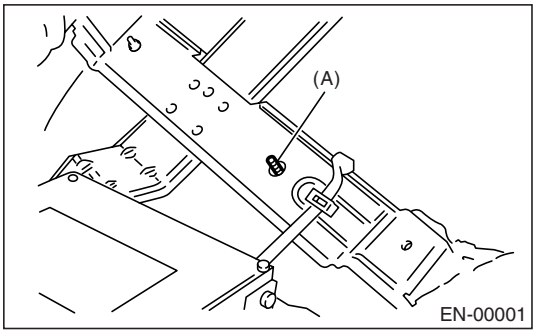
5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of each sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the parts.

6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

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

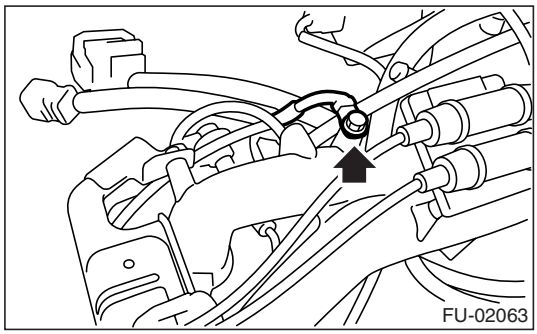
7) Connectors of each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts as the grounding point to body when measuring voltage and resistance in the passenger compartment.



(A) Stud bolt

9) Use engine grounding terminal or engine as the grounding point to chassis when measuring voltage and resistance in the engine compartment.



10) Every MFI-related part is a precision part. Do not drop them.

11) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control module.
• The antenna feeder must be placed as far apart as possible from the ECM and MFI 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.

12) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run until it stops.

13) Diagnostics should be conducted by starting with simple, easy operations then proceeding to complicate, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish the cause among engine, electrical system and transmission.
14) For the model with ABS, the ABS warning light may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. This is due to speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

B: INSPECTION

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

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

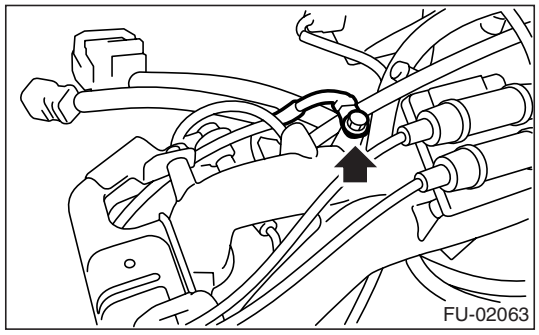
Standard voltage: 12 V

Specific gravity: 1.260 or more

2) Check the condition of main fuse, other fuses, harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

Make sure the engine grounding terminal is properly connected to engine.



C: NOTE

1. GENERAL DESCRIPTION

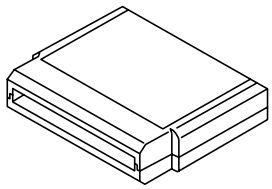
• The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
• Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with E-OBD 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 first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or 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.
• When troubleshooting the vehicle which complies with E-OBD Regulations, connect the Subaru Select Monitor or general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.

The MFI system also has the following features:
• Reduced emission of harmful exhaust gases.
• Reduced in fuel consumption.
• Increased engine output.
• Superior acceleration and deceleration.
• Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

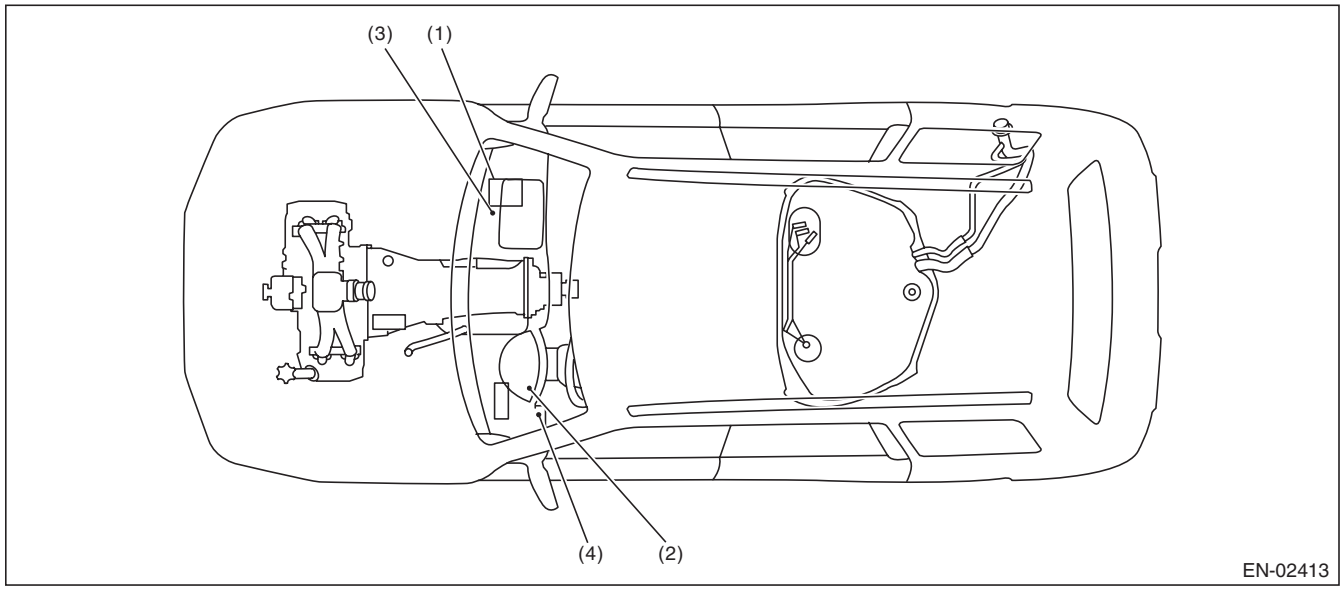
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

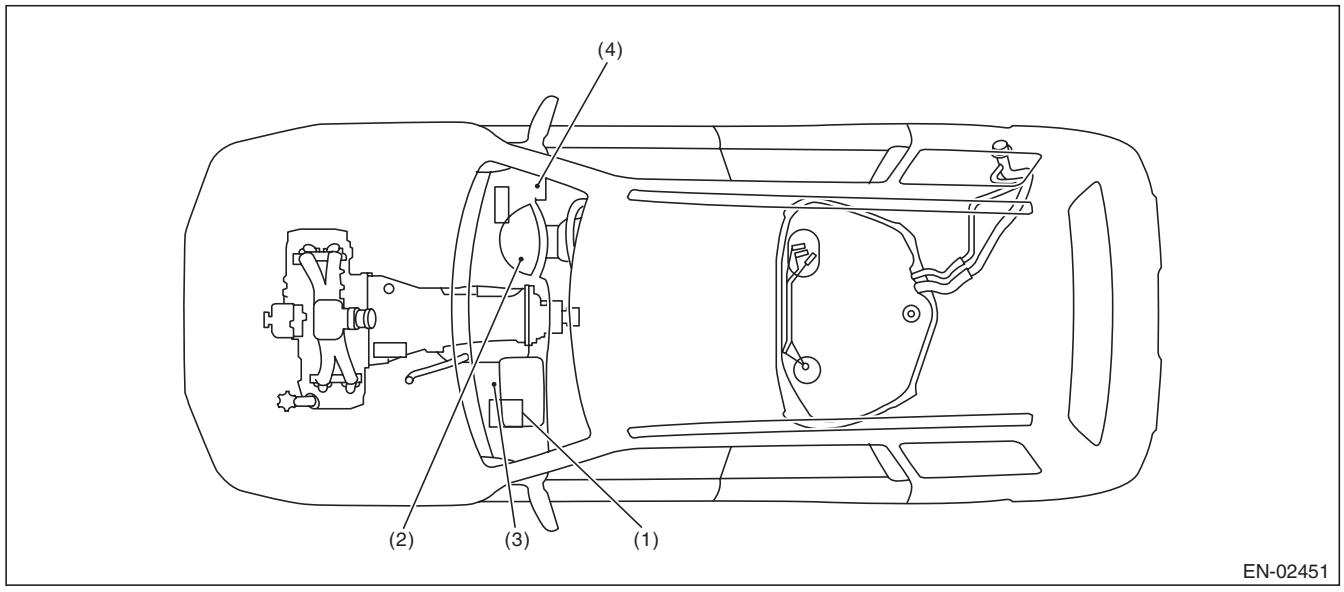
A: LOCATION

1. CONTROL MODULE

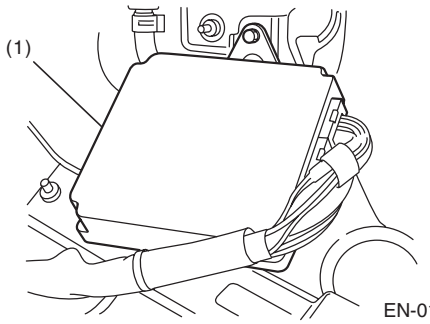
- LHD model



- RHD model



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



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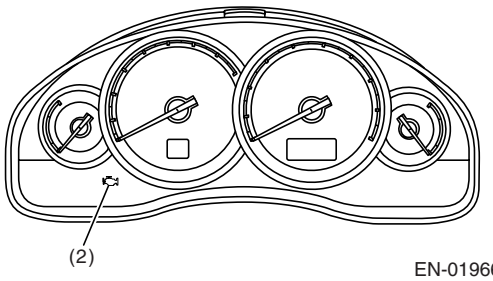

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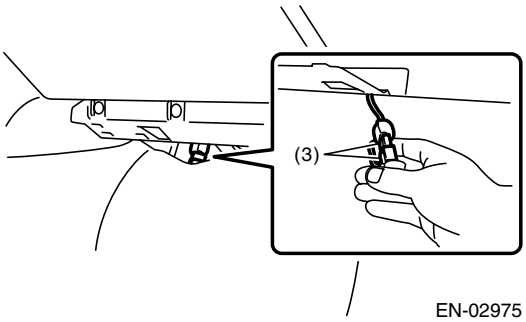

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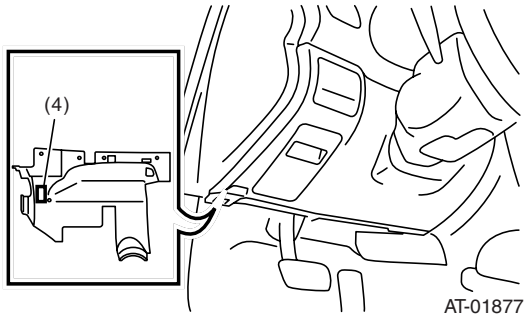
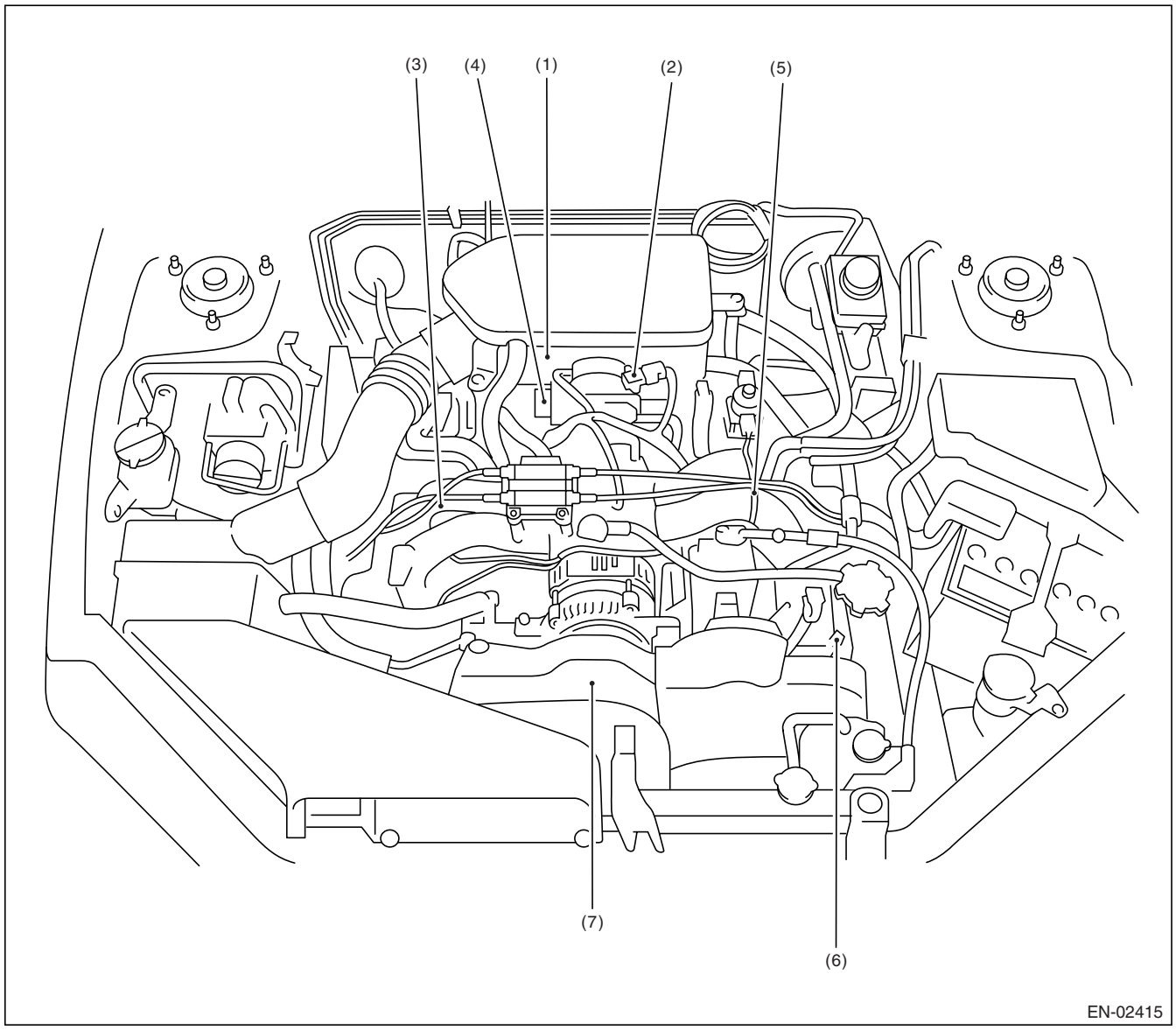
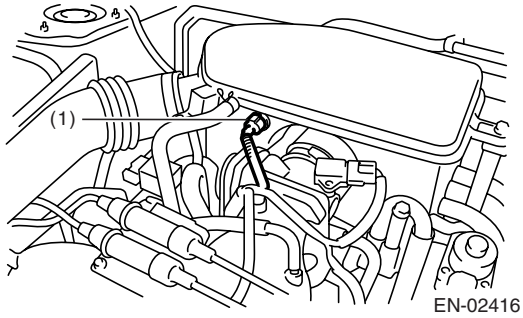


AT-01877

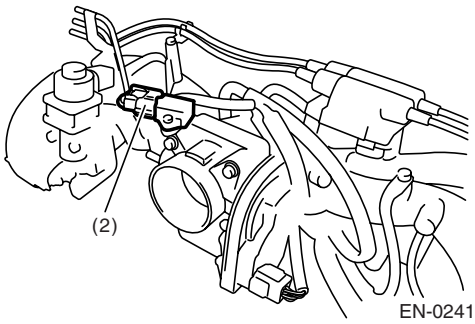
2. SENSOR



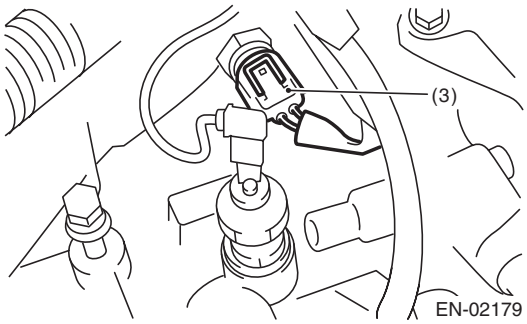
(1) Intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor



EN-02416



EN-02417



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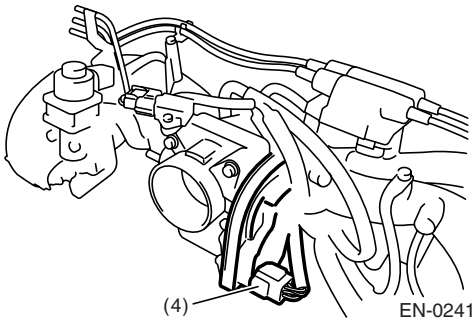

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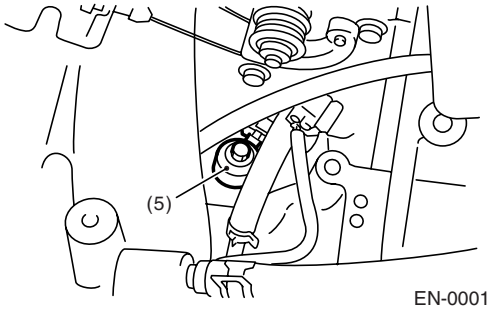
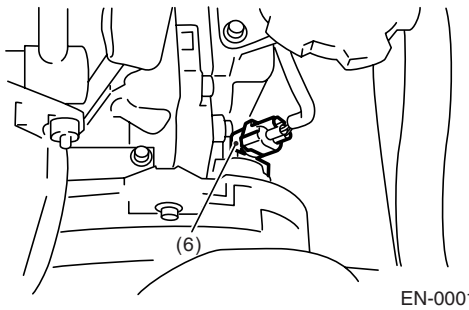
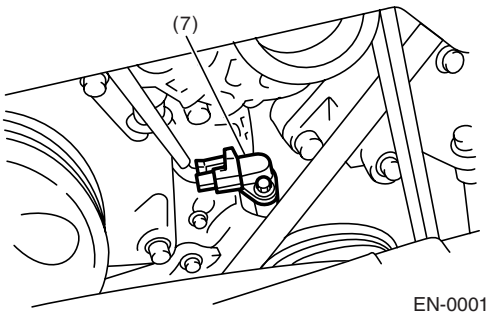


EN-00010

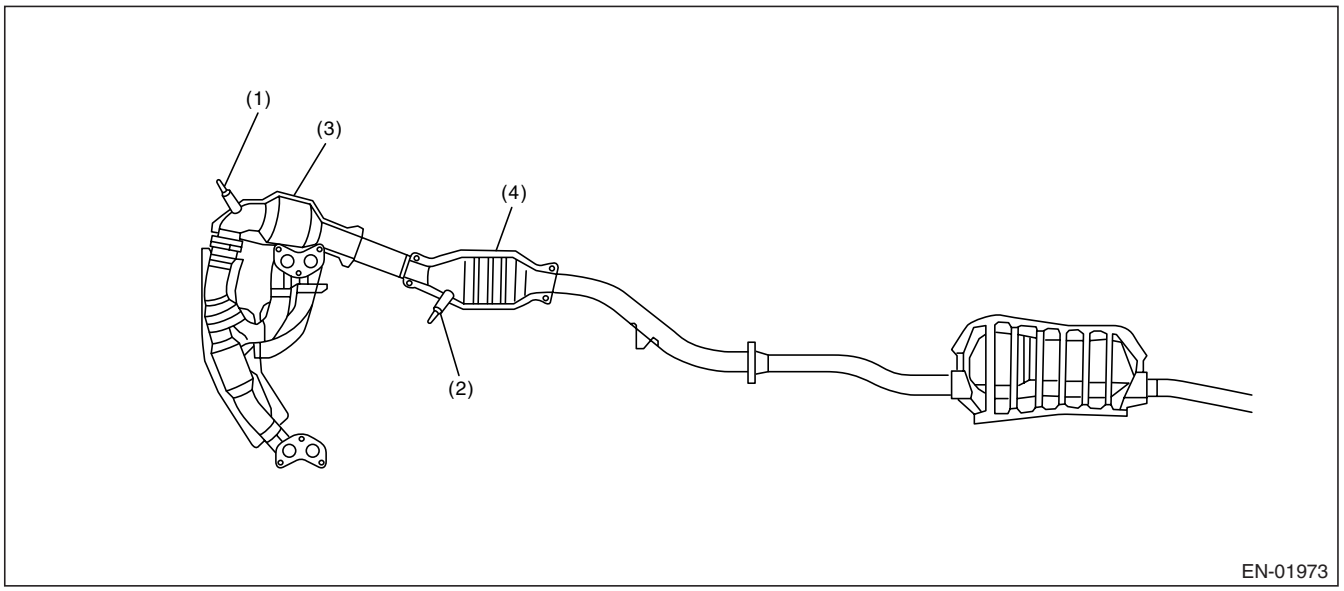


EN-00011

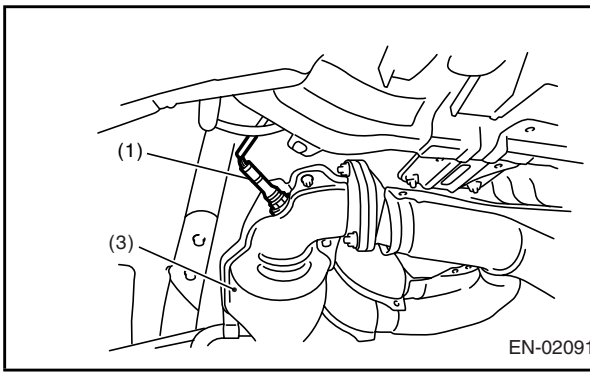


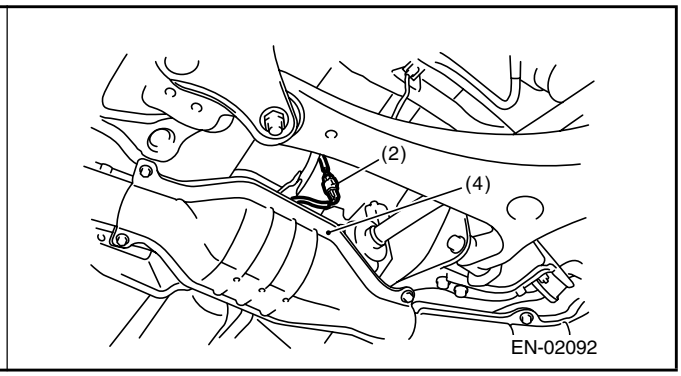
EN-00012

Electrical Component Location

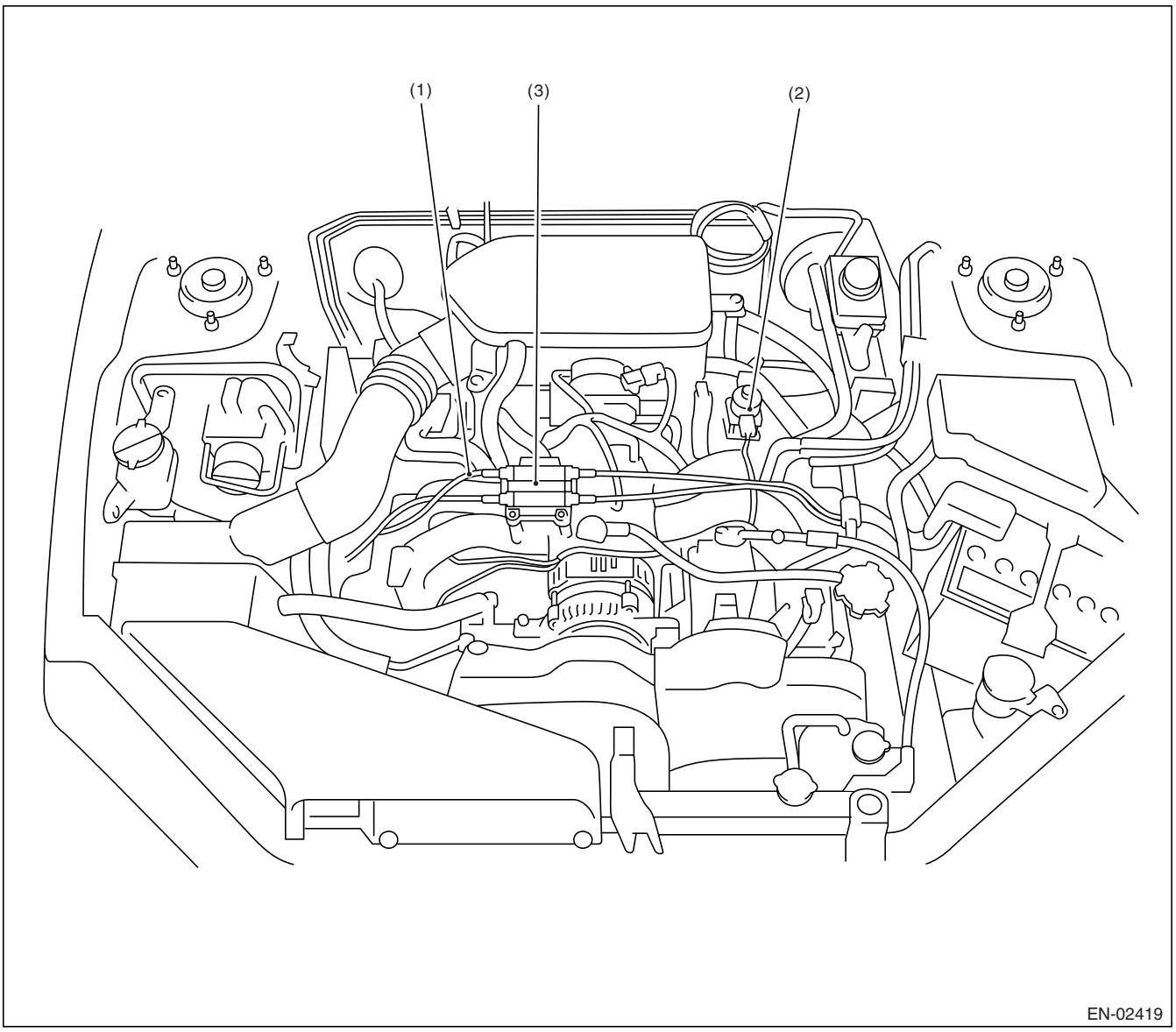


(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter



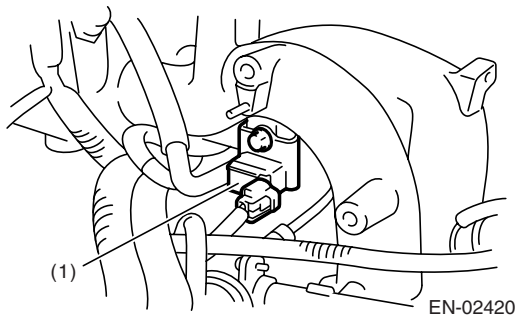


3. SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



(1) Purge control solenoid valve (2) EGR valve (EC, EK, K4 model) (3) Ignition coil and ignitor ASSY

Electrical Component Location



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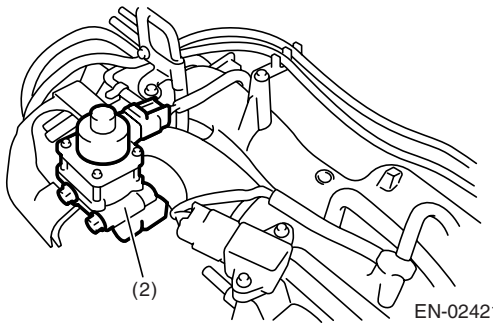

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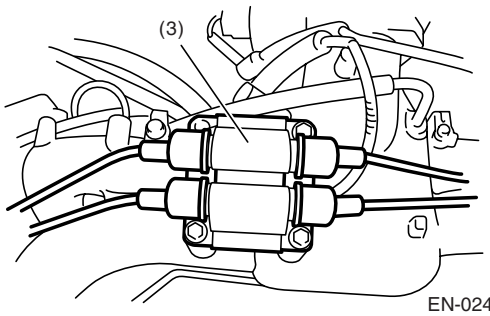
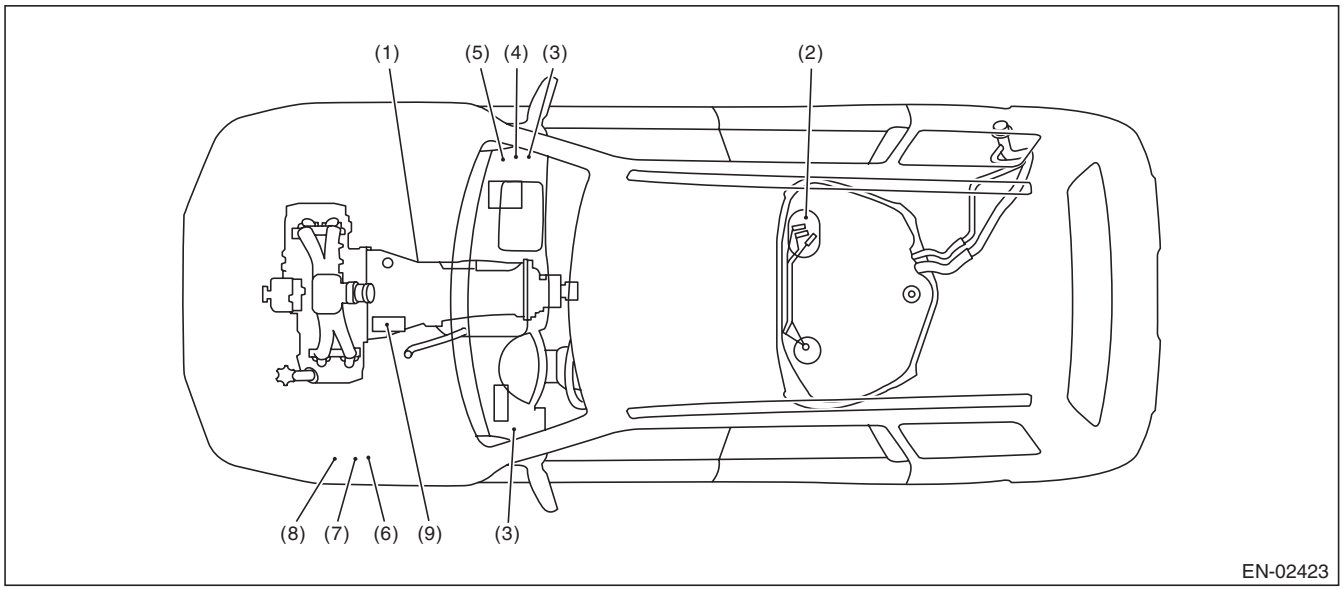


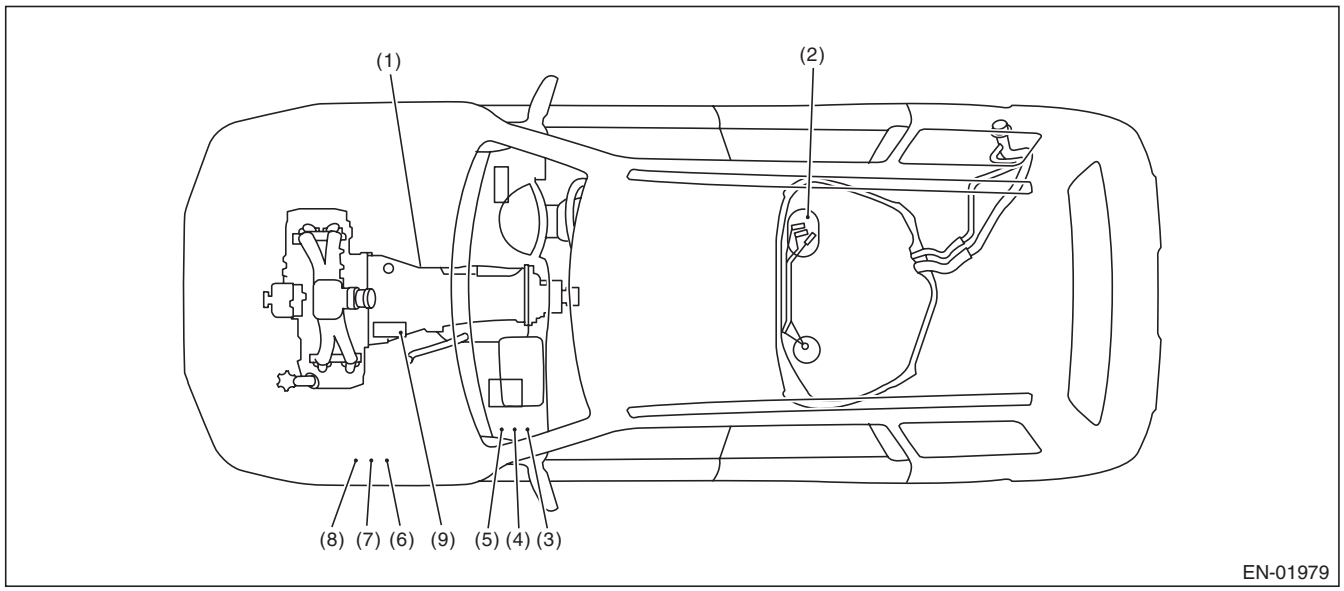
EN-02422

SUBARU.

- LHD model

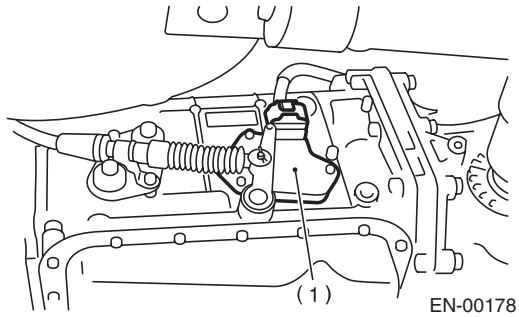


- RHD model

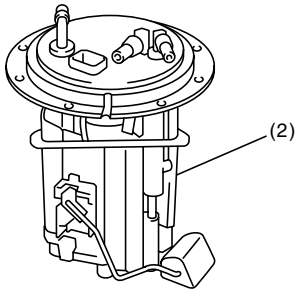


(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator main fan relay 1
(7) Radiator sub fan relay
(8) Radiator main fan relay 2
(9) Starter

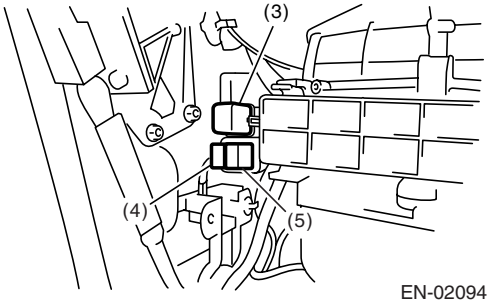
Electrical Component Location



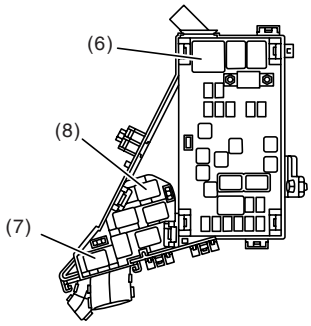
EN-00178



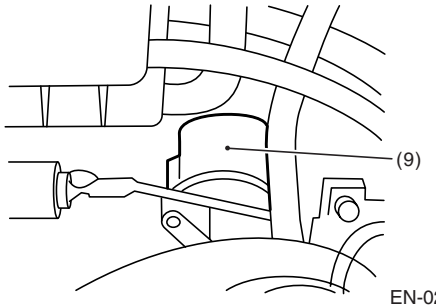
EN-02093



EN-02094



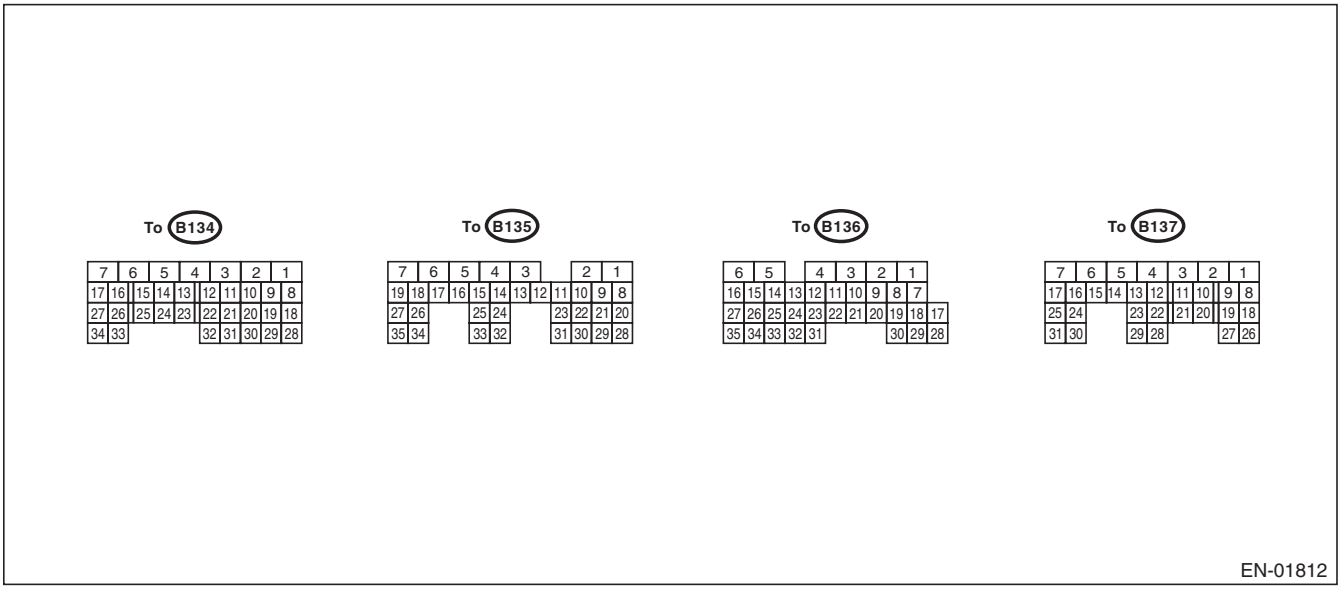
EN-02095



EN-02096

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor (Model with immobilizer)	Signal (+)	B136	27	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	24	0	0	—
	Shield	B136	32	0	0	—
Crankshaft position sensor (Model without immobilizer)	Signal (+)	B136	26	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	24	0	0	—
	Shield	B136	32	0	0	—
Camshaft position sensor (Model with immobilizer)	Signal (+)	B136	26	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	25	0	0	—
	Shield	B136	32	0	0	—
Camshaft position sensor (Model without immobilizer)	Signal (+)	B136	27	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	25	0	0	—
	Shield	B136	32	0	0	—
Electronic throttle control	Main	B137	23	0.4 — 1.1 Fully opened: 3.7 — 4.3	0.3 — 0.9 (After engine is warmed-up.)	—
	Sub	B137	24	3.9 — 4.8 Fully opened: 0.65 — 1.5	4.05 — 4.95 (After engine is warmed-up.)	—
Electronic throttle control motor 1 (+)		B137	2	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 2 (+)		B137	3	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 1 (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 1 kHz

Engine Control Module (ECM) I/O Signal

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Electronic throttle control motor 2 (–)		B137	5	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 1 power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor 2 power supply		B137	7	10 — 13	13 — 14	—
Electronic throttle control motor relay		B137	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator pedal position sensor	Main	B137	29	Fully closed: 0.5 — 1.5 Fully opened: 3 — 5	Fully closed: 0.5 — 1.5 Fully opened: 3 — 5	—
	Power supply	B137	25	5	5	—
	Ground	B137	31	0	0	—
	Sub	B137	30	Fully closed: 0.5 — 1.5 Fully opened: 3 — 5	Fully closed: 0.5 — 1.5 Fully opened: 3 — 5	—
	Shield	B137	19	0	0	—
Rear oxygen sensor	Signal	B136	19	0	0 — 0.9	—
	Shield	B136	30	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B135	2	0 — 1.0	13 — 14	—
	Signal 2	B135	3	0 — 1.0	13 — 14	—
Rear oxygen sensor heater signal		B134	1	0 — 1.0	13 — 14	—
Engine coolant temperature sensor		B136	22	1.0 — 1.6	1.0 — 1.6	After engine is warmed-up.
Starter switch		B135	23	OFF: 0 ON: 10 — 13	OFF: 0 ON: 13 — 14	—
A/C switch		B135	20	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	13	10 — 13	13 — 14	—
Neutral position switch		B135	12	ON: 0 OFF: 10 — 14		• For AT model switch is ON when shifted into “P” or “N” range. • For MT model switch is ON when shifted into “N” range.
Test mode connector		B135	24	5	5	When connected: 0
Knock sensor	Signal	B136	23	2.8	2.8	—
	Shield	B136	12	0	0	—
Backup power supply		B136	7	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B136	3	10 — 13	13 — 14	—
		B136	4	10 — 13	13 — 14	—
Sensor power supply 1		B136	17	5	5	—
Sensor power supply 2		B137	25	5	5	—
Ignition control	1	B134	23	0	1 — 3.4	Waveform
	2	B134	24	0	1 — 3.4	Waveform
Blower fan switch		B135	11	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C middle pressure switch		B135	8	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel injector	#1	B134	17	10 — 13	1 — 14	Waveform
	#2	B134	27	10 — 13	1 — 14	Waveform
	#3	B134	34	10 — 13	1 — 14	Waveform
	#4	B134	33	10 — 13	1 — 14	Waveform
Fuel pump relay control (Model with immobilizer)		B135	17	0.5 or less	0.5 or less	—
Fuel pump relay control (Model without immobilizer)		B134	18	0.5 or less	0.5 or less	—
A/C relay control		B135	35	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	10	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B134	9	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Self-shutoff control		B135	14	10 — 13	13 — 14	—
Malfunction indicator light		B135	15	1 or less	—	Light ON: 1 or less Light OFF: 10 — 14
Engine speed output		B135	27	—	0 — 13 or more	Waveform
Purge control solenoid valve		B134	8	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
EGR solenoid valve	Signal A+	B134	13	0 or 10 — 13	0 or 13 — 14	—
	Signal A–	B134	12	0 or 10 — 13	0 or 13 — 14	—
	Signal B+	B134	3	0 or 10 — 13	0 or 13 — 14	—
	Signal B–	B134	4	0 or 10 — 13	0 or 13 — 14	—
Power steering switch		B135	8	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Front oxygen (A/F) sensor signal 1		B136	35	—	2.05 — 2.25	—
Front oxygen (A/F) sensor signal 2		B136	33	—	2.05 — 2.25	—
Front oxygen (A/F) sensor shield		B136	34	0	0	—
Manifold absolute pressure sensor		B136	20	4.0 — 4.8	1.1 — 1.9	—
Intake air temperature sensor		B136	28	3.3 — 3.5	3.3 — 3.5	Intake air temperature: 25°C (75°F)
Generator control		B135	16	0 — 6.5	0 — 6.5	—
SSM communication line		B135	32	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—
Cruise control main switch		B137	14	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Cruise control clutch switch		B137	22	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
Brake switch 1		B137	12	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B137	13	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—

Engine Control Module (ECM) I/O Signal

DESCRIPTION	Connector No.	Terminal No.	Signal (V)		NOTE
			Ignition SW ON (engine OFF)	Engine ON (idling)	
Cruise control command switch	B136	21	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	—
GND (sensor 1)	B136	18	0	0	—
GND (sensor 2)	B137	31	0	0	—
GND (injector)	B134	7	0	0	—
GND (power supply)	B134	2	0	0	—
	B137	1	0	0	—
GND (control system)	B136	5	0	0	—
	B136	6	0	0	—
GND (oxygen sensor heater 1)	B135	5	0	0	—
GND (oxygen sensor heater 2)	B135	6	0	0	—
GND (electronic throttle control)	B136	1	0	0	—
	B136	2	0	0	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	Specifications
Engine load	1.6 — 2.9 (%) : Idling
	6.4 — 12.8 (%) : 2,500 rpm racing

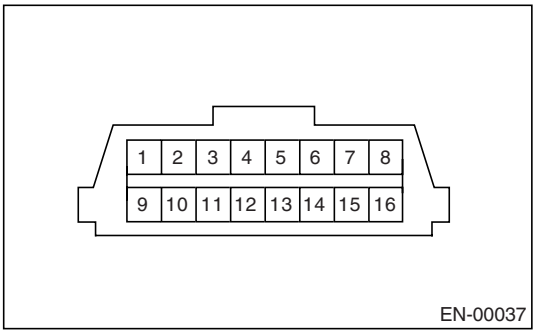
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for connecting the Subaru Select Monitor.

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool because the circuit for Subaru Select Monitor may be damaged.



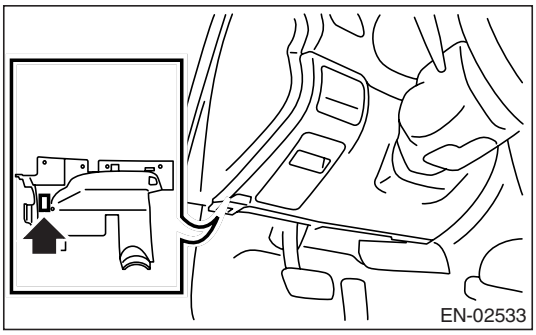
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1) Prepare a 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 DTC and freeze frame 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
Read out the data according to repair procedures. (For detailed operation procedure, refer to the general scan tool operation manual.)

NOTE:
For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.0)(diag)-64, 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, malfunction indicator light status and diagnosis support information	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa, inHg or psig
0C	Engine revolution	rpm
0D	Vehicle speed	km/h or MPH
0E	Ignition timing advance	°
0F	Intake air temperature	°C or °F
10	Air flow rate from manifold absolute pressure sensor	g/s or lb/m
11	Throttle valve absolute opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1 sensor 2	V and %
1C	Supporting OBD system	—
21	Driving distance after MIL illuminates	km or miles
24	A/F value and A/F sensor output voltage	— and V
34	A/F sensor lambda valve and current	— and mA

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 of freeze frame data	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa, inHg or psig
0C	Engine revolution	rpm
0D	Vehicle speed	km/h or MPH
0E	Ignition timing advance	°
0F	Intake air temperature	°C or °F
10	Air flow rate from mass air flow sensor	g/s or lb/m
11	Throttle valve absolute opening angle	%

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

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

Refer to "Read Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4SO 2.0)(diag)-31, Read 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.

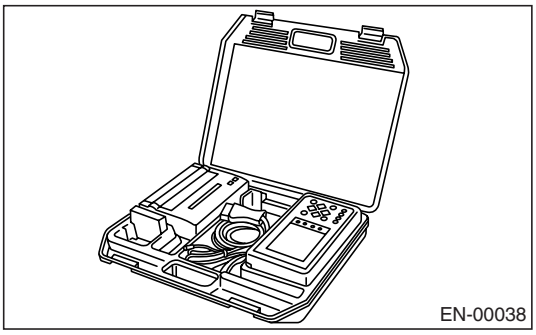
NOTE:
Refer to general scan tool manufacturer's operation manual to clear or reset emission-related diagnostic information (MODE $04).

9. Subaru Select Monitor

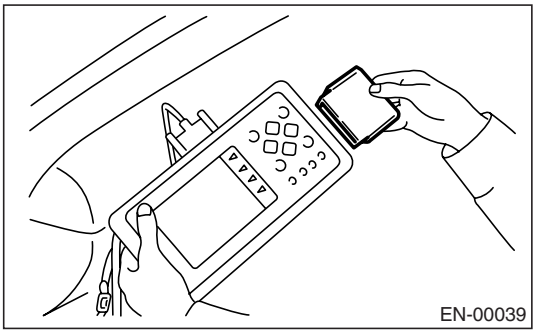
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>

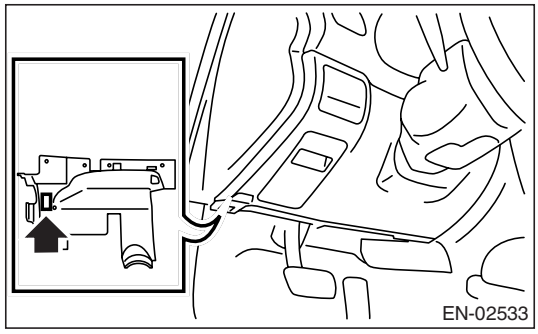


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



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

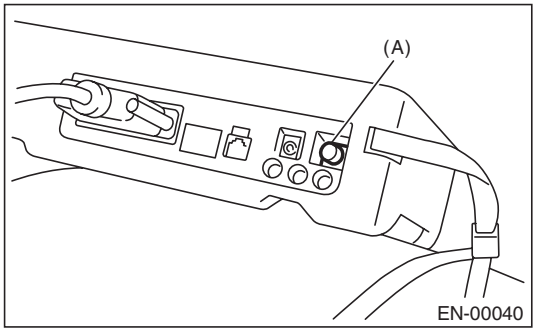
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

5) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine load	Engine load	%	1 — 3%
Engine coolant temperature signal	Coolant Temp.	°C or °F	≥ 75 °C or 167°F
A/F Correction #1	A/F Correction #1	%	−10 — +10%
A/F Learning #1	A/F Learning #1	%	−15 — +15%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	200 — 300 mmHg, 26.7 — 40 kPa, 7.8 — 11.8 inHg or 3.8 — 5.8 psig
Engine speed signal	Engine Speed	rpm	600 — 800 rpm (Agree with the tachometer indication)
Meter vehicle speed signal	Vehicle Speed	km/h or MPH	0 km/h or 0 MPH (at parking)
Ignition timing signal	Ignition Timing	deg	10 — 15 deg
Intake air temperature signal	Intake Air Temp.	°C or °F	(Ambient air temperature)
Throttle opening angle signal	Throttle Opening Angle	%	1 — 2%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0.01 — 0.85 V
Battery voltage	Battery Voltage	V	12 — 14 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2 — 4 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Atmospheric pressure signal	Atmosphere Pressure	mmHg, kPa, inHg or psig	(Atmosphere pressure)
Intake manifold relative pressure	Mani. Relative Pressure	mmHg, kPa, inHg or psig	(Intake manifold absolute pressure − Atmospheric pressure)
Learned Ignition Timing	Learned Ignition Timing	°	−2 — 2°
Acceleration opening angle signal	Accel. Opening Angle	%	0.0%
Rear oxygen sensor heater current	Rear O2 Heater Current	A	0.9 — 1.1 A
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 3%
EGR step number	EGR step number	STEP	0
Generator duty ratio	ALT Duty	%	0 — 100%
A/F sensor resistance value 1	A/F Sensor #1 Resistance	Ω	25 — 27 mA
A/F sensor output lambda 1	A/F Sensor #1	—	0.85 — 1.15
A/F correction 3	A/F Correction #3	%	3.5 — 6.5%
Front oxygen (A/F) sensor current	A/F Heater Current	A	5 — 10 A
Main-throttle position sensor fully closed voltage	Main-Throttle Sensor Closed Position Voltage	V	0.3 — 0.7 V
AT/MT identification terminal	AT Vehicle ID Signal	—	ON/OFF
Test mode terminal	Test Mode Signal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch signal	P/S Switch	—	OFF (At OFF)

Remarks	Display	Unit of measure	Note (at idling)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Steering wheel switch signal	Handle Switch	—	Hi/Low
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	Rich/Lean
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Wiper switch signal	Wiper Switch	—	OFF (At OFF)
A/C middle pressure switch signal	A/C Mid Pressure Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF (At OFF)
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF (At OFF)
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF (At OFF)
Fuel pump relay signal	Fuel Pump Relay	—	ON
AT coordinate retard angle demand signal	Retard Signal from AT	—	OFF
AT coordinate fuel cut demand signal	Fuel Cut Signal from AT	—	OFF
AT coordinate permission signal	Torque Permission Signal	—	ON/OFF
Throttle motor duty	Throttle Motor Duty	%	5 — 10%
Throttle power supply voltage	Throttle Motor Voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub-Throttle Sensor	V	1.48 — 1.50 V
Main throttle sensor voltage	Main-throttle Sensor	V	0.62 V
Sub acceleration sensor voltage	Sub-Accelerator Sensor	V	0.5 — 1.5 V
Main acceleration sensor voltage	Main-Accelerator Sensor	V	0.5 — 1.5 V
Memory vehicle speed	Memorized Cruise Speed	km/h or MPH	0 km/h or 0 MPH
Fuel level sensor resistance	Fuel level resistance	Ω	0 — 100 Ω
ETC motor relay signal	ETC Motor Relay	—	ON
Clutch switch signal	Clutch Switch	—	OFF (At OFF)
Stop light switch signal	Stop Light Switch	—	OFF (At OFF)
SET/COAST switch signal	SET/CST Switch	—	OFF (At OFF)
RESUME/ACCEL switch signal	RES/ACC Switch	—	OFF (At OFF)
Brake switch signal	Brake Switch	—	OFF (At OFF)
Main switch signal	Main Switch	—	OFF (At OFF)
Integrated module data reception	Body Int. Unit Data	—	ON
Integrated module data update	Body Int. Unit Count	—	ON

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
6) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
Number of diagnosis code	Number of Diagnostic Code(s):	0
Condition of malfunction indicator light	MI (MIL)	OFF
Monitoring test of misfire	Misfire monitoring	—
Monitoring test of fuel system	Fuel system monitoring	complete
Monitoring test of comprehensive component	Component monitoring	complete
Test of catalyst	Catalyst Diagnosis	—
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete
Test of EGR system	EGR system	complete

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA FOR ENGINE. (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.
• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	—
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing signal	Ignition Timing	°
Amount of intake air	Mass Air Flow	g/s or lb/m
Intake air temperature signal	Intake Air Temp	°C or °F
Throttle position signal	Throttle Opening Angle	%

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
5) On the «Data Display» screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Message	LED "ON" requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Steering wheel switch signal	Handle Switch	RHD or LHD	When handle switch Low signal is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Sig.	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Sig.	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower fan SW	ON or OFF	When blower fan switch is turned ON.
Light switch signal	Light Switch	ON or OFF	When light switch is turned ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned ON.
Windshield wiper switch signal	Wiper Switch	ON or OFF	When windshield wiper switch is turned ON.
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When A/C middle pressure switch is turned ON.
Air conditioning relay signal	Compressor relay	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON output
AT retard angle demand signal	Retard Signal	ON or OFF	When AT retard angle demand signal is input.
AT fuel cut signal	Fuel Cut	ON or OFF	When AT fuel cut signal is input.

Remarks	Display	Message	LED “ON” requirements
AT coordinate permission signal	Torque Permission Signal	ON or OFF	When AT coordinate permission signal is input.
Clutch switch signal	Clutch Switch	ON or OFF	When clutch switch is turned to ON.
Stop light switch signal	Stop Light Switch	ON or OFF	When stop light switch is turned to ON.
SET/COAST switch signal	SET/CST Switch	ON or OFF	When SET/CST switch is turned to ON.
RESUME/ACCEL switch signal	RES/ACC Switch	ON or OFF	When RES/ACC switch is turned to ON.
Brake switch signal	Brake Switch	ON or OFF	When brake switch is turned to ON.
Main switch signal	Main Switch	ON or OFF	When main switch is turned to ON.
Cancel switch signal	Cancel Switch	ON or OFF	When cancel switch is turned to ON.
Electronic throttle control motor relay signal	ETC Motor Relay	ON or OFF	When electronic throttle control motor relay is in function.
Data reception signal	Body Int. Unit Data	ON or OFF	When data reception signal is entered.
Counter update signal	Body Int. Unit Count	ON or OFF	When counter update signal is entered.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

10. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {Diagnostic Code(s) Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>

3. GENERAL SCAN TOOL

Refer to the data denoting emission-related powertrain DTC.
For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>

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

11.Inspection Mode

A: PROCEDURE

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>

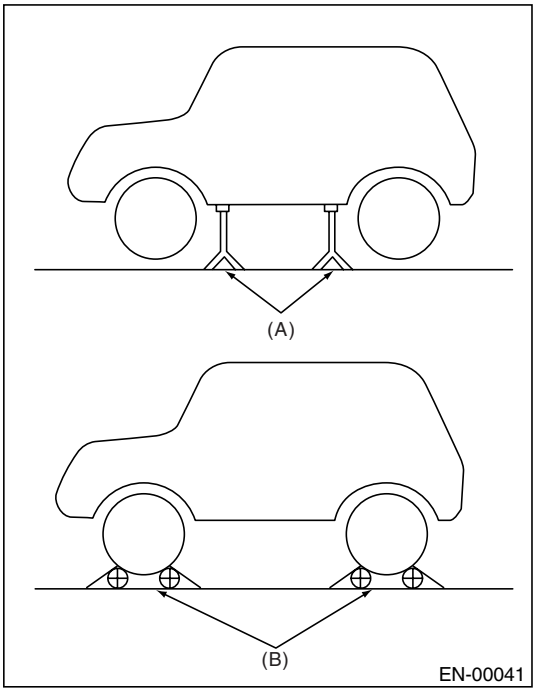
DTC	Item
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
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)
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)
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
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)
P0458	Evaporative Emission System Purge Control Valve Circuit Low
P0459	Evaporative Emission System Purge Control Valve Circuit High
P0462	Fuel Level Sensor “A” Circuit Low
P0463	Fuel Level Sensor “A” Circuit High
P0500	Vehicle Speed Sensor “A”
P0512	Starter Request Circuit
P0513	Incorrect Immobilizer Key
P0519	Idle Air Control System Performance
P0600	Serial Communication Link
P0604	Internal Control Module Random Access Memory (RAM) Error
P0605	Internal Control Module Read Only Memory (ROM) Error
P0607	Control Module Performance
P0638	Throttle Actuator Control Range/Performance (Bank 1)
P0691	Fan 1 Control Circuit Low
P0692	Fan 1 Control Circuit High
P0851	Park/Neutral Switch Input Circuit Low
P0852	Park/Neutral Switch Input Circuit High
P1134	A/F Sensor Micro-Computer Problem
P1160	Return Spring Failure
P1518	Starter Switch Circuit Low Input
P1560	Back-up Voltage Circuit Malfunction
P1570	Antenna

DTC	Item
P1571	Reference Code Incompatibility
P1572	IMM Circuit Failure (Except Antenna Circuit)
P1574	Key Communication Failure
P1576	EGI Control Module EEPROM
P1577	IMM Control Module EEPROM
P1578	Meter Failure
P2100	Throttle Actuator Control Motor Circuit/Open
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
P2111	Throttle Actuator Control System - Stuck Open
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
P2503	Charging System Voltage Low

1. PREPARATION FOR THE INSPECTION MODE

1) Check that the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

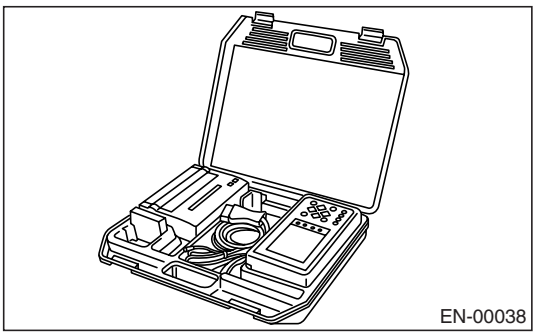
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



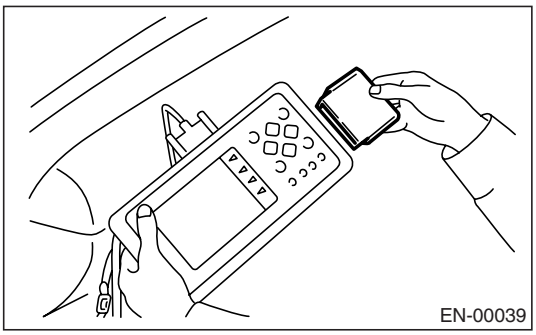
(A) Rigid racks
(B) Free rollers

2. SUBARU SELECT MONITOR

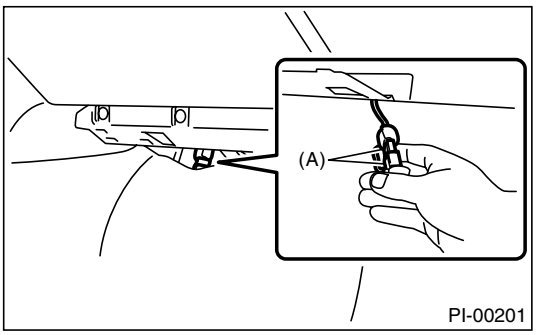
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>


EN-00038

4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>


EN-00039

6) Connect the test mode connector (A) located at the lower portion of glove box.



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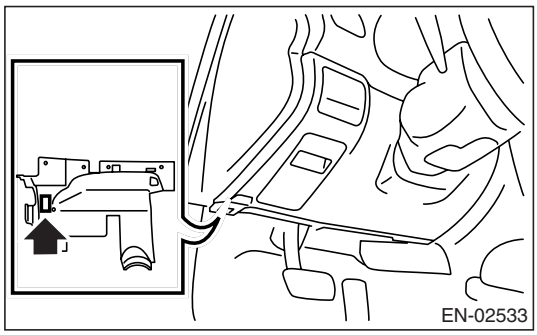
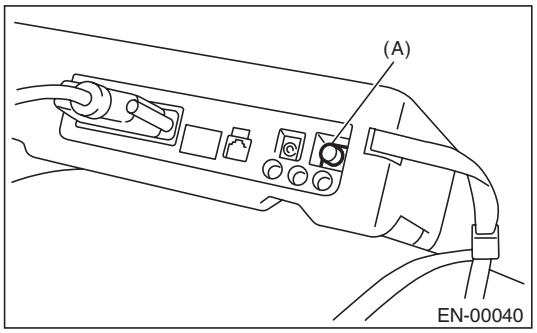
7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).


EN-02533

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

8) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



EN-00040

(A) Power switch

9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type has been displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the "Perform D Check?" is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.

- If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:

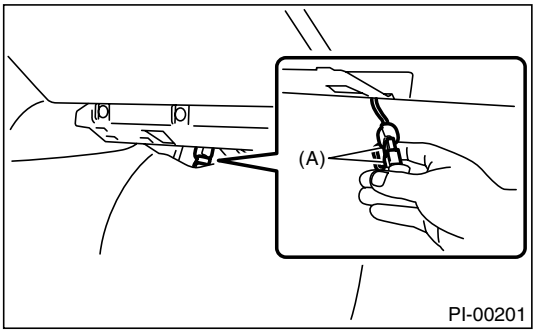
- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
- For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".

<Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>

• Release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis function.

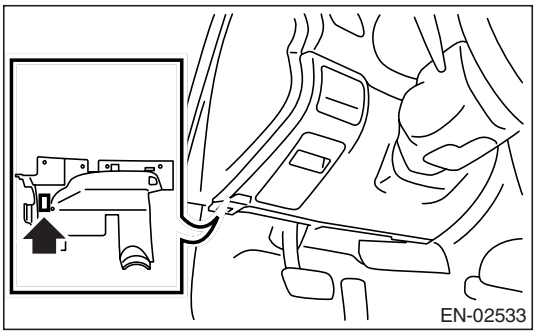
3. GENERAL SCAN TOOL

1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>
2) Idle the engine.
3) Connect the test mode connector (A) in the lower portion of glove box.



4) Connect the general scan tool to data link connector located in the lower portion of the lower panel of instrument panel (on the driver's side).

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in "P" position before starting. (AT model)
• Depress the clutch pedal when starting engine. (MT model)

6) Using the select lever or shift lever, turn the "P" position switch and "N" position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT model)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the select lever or shift lever in "D" position (AT model) or "1st" gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• For AWD model, release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the general scan tool, check DTC and record the result(s).

NOTE:
• For detailed operation procedure, refer to the general scan tool operation manual.
• For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>

12.Drive Cycle

A: PROCEDURE

There are two drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR DRIVE CYCLE

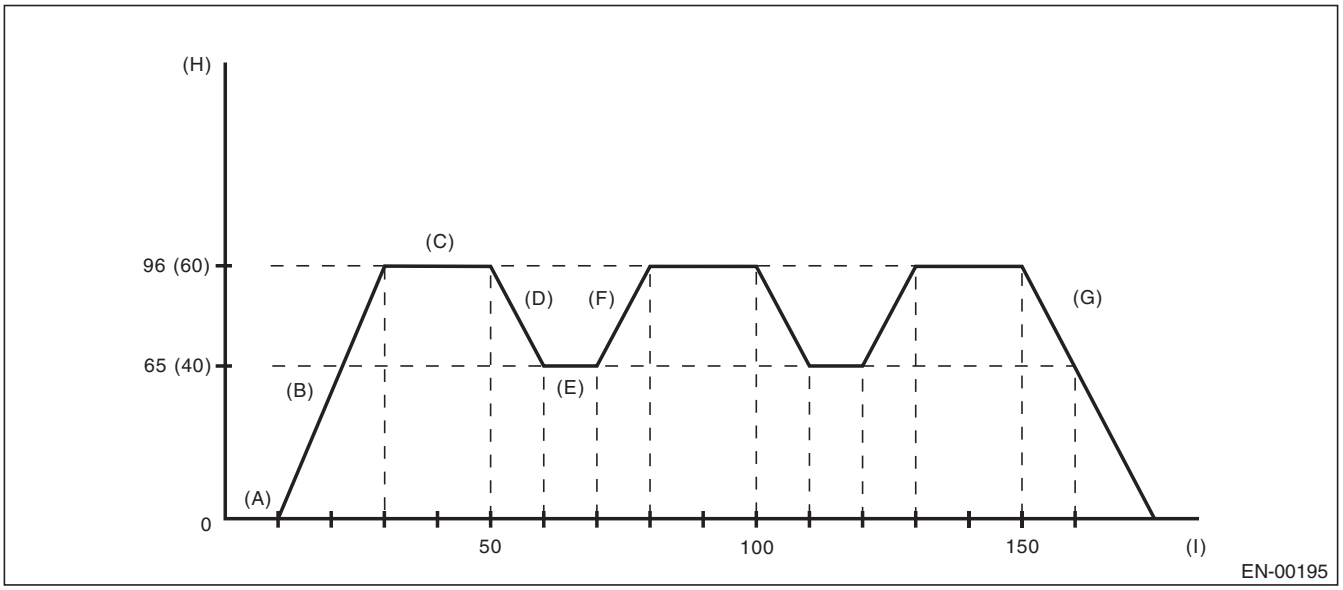
1) Check that the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Perform the diagnosis after warming up the engine except when the engine coolant temperature at starting is specified.
• Perform the diagnosis twice if the DTC marked with *. After completing the first diagnosis, stop the engine and perform the second diagnosis in the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Coolant temperature at start is less than 20°C (68°F).
*P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0171	System Too Lean (Bank 1)	—
*P0172	System Too Rich (Bank 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
*P0483	Cooling Fan Rationality Check	—
P1137	O2 Sensor Circuit (Bank1 Sensor1)	—

3. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for 1 minute.
(B) Accelerate the vehicle to 96 km/h (60 MPH) within 20 seconds.
(C) Drive the vehicle at 96 km/h (60 MPH) for 20 seconds.
(D) Decelerate the vehicle to 65 km/h (40 MPH) with throttle fully closed.
(E) Drive the vehicle at 65 km/h (40 MPH) for 10 seconds.
(F) Accelerate the vehicle to 96 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Sec.

DTC	Item	Condition
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0130	O2 Sensor Circuit (Bank1 Sensor1)	—
*P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
P0301	Cylinder 1 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0302	Cylinder 2 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0303	Cylinder 3 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0304	Cylinder 4 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0400	Exhaust Gas Recirculation Flow	—
P0700	Transmission Control System (MIL Request)	—
P1134	A/F Sensor Micro-Computer Problem	—
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)	—
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	—
P2504	Charging System Voltage High	—

13. Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor power switch to OFF.

NOTE:
• Initial diagnosis of electronic throttle control is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Clear Diagnostic Code?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF, and the Subaru Select Monitor power switch to OFF.

NOTE:
• Initial diagnosis of electronic throttle control is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

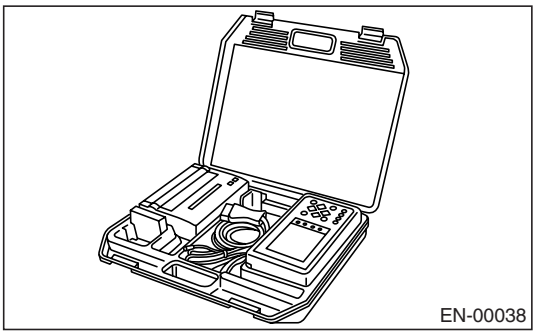
3. GENERAL SCAN TOOL

For clear memory procedures using the general scan tool, refer to the general scan tool operation manual.

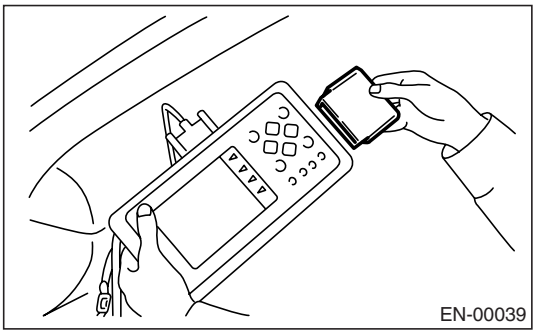
14. Compulsory Valve Operation Check Mode

A: PROCEDURE

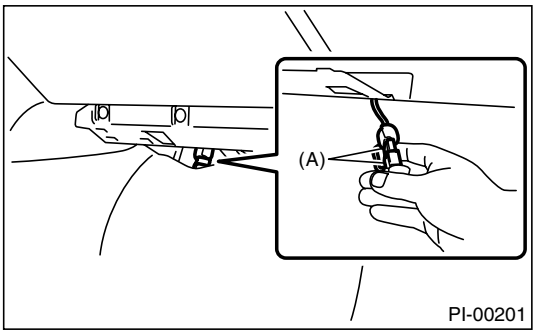
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>


EN-00038

2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>

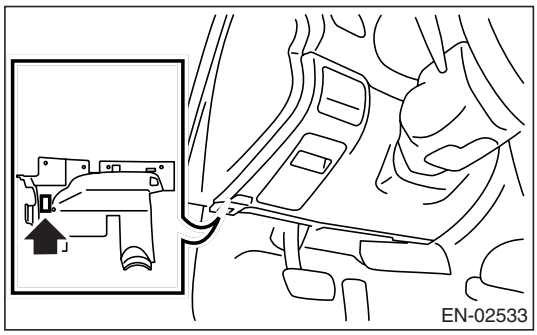

EN-00039

4) Connect the test mode connector (A) in the lower portion of glove box.



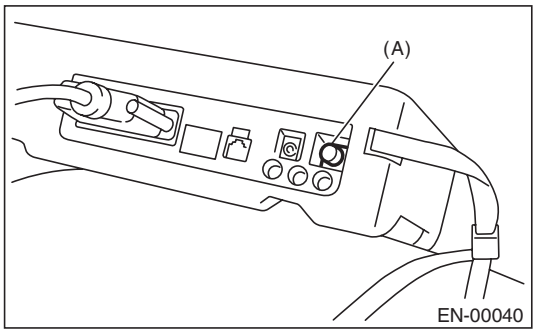
PI-00201

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


EN-02533

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

6) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



EN-00040

(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type has been displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

DESCRIPTION	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve

NOTE:

• The following parts will be displayed but not functional.

Display
EGR Solenoid Valve
ASV Solenoid Valve
FICD Solenoid
Pressure Switching Sol.1
Pressure Switching Sol.2
Turbocharger Wastegate Solenoid
PCV Solenoid Valve
Vent. Solenoid Valve
AAI Solenoid Valve
Tank Sensor Cntl Valve
Exhaust Bypass Valve Control Permit Flag

• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

15.Malfunction Indicator Light

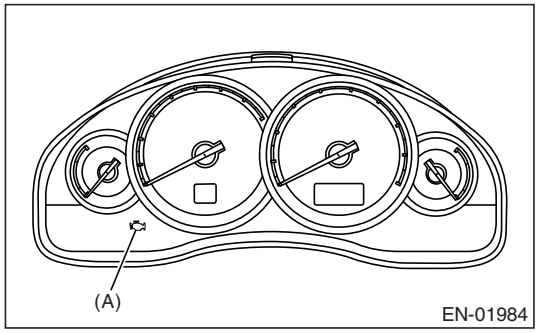
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SO 2.0)(diag)-42, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4SO 2.0)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink. <Ref. to EN(H4SO 2.0)(diag)-46, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking. <Ref. to EN(H4SO 2.0)(diag)-48, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

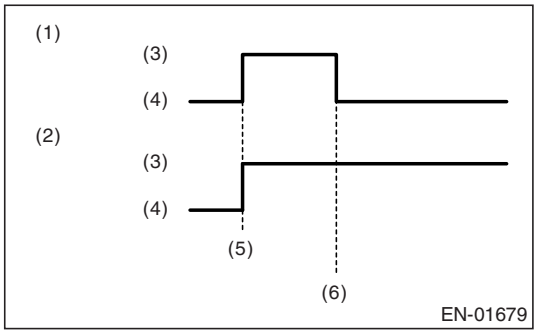
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

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 the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>

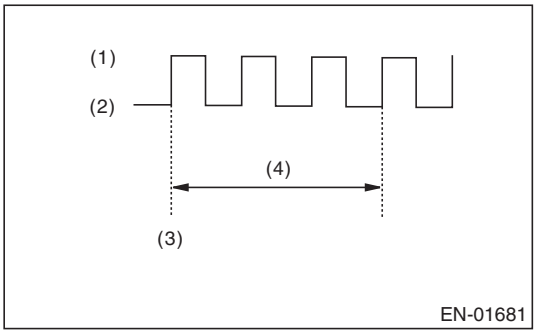


2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or emission control system is malfunctioning.



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

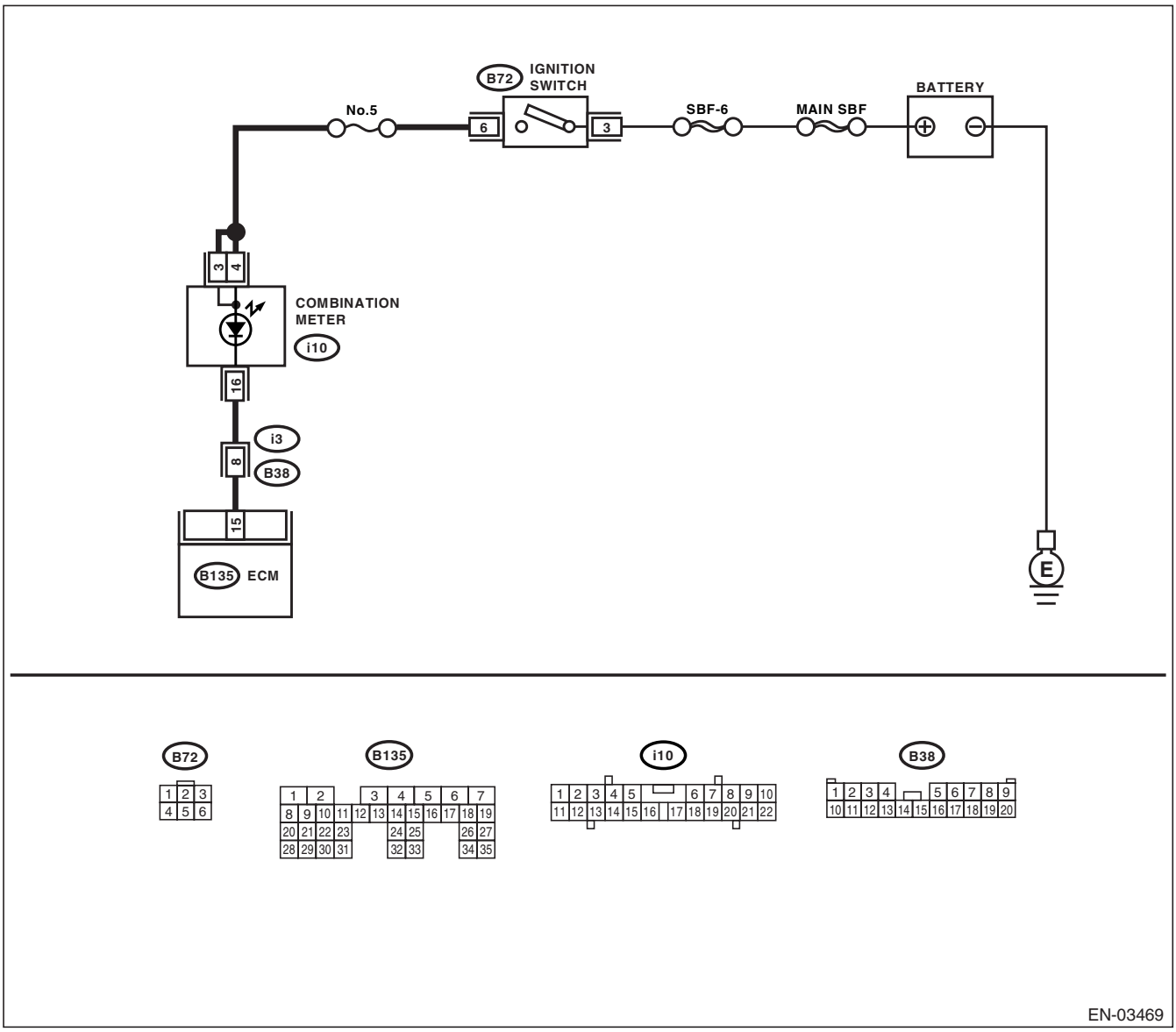
3) Turn the ignition switch to OFF and connect the test mode connector.
(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
(2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz. (During diagnosis)
(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

DIAGNOSIS:
The malfunction indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.
WIRING DIAGRAM:



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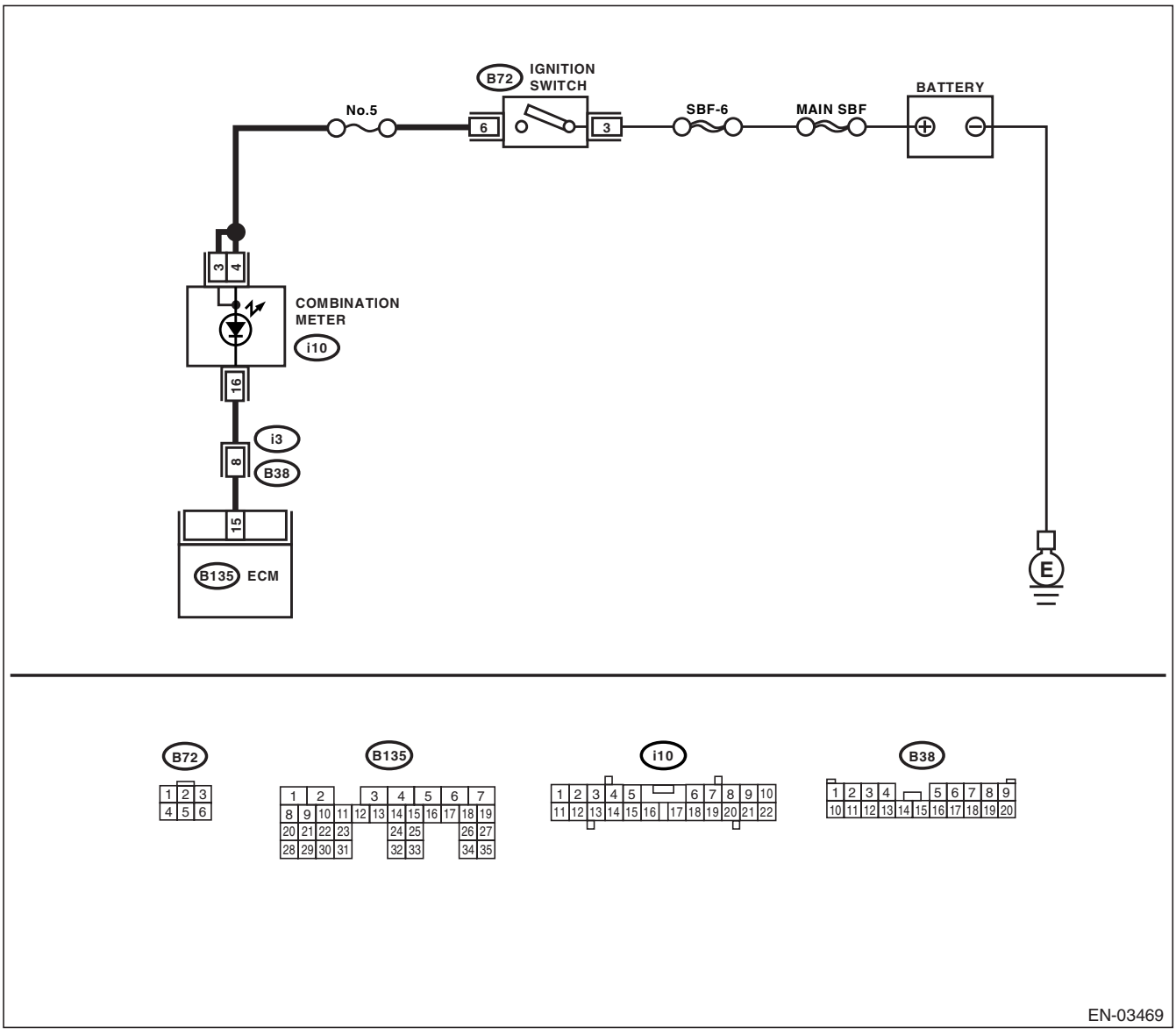
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check for poor connection by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-15, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B135) No. 15 — (i10) No. 16:***	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 and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the meter case assembly of combination meter. <Ref. to IDI-15, Combination Meter.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 5) • Open or short circuit of harness between fuse (No. 5) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

DIAGNOSIS:
The malfunction indicator light circuit is shorted.
TROUBLE SYMPTOM:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

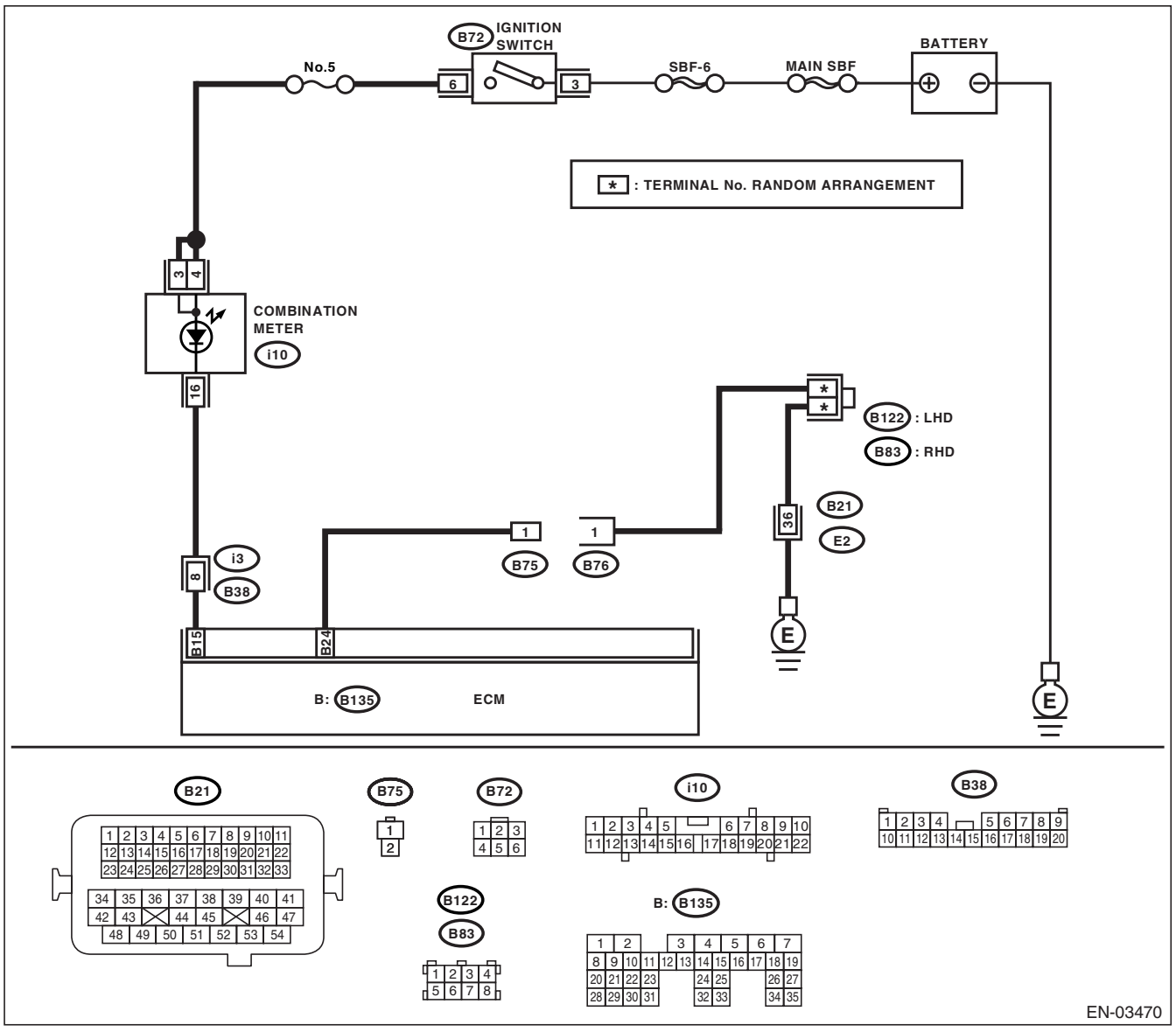
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

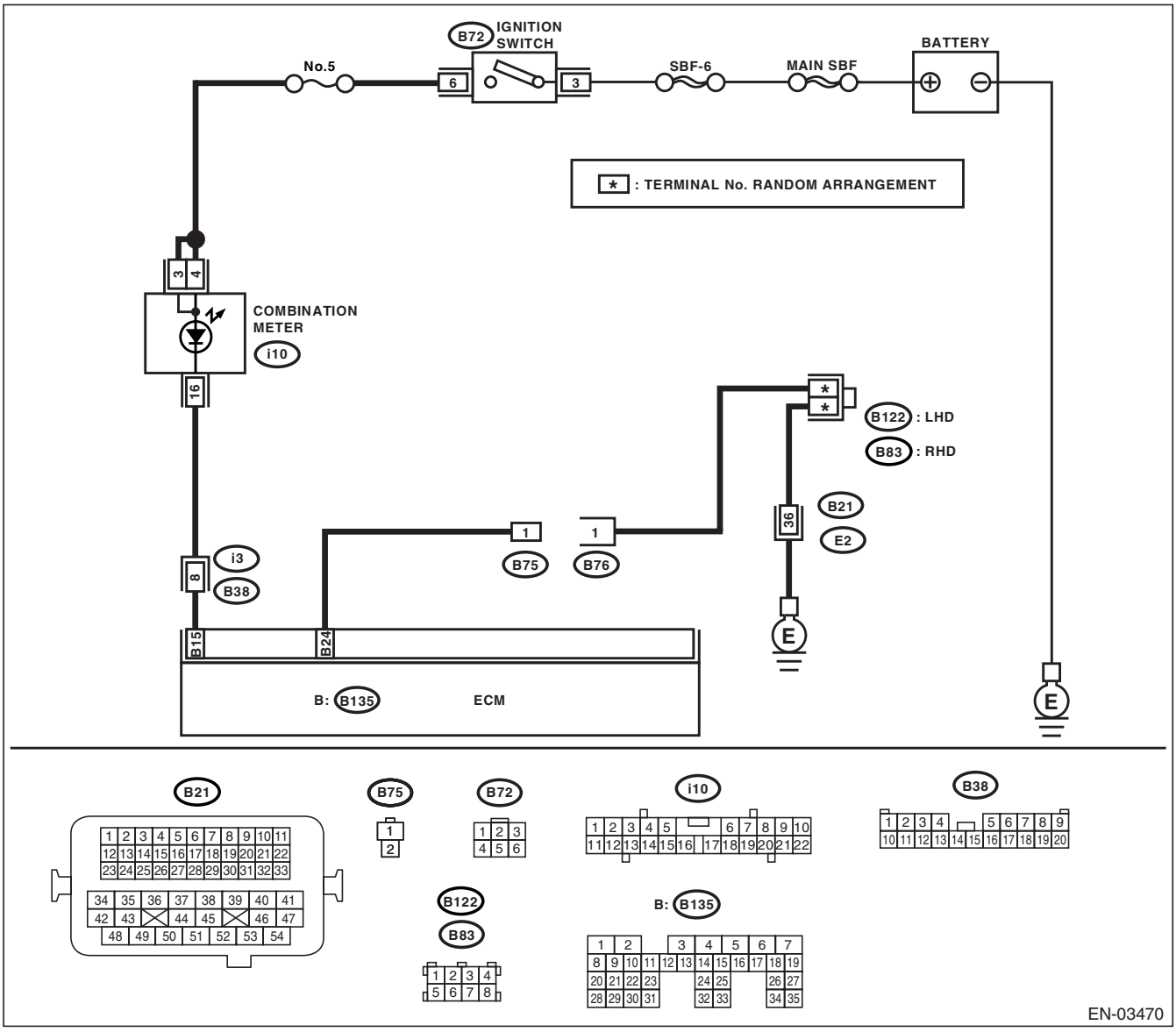
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step **2.**	Repair the malfunction indictor light circuit. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	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 test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 24 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.
TROUBLE SYMPTOM:
Malfunction indicator light blinks when test mode connector is not connected.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **2.**	System is normal. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when test mode connector is connected.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUND TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 24 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit of harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

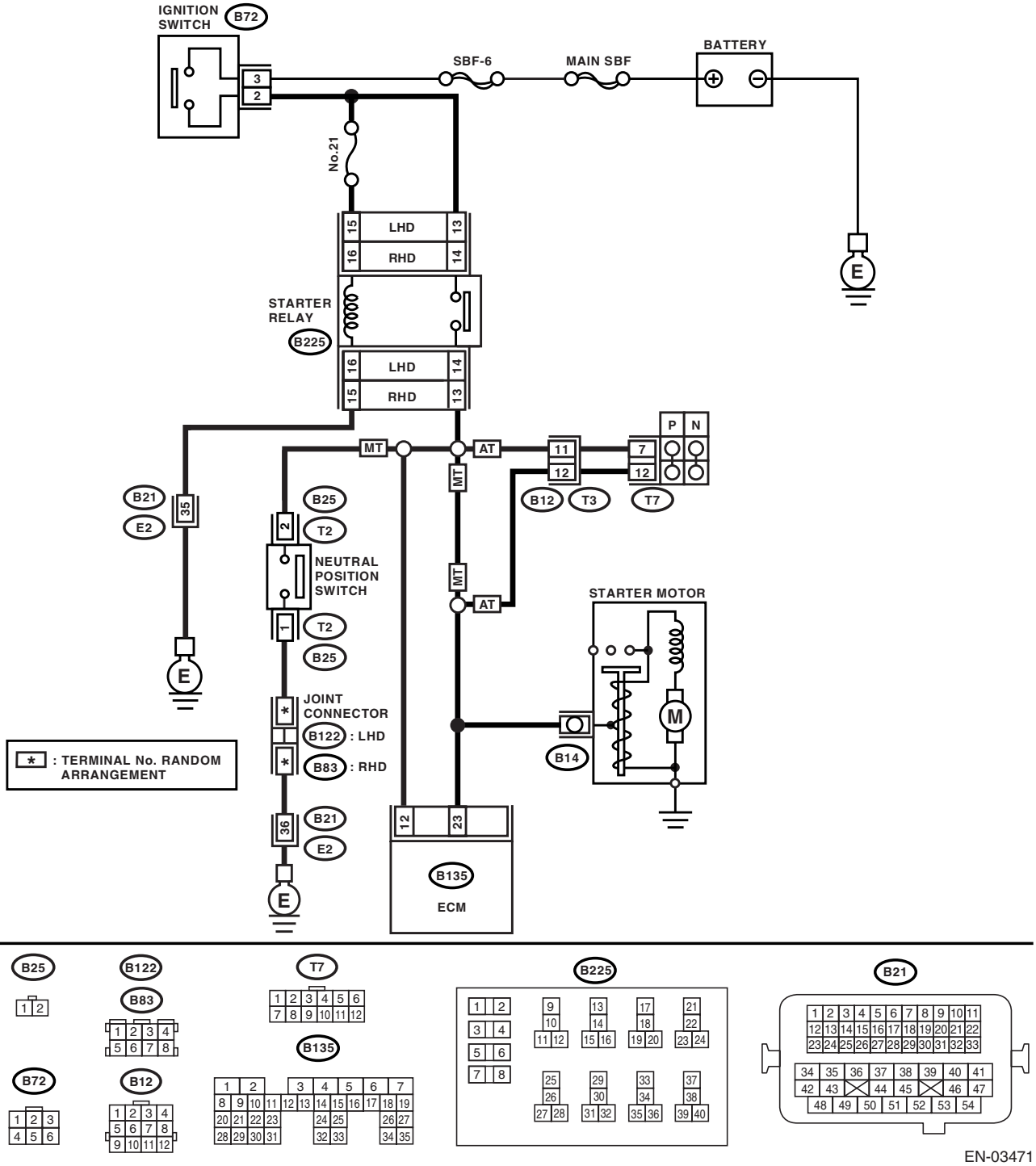
A: PROCEDURE

1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO 2.0)(diag)-51, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO 2.0)(diag)-54, 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(H4SO 2.0)(diag)-56, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO 2.0)(diag)-59, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-62, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-03471

Diagnostics for Engine Starting Failure

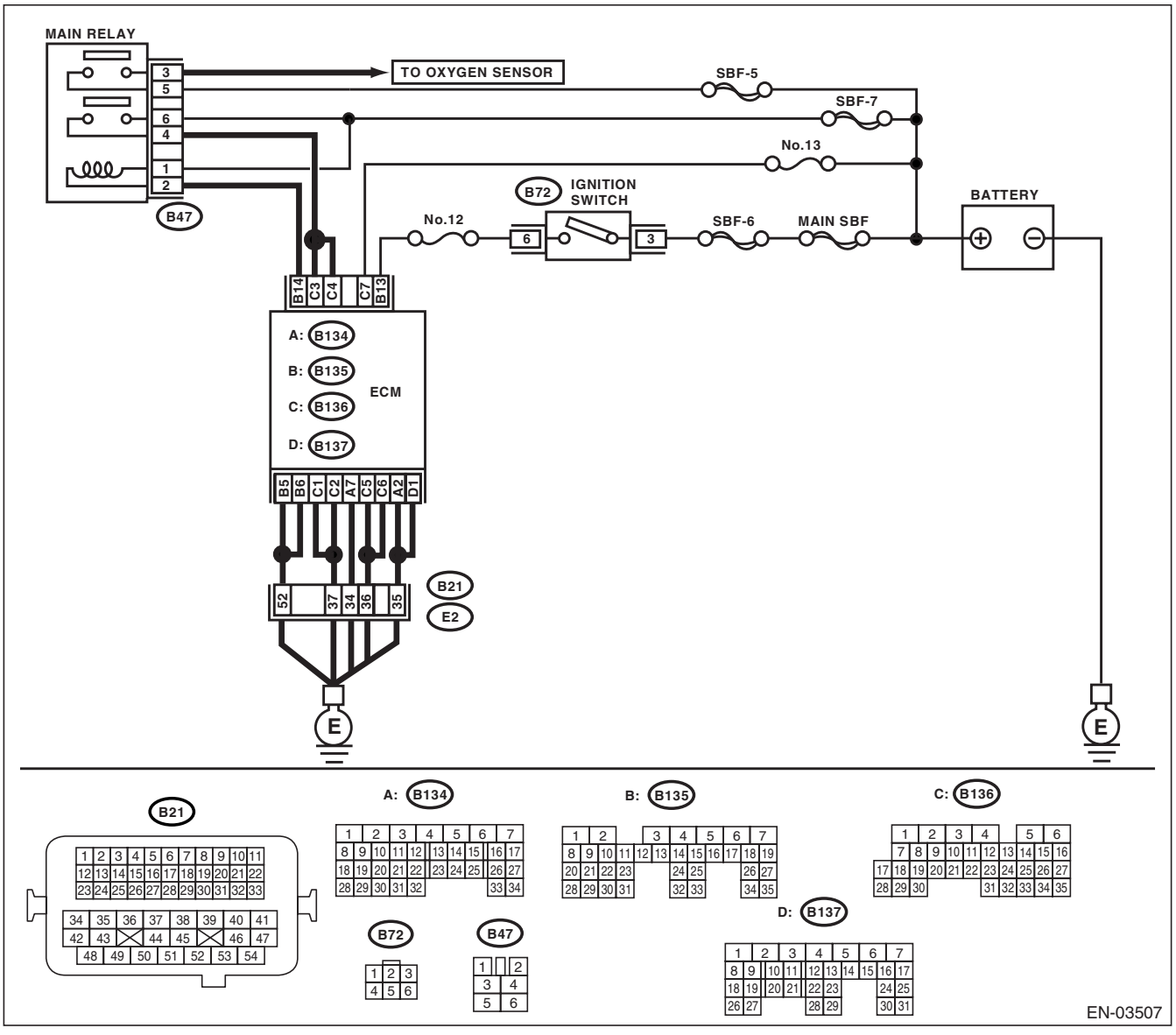
	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2.**	Charge or replace the battery.
2	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **3.**	Go to step **4.**
3	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4SO 2.0)(diag)-31, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
4	**CHECK INPUT SIGNAL OF 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 power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: • For AT model, place the select lever in "P" or "N" range. • For MT model, depress the clutch pedal.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H4SO 2.0)-6, Starter.>	Go to step **5.**
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit of harness between ignition switch and battery, and check fuse SBF No. 6 and MAIN SBF.
6	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **7.**	Replace the ignition switch.
7	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***LHD model*** ***(B225) No. 13 (+) — Chassis ground (−):*** ***(B225) No. 15 (+) — Chassis ground (−):*** ***RHD model*** ***(B225) No. 14 (+) — Chassis ground (−):*** ***(B225) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open circuit of harness between starter relay and ignition switch.

	Step	Check	Yes	No
8	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the starter relay.
9	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connector from ECM. 4) Turn the ignition switch to START. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the open or ground short circuit of harness between ECM and starter relay. For AT model, check the inhibitor switch. <Ref. to 4AT-51, INSPECTION, Inhibitor Switch.>

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

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



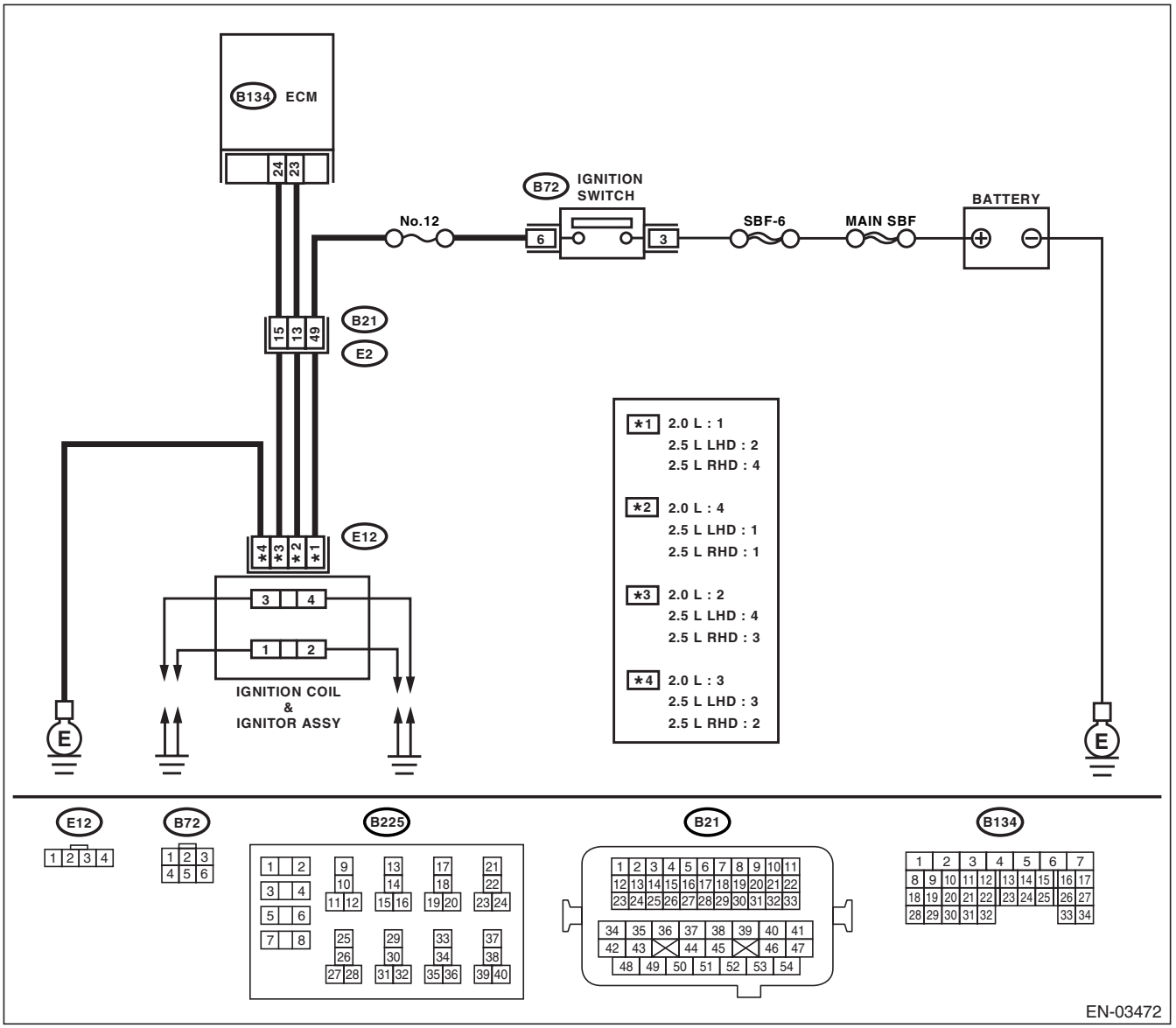
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit of harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit of harness between ECM connector and main relay connector.
6	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open or ground short circuit of harness between ECM connector and main relay connector.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit of harness of power supply circuit.

Step		Check	Yes	No
8	**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. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO 2.0)(diag)-56, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit of harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



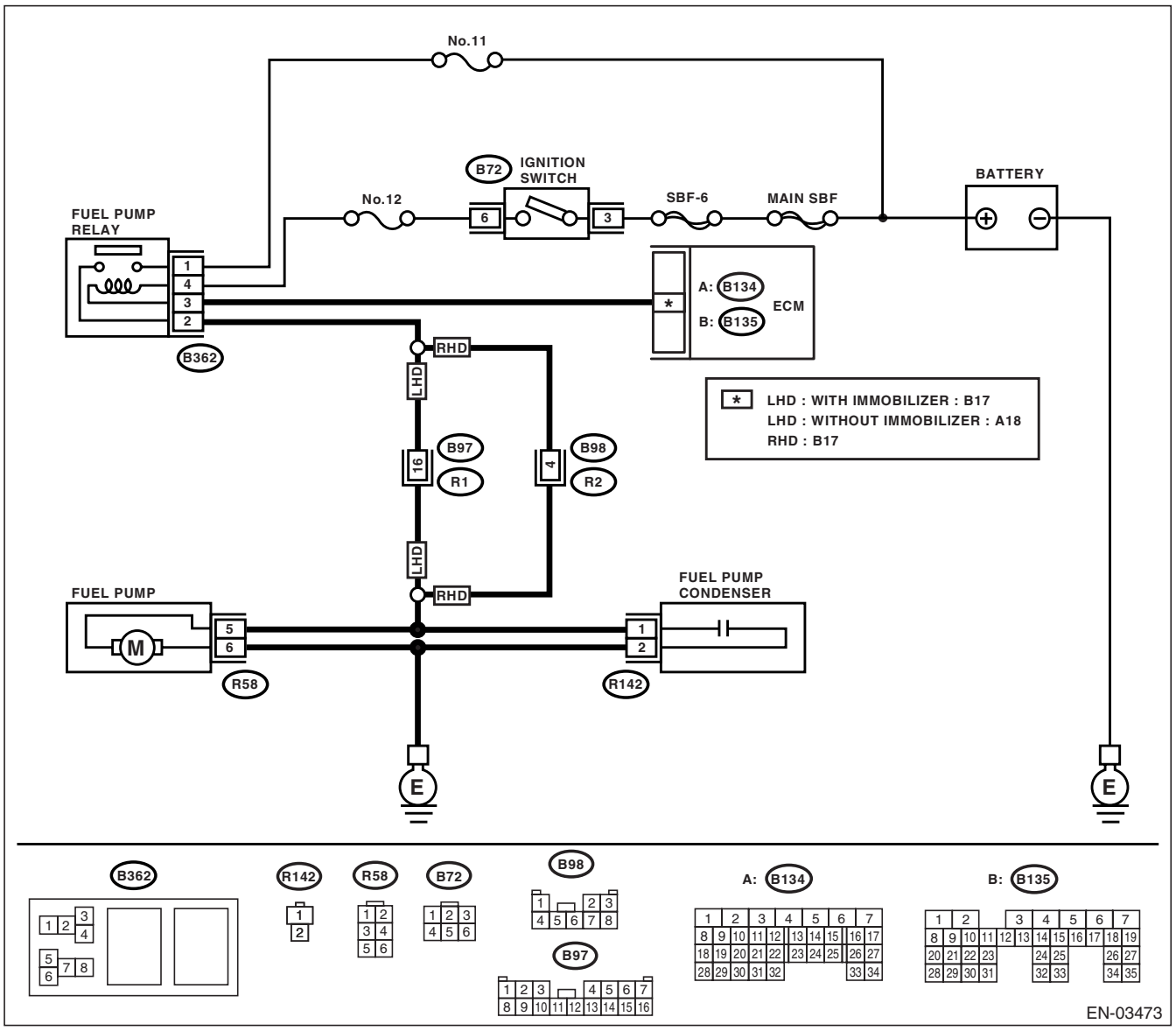
	Step	Check	Yes	No
1	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug thread portion on engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check the fuel pump system. <Ref. to EN(H4SO 2.0)(diag)-59, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil and ignitor assembly. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***2.0 L model*** ***(E12) No. 1 (+) — Engine ground (−):*** ***2.5 L LHD model*** ***(E12) No. 2 (+) — Engine ground (−):*** ***2.5 L RHD model*** ***(E12) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ignition coil and ignitor assembly, and main relay connector • Poor contact in coupling connector • Blown out fuse
3	**CHECK HARNESS OF IGNITION COIL AND IGNITOR ASSEMBLY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***2.0 L model and 2.5 L LHD model*** ***(E12) No. 3 — Engine ground:*** ***2.5 L RHD model*** ***(E12) No. 2 — 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 ignition coil and ignitor assembly connector and engine grounding terminal
4	**CHECK IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 10 — 15 kΩ?	Go to step **5.**	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, Ignition Coil and Ignitor Assembly.>

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL OF IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Connect the connector to ignition coil and ignitor assembly. 2) Check if the voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***2.0 L model*** ***(E12) No. 4 (+) — Engine ground (−):*** ***(E12) No. 2 (+) — Engine ground (−):*** ***2.5 L LHD model*** ***(E12) No. 1 (+) — Engine ground (−):*** ***(E12) No. 4 (+) — Engine ground (−):*** ***2.5 L RHD model*** ***(E12) No. 1 (+) — Engine ground (−):*** ***(E12) No. 3 (+) — Engine ground (−):***	Does the voltage vary more than 10 V?	Go to step **6.**	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, Ignition Coil and Ignitor Assembly.>
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil and ignitor assembly. 4) Measure the resistance of harness between ECM and ignition coil and ignitor assembly connector. ***Connector & terminal*** ***2.0 L model*** ***(B134) No. 23 — (E12) No. 4:*** ***(B134) No. 24 — (E12) No. 2:*** ***2.5 L LHD model*** ***(B134) No. 23 — (E12) No. 1:*** ***(B134) No. 24 — (E12) No. 4:*** ***2.5 L RHD model*** ***(B134) No. 23 — (E12) No. 1:*** ***(B134) No. 24 — (E12) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and ignition coil and ignitor assembly connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B134) No. 23 — Engine ground:*** ***(B134) No. 24 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the ground short circuit of harness between ECM and ignition coil and ignitor assembly connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel pump circuit. <Ref. to EN(H4SO 2.0)(diag)-59, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

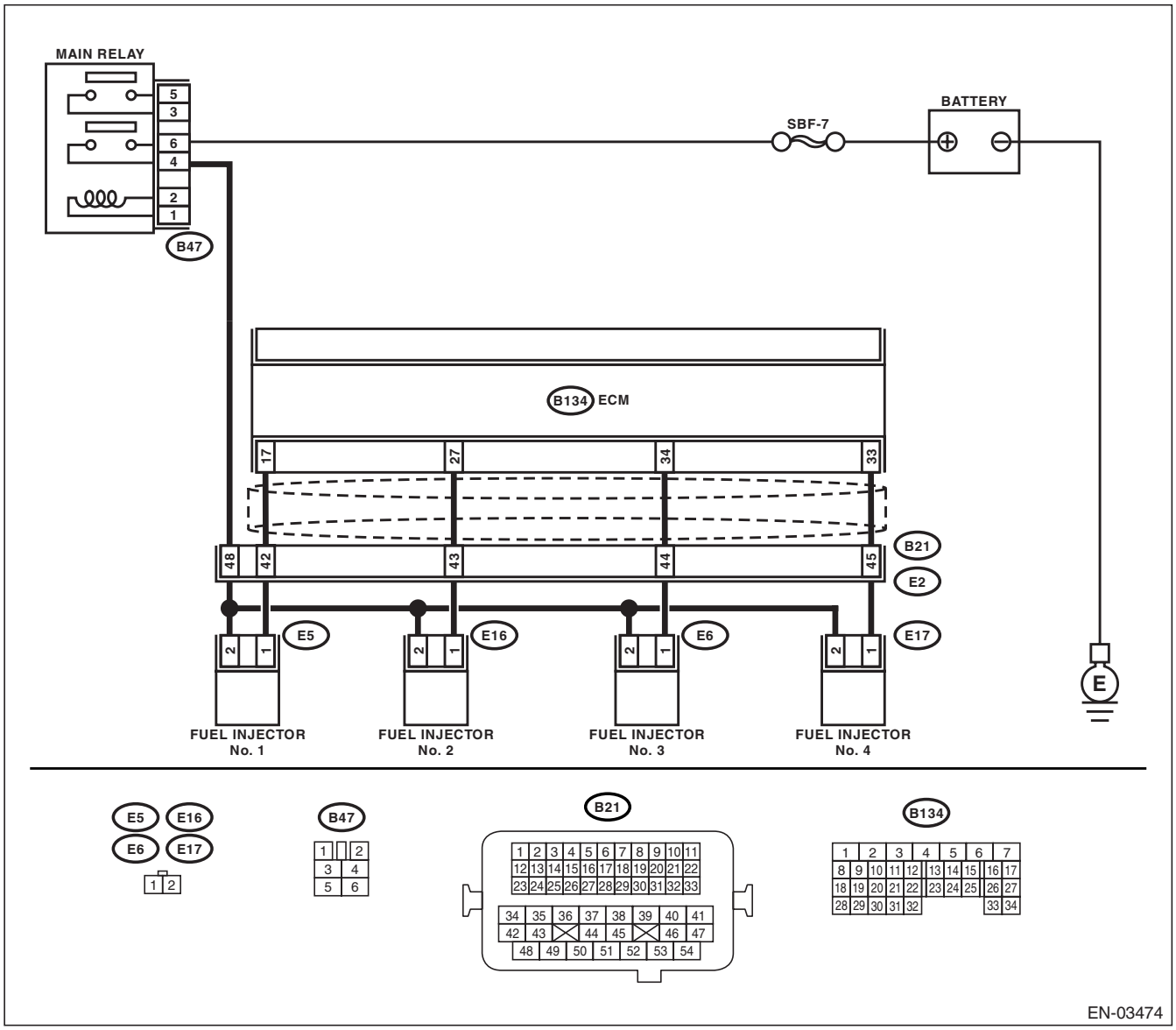
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Check if the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-62, 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 connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 6 — 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 fuel pump connector and chassis grounding 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. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO 2.0)-47, Fuel Pump.>	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 5 — (B362) 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 fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit of harness between fuel pump and fuel pump relay connector.
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 3 and No. 4. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Go to step **7.**	Replace the fuel pump relay. <Ref. to FU(H4SO 2.0)-47, Fuel Pump.>

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***RHD model and LHD model (with immobilizer)*** ***(B135) No. 17 — (B362) No. 3:*** ***LHD model (without immobilizer)*** ***(B134) No. 18 — (B362) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit of harness between ECM and fuel pump relay connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-62, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:



	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 for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO 2.0)-27, 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 more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 17 — (E5) No. 1:*** ***#2 (B134) No. 27 — (E16) No. 1:*** ***#3 (B134) No. 34 — (E6) No. 1:*** ***#4 (B134) No. 33 — (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 of harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 17 — Chassis ground:*** ***#2 (B134) No. 27 — Chassis ground:*** ***#3 (B134) No. 34 — Chassis ground:*** ***#4 (B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) 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.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4SO 2.0)(diag)-224, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	NOTE
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-69, 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(H4SO 2.0)(diag)-71, 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(H4SO 2.0)(diag)-74, 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(H4SO 2.0)(diag)-76, 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(H4SO 2.0)(diag)-79, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-81, 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(H4SO 2.0)(diag)-84, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-87, 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(H4SO 2.0)(diag)-89, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-92, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4SO 2.0)(diag)-94, 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(H4SO 2.0)(diag)-96, 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(H4SO 2.0)(diag)-99, 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(H4SO 2.0)(diag)-102, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O2 Sensor Circuit (Bank1 Sensor1)	<Ref. to EN(H4SO 2.0)(diag)-104, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-107, 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(H4SO 2.0)(diag)-109, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-111, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-113, 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(H4SO 2.0)(diag)-115, 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(H4SO 2.0)(diag)-118, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-121, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-123, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-125, 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(H4SO 2.0)(diag)-128, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-132, 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(H4SO 2.0)(diag)-139, 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(H4SO 2.0)(diag)-141, 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(H4SO 2.0)(diag)-143, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-145, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO 2.0)(diag)-147, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-150, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-152, 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(H4SO 2.0)(diag)-154, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	NOTE
P0463	Fuel Level Sensor “A” Circuit High	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor “A”	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.0)(diag)-157, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Air Control System Performance	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4SO 2.0)(diag)-160, 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(H4SO 2.0)(diag)-161, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.0)(diag)-162, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0691 FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0692 FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Switch Input Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-165, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Switch Input Circuit High	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-Computer Problem	<Ref. to EN(H4SO 2.0)(diag)-175, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	O2 Sensor Circuit (Bank1 Sensor1)	<Ref. to EN(H4SO 2.0)(diag)-177, DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.0)(diag)-180, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-180, 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(H4SO 2.0)(diag)-180, 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(H4SO 2.0)(diag)-180, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-180, 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(H4SO 2.0)(diag)-180, 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(H4SO 2.0)(diag)-180, 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(H4SO 2.0)(diag)-181, 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(H4SO 2.0)(diag)-183, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-184, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	<Ref. to EN(H4SO 2.0)(diag)-187, DTC P1521 BRAKE CIRCUIT RANGE/PERFORMANCE PROBLEM(HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.0)(diag)-189, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-20, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-21, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-24, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-25, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2100	Throttle Actuator Control Motor Circuit/Open	<Ref. to EN(H4SO 2.0)(diag)-190, DTC P2100 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT/OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.0)(diag)-190, 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(H4SO 2.0)(diag)-197, 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(H4SO 2.0)(diag)-200, 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(H4SO 2.0)(diag)-202, DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2111	Throttle Actuator Control System - Stuck Open	<Ref. to EN(H4SO 2.0)(diag)-202, DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	NOTE
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-203, 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(H4SO 2.0)(diag)-206, 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(H4SO 2.0)(diag)-208, 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(H4SO 2.0)(diag)-211, 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(H4SO 2.0)(diag)-213, 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(H4SO 2.0)(diag)-218, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2503	Charging System Voltage Low	<Ref. to EN(H4SO 2.0)(diag)-221, DTC P2503 CHARGING SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2504	Charging System Voltage High	<Ref. to EN(H4SO 2.0)(diag)-222, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

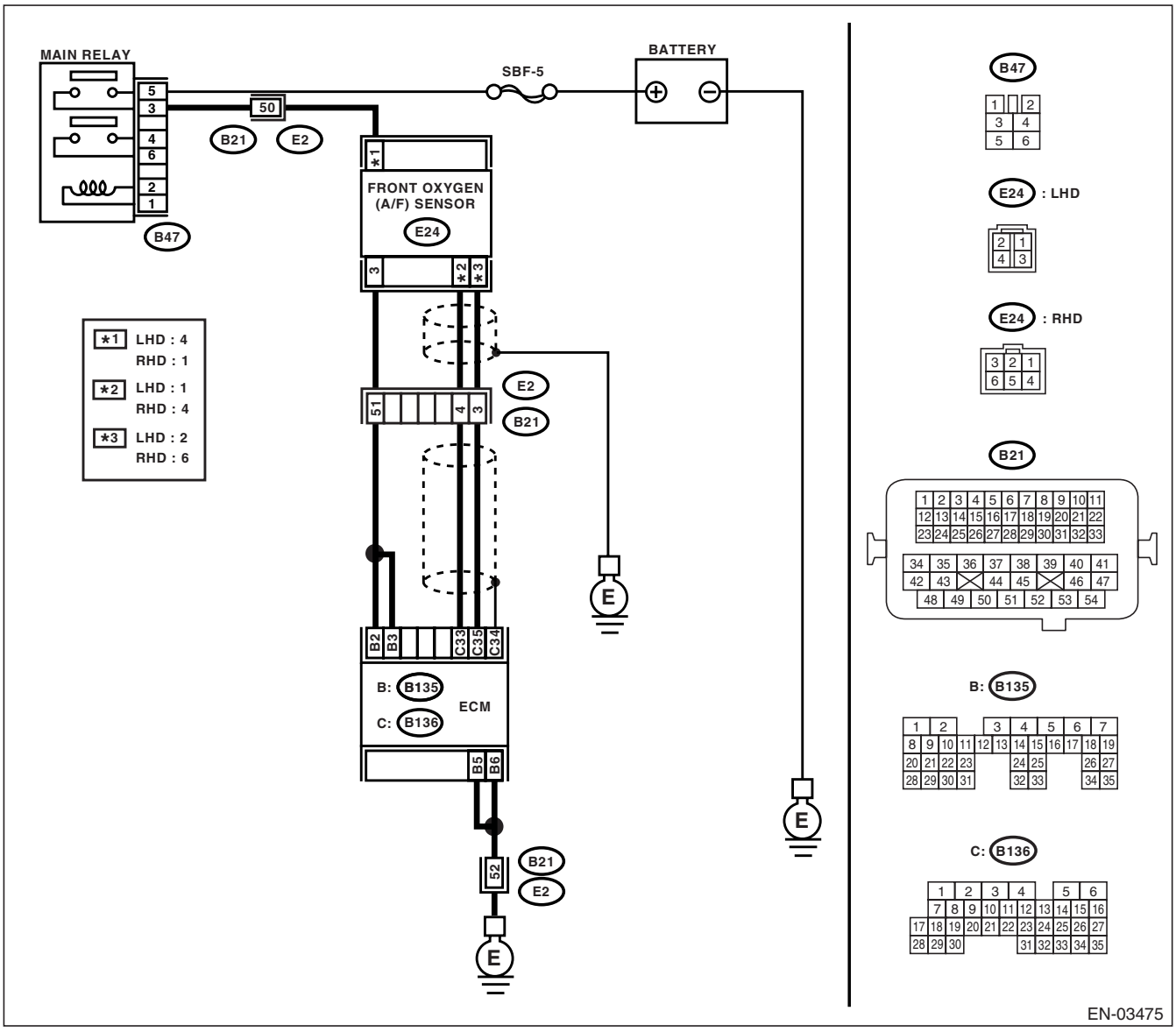
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	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 and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 2 — (E24) No. 3:*** ***(B135) No. 3 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***LHD model*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:*** ***RHD model*** ***(B136) No. 33 — (E24) No. 4:*** ***(B136) No. 35 — (E24) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***LHD model*** ***(B47) No. 3 — (E24) No. 4:*** ***RHD model*** ***(B47) No. 3 — (E24) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***LHD model*** ***No. 3 — No. 4:*** ***RHD model*** ***No. 1 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

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

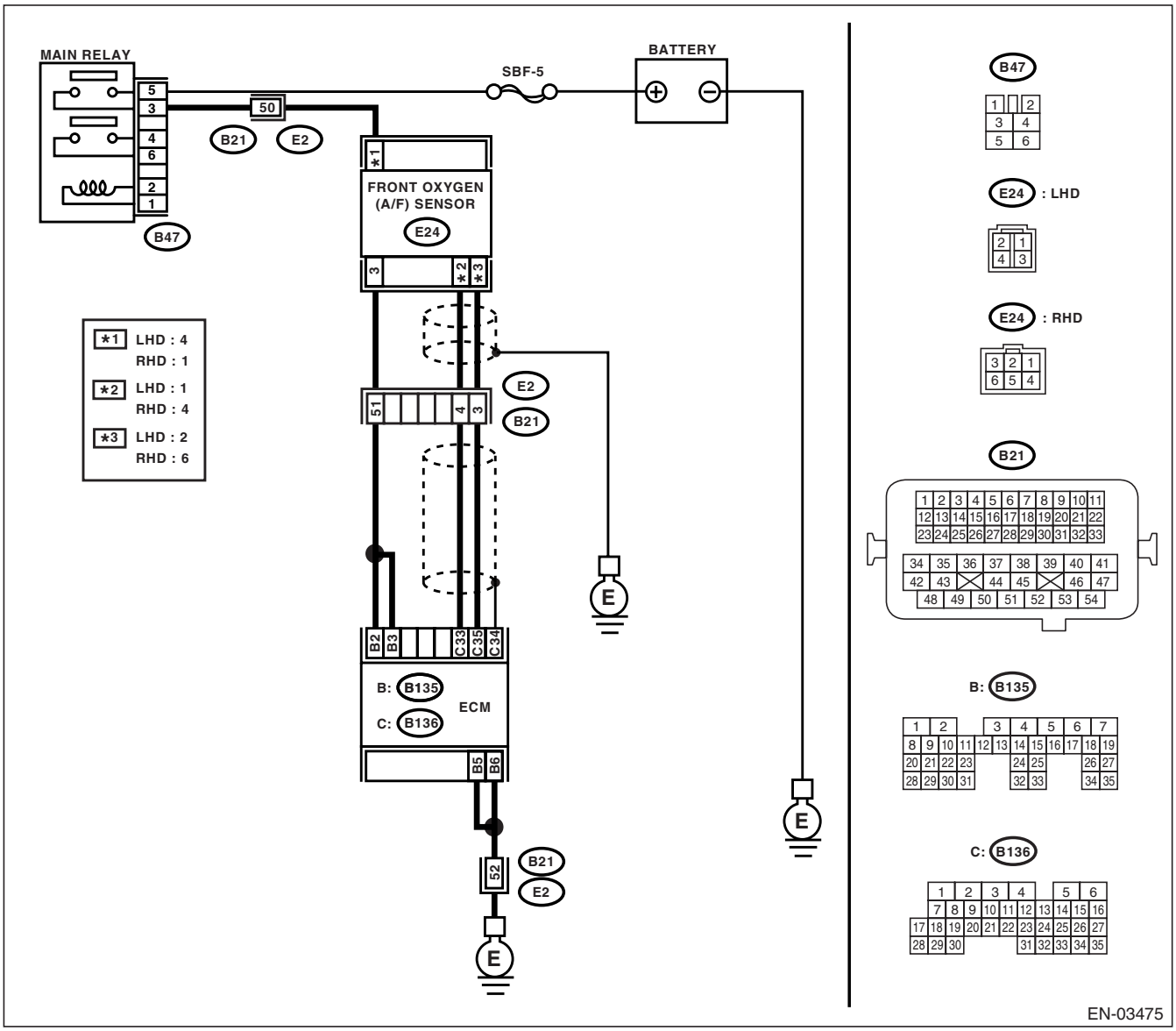
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Do DTC P0031 and P0037 display at the same time on the Subaru Select Monitor?	Go to step **2.**	Go to step **5.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector 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*** ***LHD model*** ***(E24) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E24) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
3	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — 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 and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the poor contact in connector. NOTE: In this case, repair the following item: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **5.**
5	**CHECK INPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **6.**
6	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***LHD model*** ***No. 3 — No. 4:*** ***RHD model*** ***No. 1 — No. 3:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

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

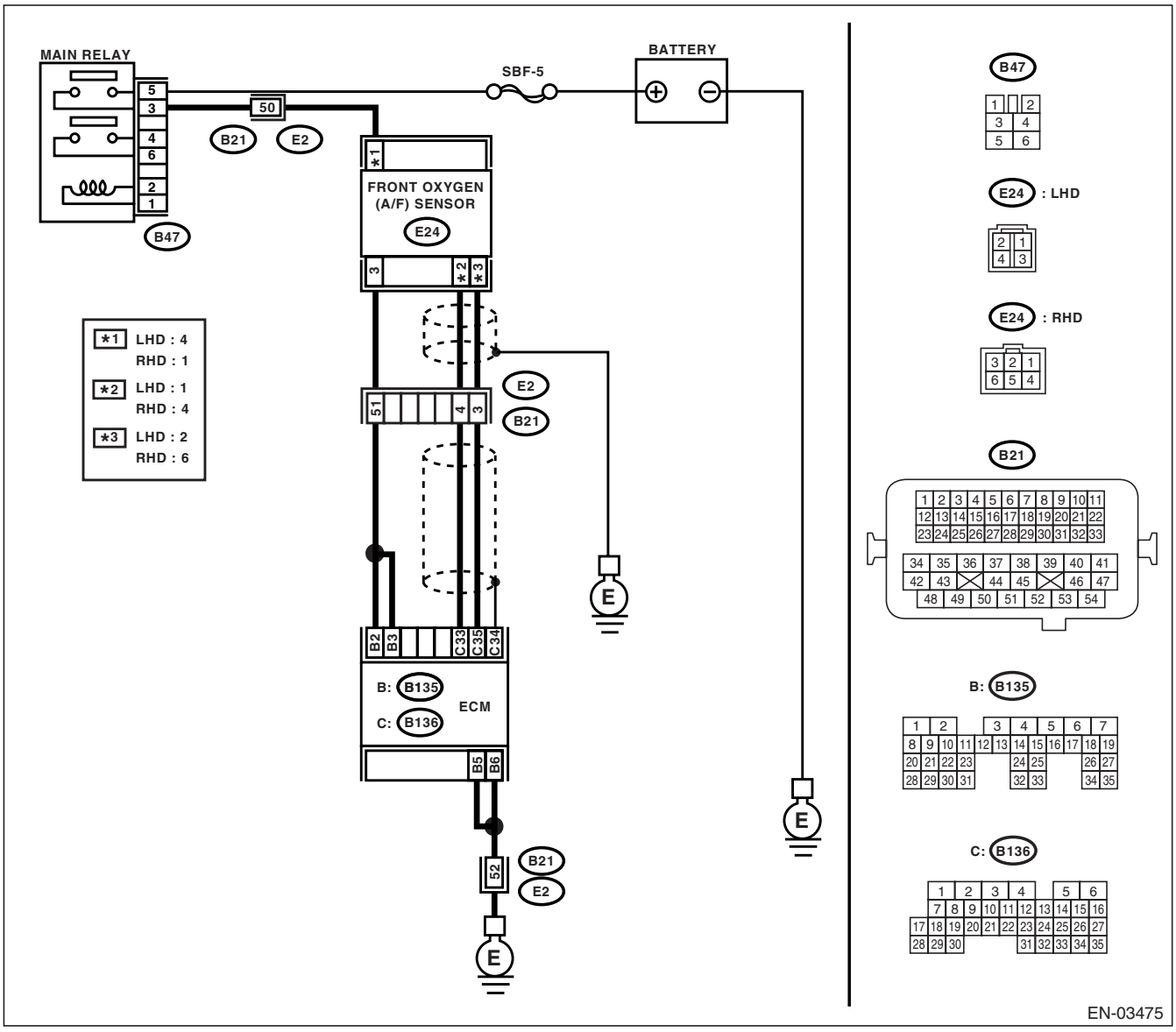
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (–):*** ***(B135) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.	Finish the diagnosis.

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

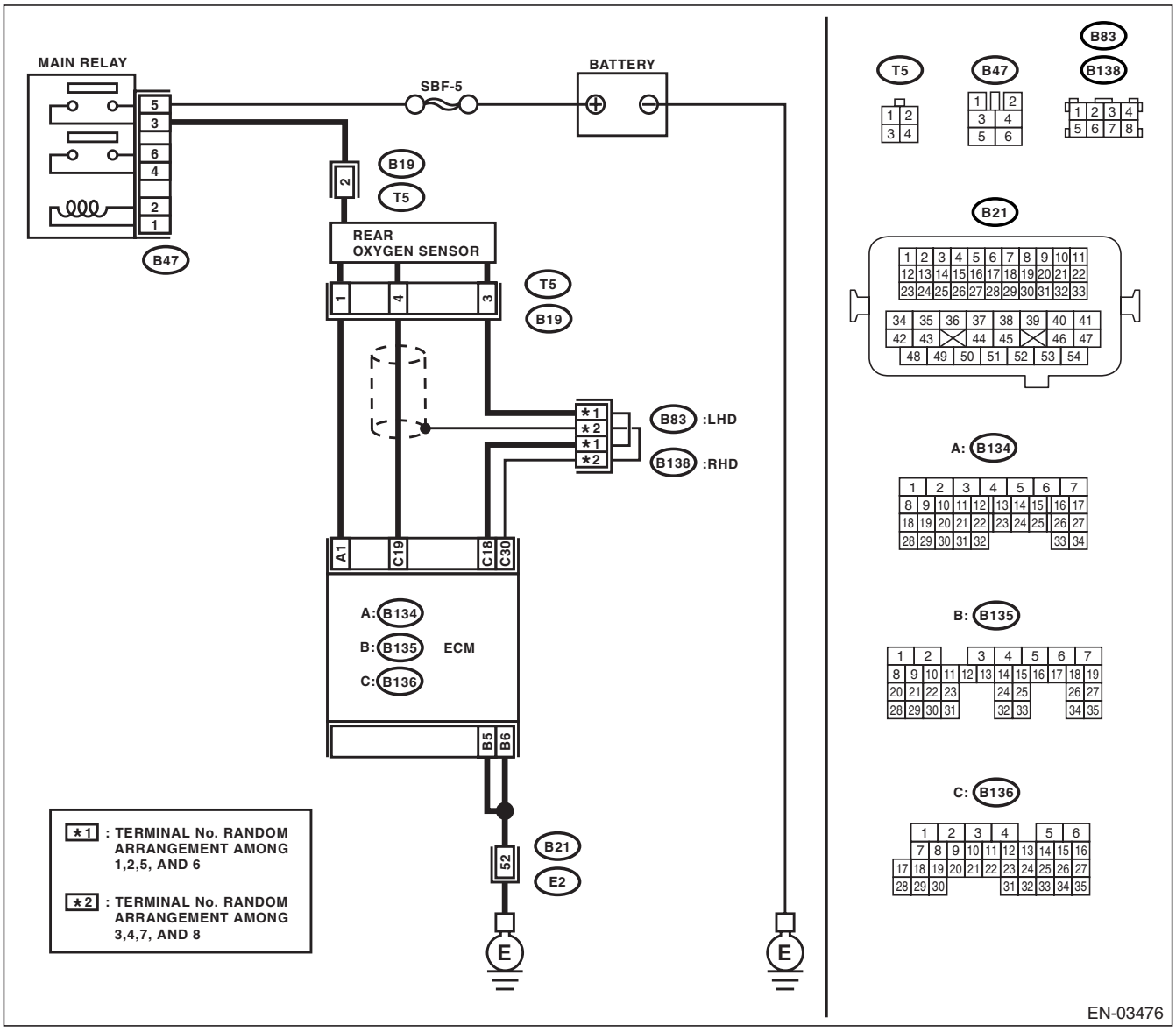
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following item: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

	Step	Check	Yes	No
6	**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 chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>

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

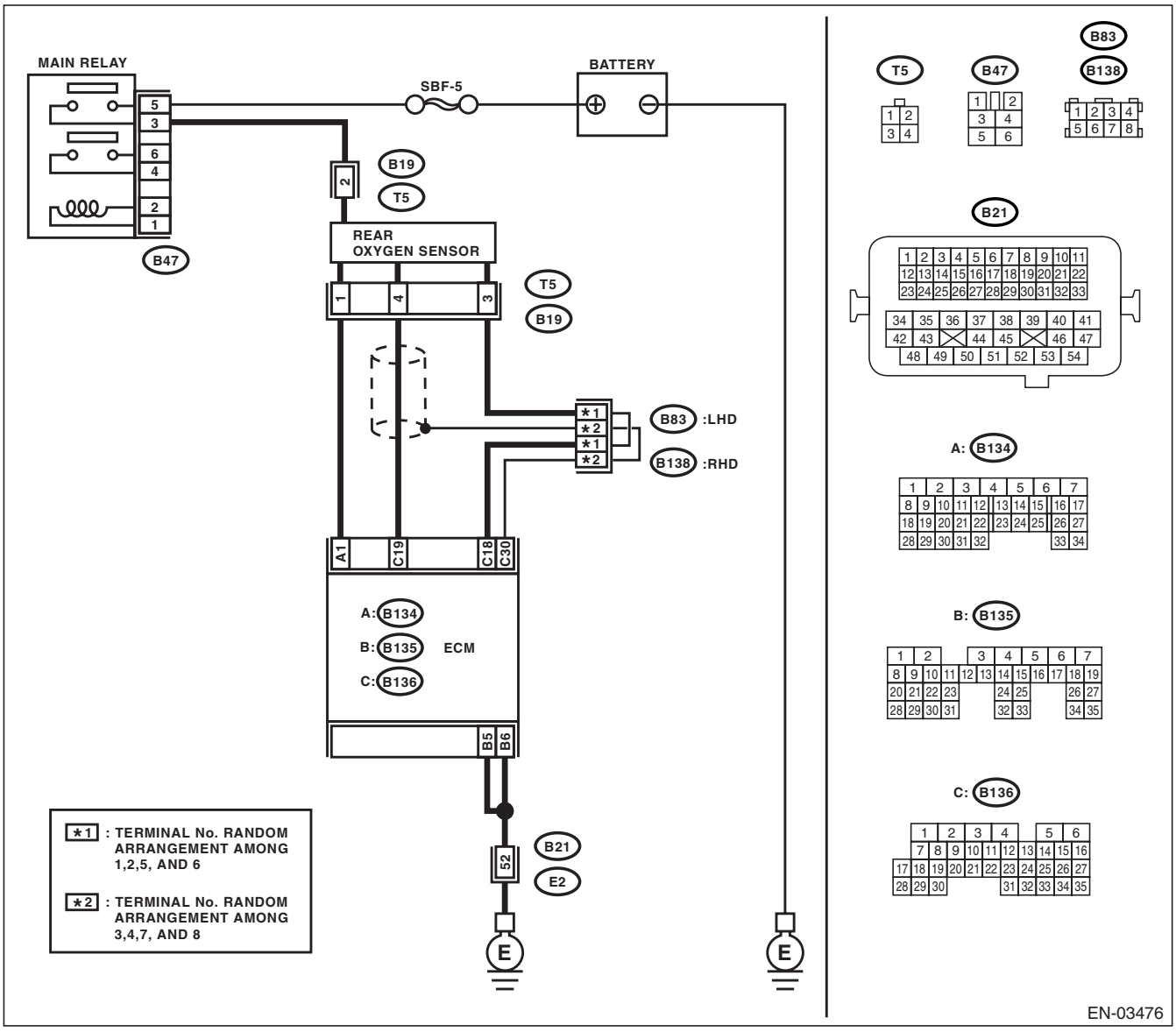
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Finish the diagnosis.

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

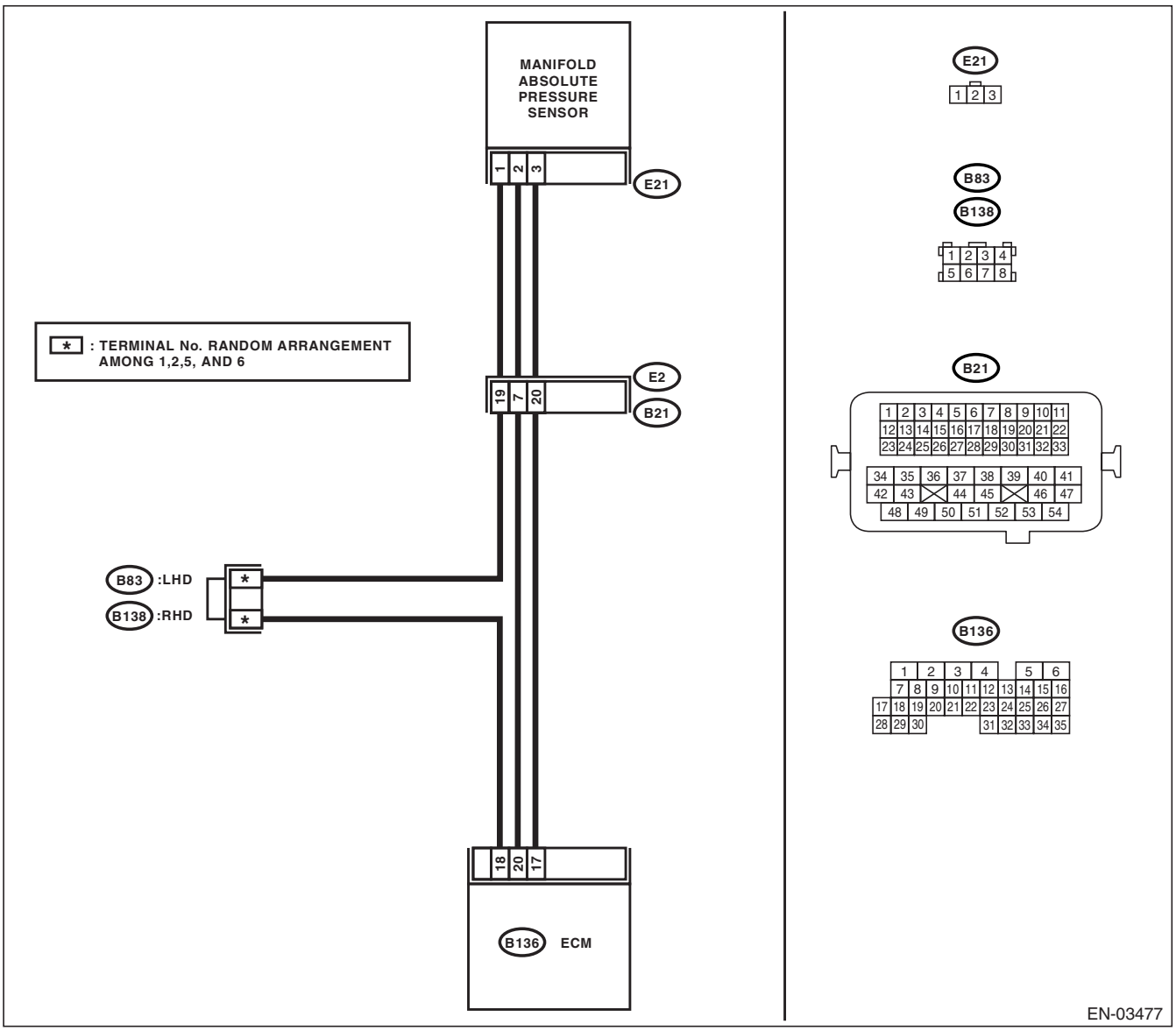
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM and manifold absolute pressure sensor connector.	Is there poor contact in ECM or manifold absolute pressure sensor connector?	Repair the poor contact in ECM or manifold absolute pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 20 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **7.**	Go to step **6.**
6	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**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) 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 more than 4.5 V?	Go to step **8.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**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 and manifold absolute pressure sensor connector. ***Connector & terminal (B136) No. 18 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

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

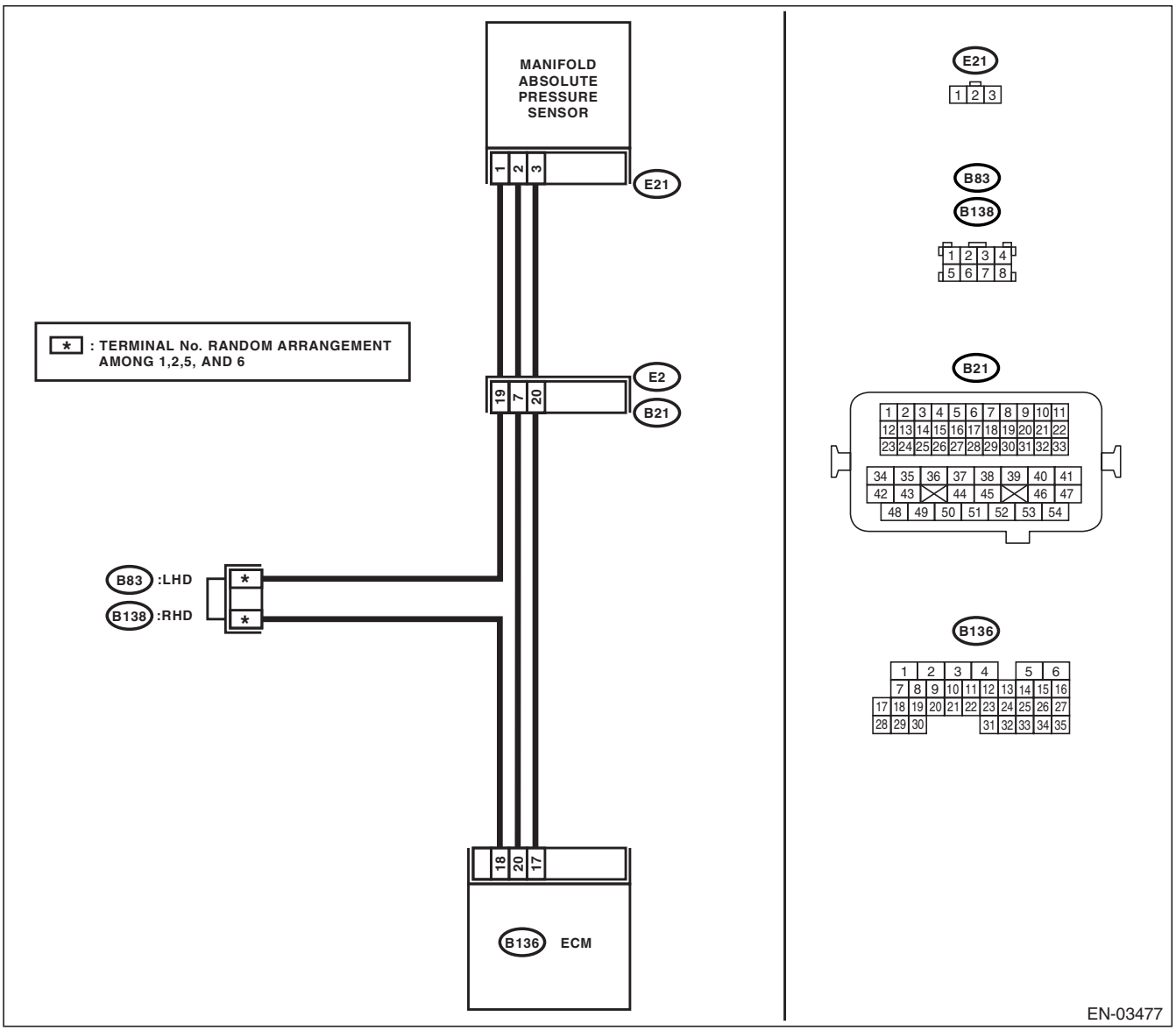
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **3.**	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 20 (+) — Chassis ground (−):***	Is the voltage more than 4.5V?	Go to step **5.**	Go to step **4.**
4	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**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) 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 more than 4.5 V?	Go to step **6.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
6	**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 and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 20 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1)Turn the ignition switch to ON. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 20 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Repair the short circuit of harness between ECM and manifold pressure sensor connector.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1)Turn the ignition switch to OFF. 2)Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 18 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

H: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

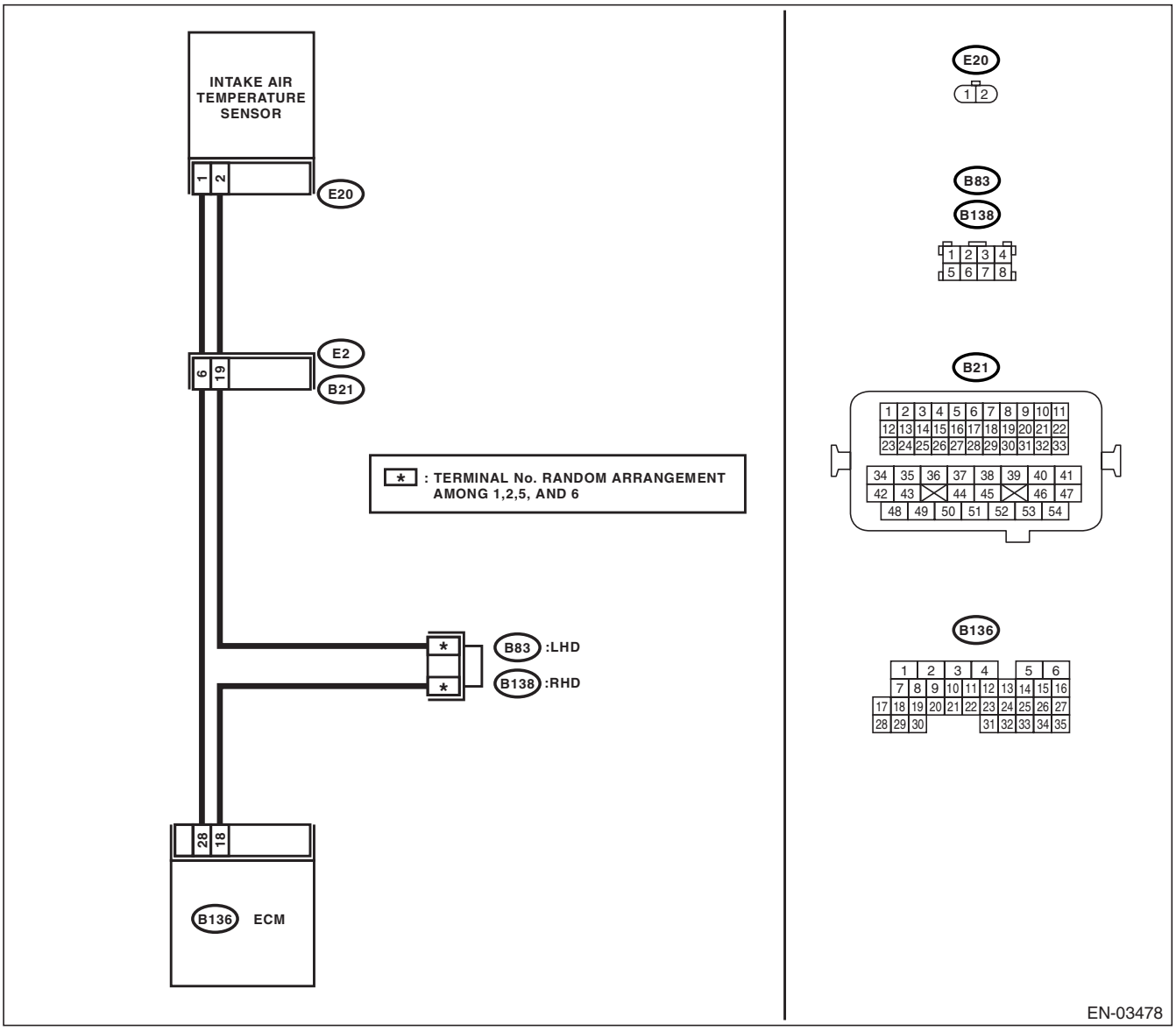
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature more than 120°C (248°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than −40°C (−40°F)?	Replace the intake air temperature sensor. <Ref. to FU(H4SO 2.0)-27, Intake Air Temperature Sensor.>	Repair the ground short circuit of harness between intake air temperature sensor and ECM connector.

I: DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

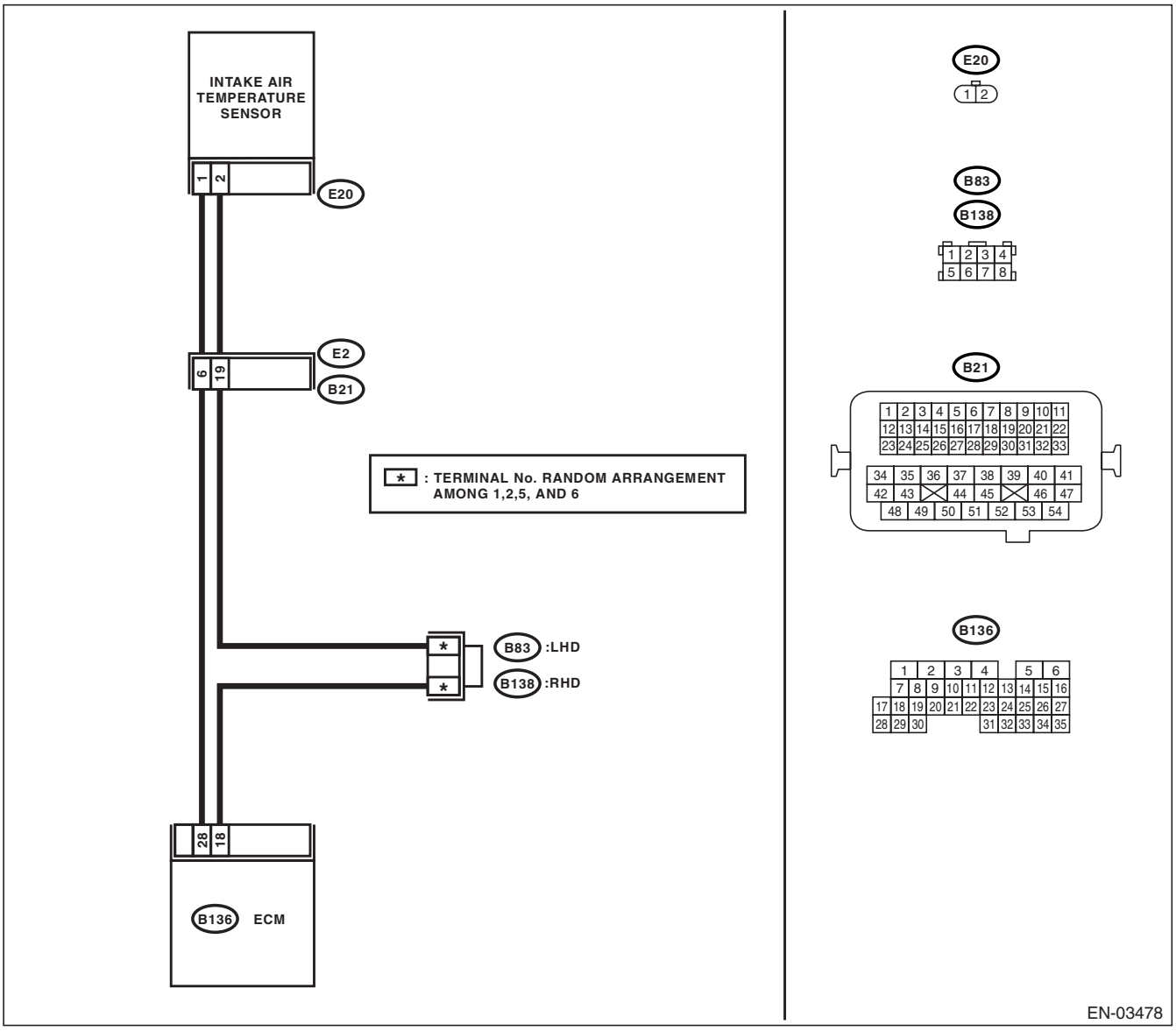
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 3 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 18 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the intake air temperature sensor. <Ref. to FU(H4SO 2.0)-27, Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

J: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

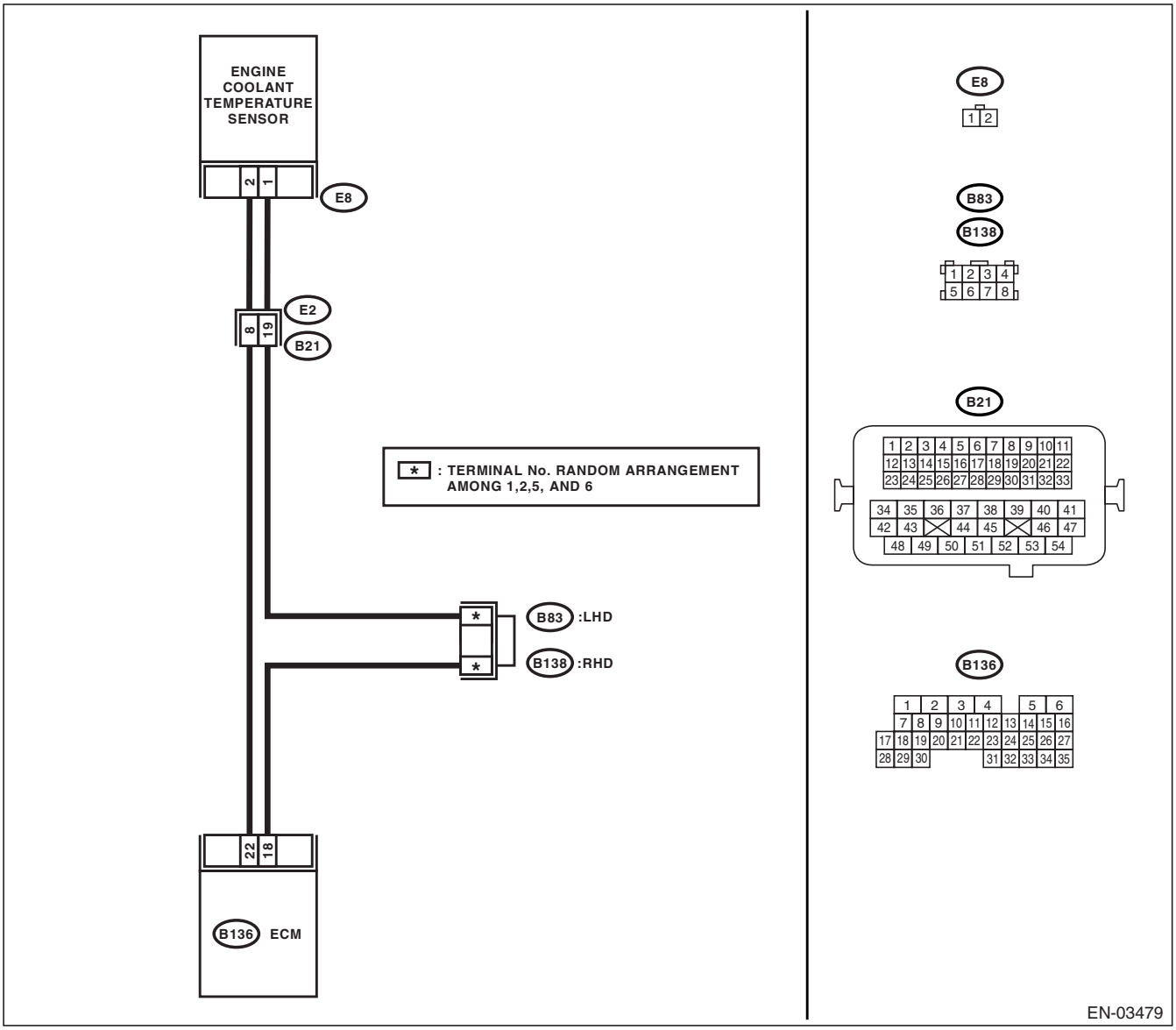
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature more than 150°C (302°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>	Repair the ground short circuit of harness between engine coolant temperature sensor and ECM connector.

K: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

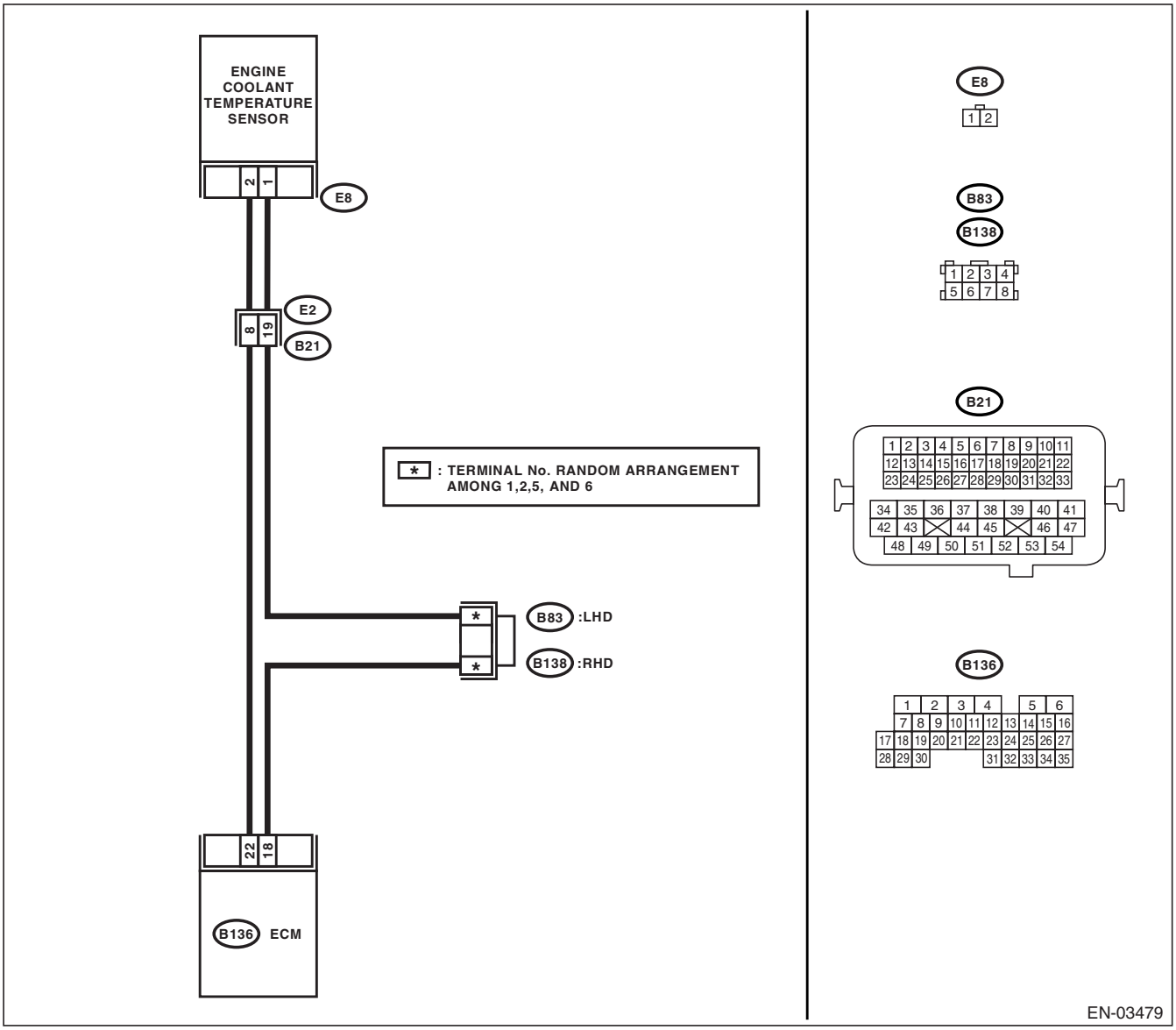
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

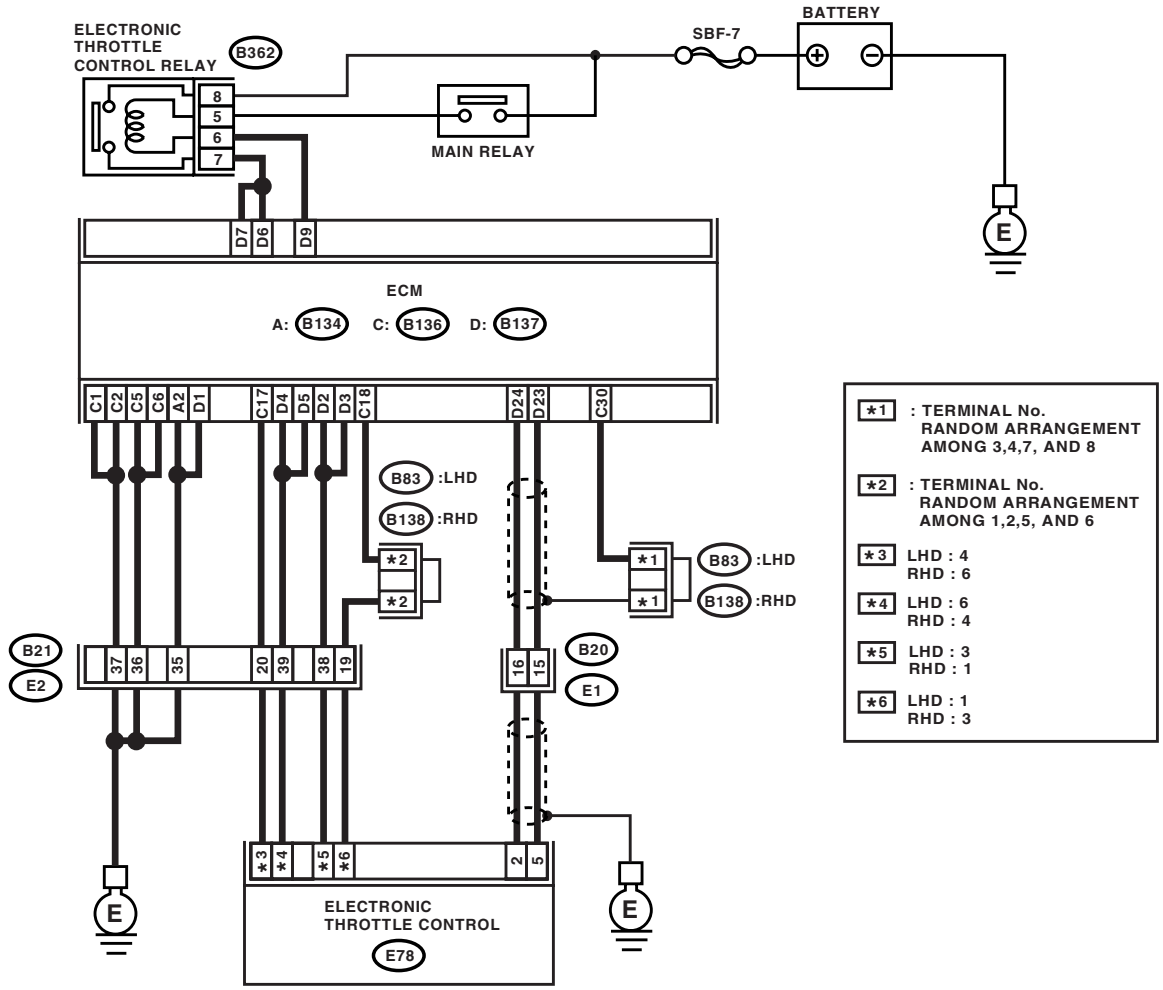
Step		Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

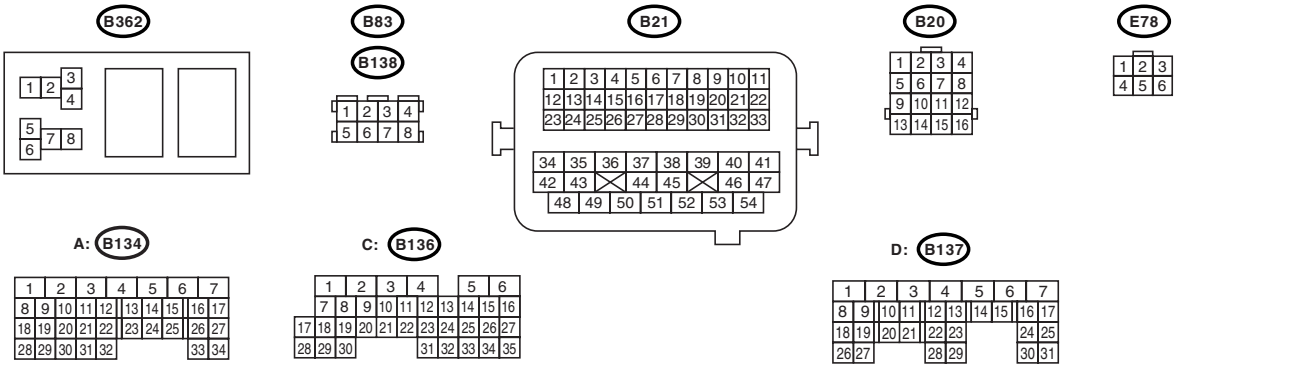
L: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***LHD model*** ***(B136) No. 17 — (E78) No. 4:*** ***RHD model*** ***(B136) No. 17 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 23 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the accelerator pedal position sensor if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

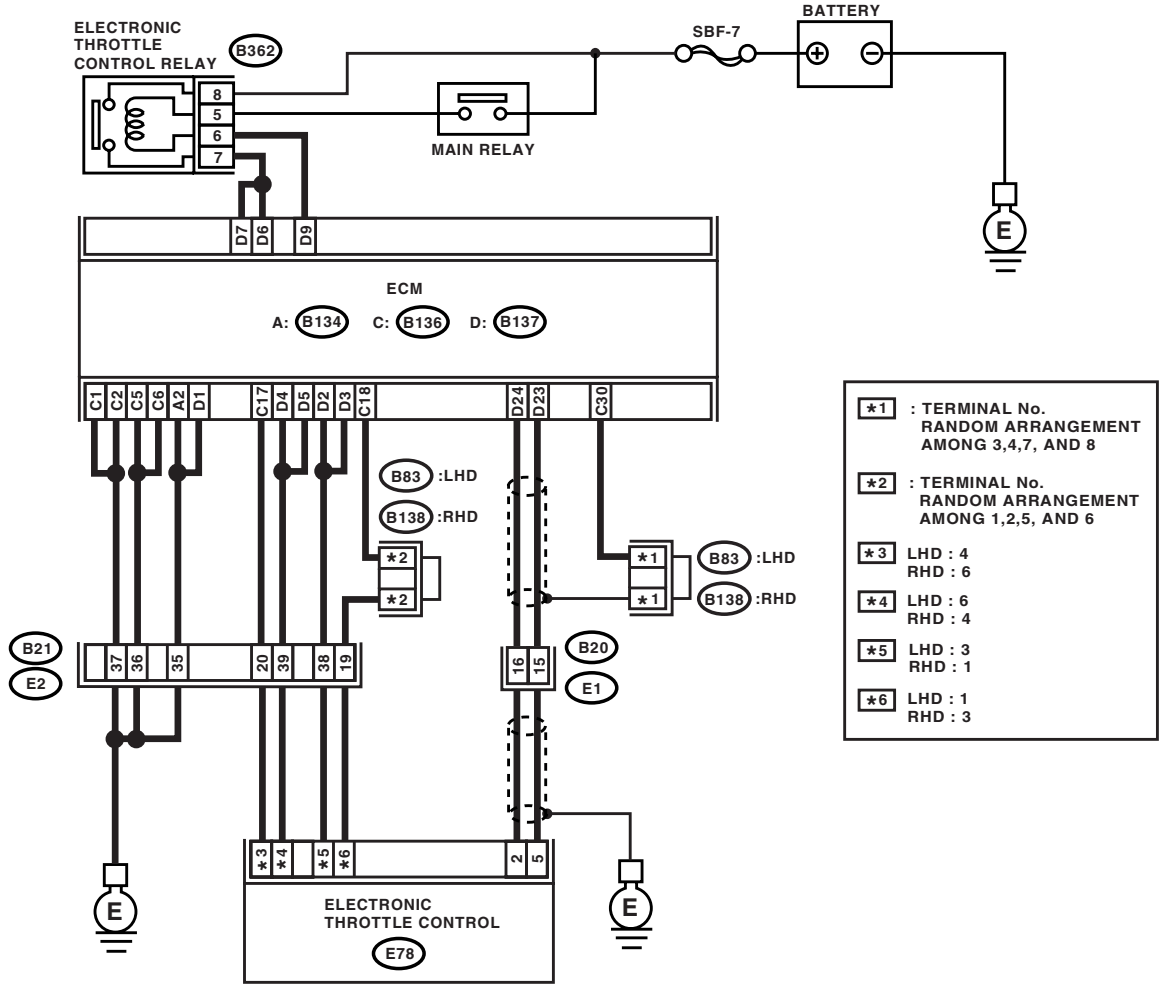
M: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

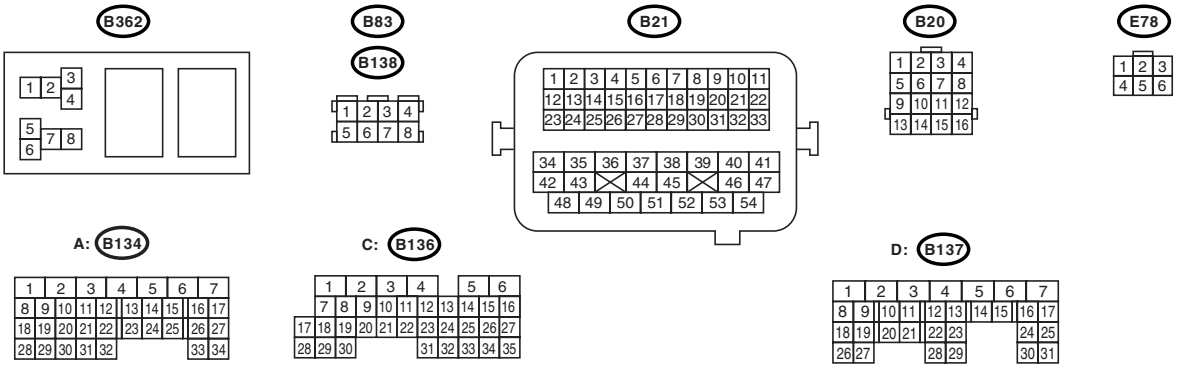
DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***LHD model*** ***(B136) No. 18 — (E78) No. 1:*** ***RHD model*** ***(B136) No. 18 — (E78) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 1 — Engine ground:*** ***RHD model*** ***(E78) No. 3 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Replace the electronic throttle control.	Repair the short circuit to sensor power supply.

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

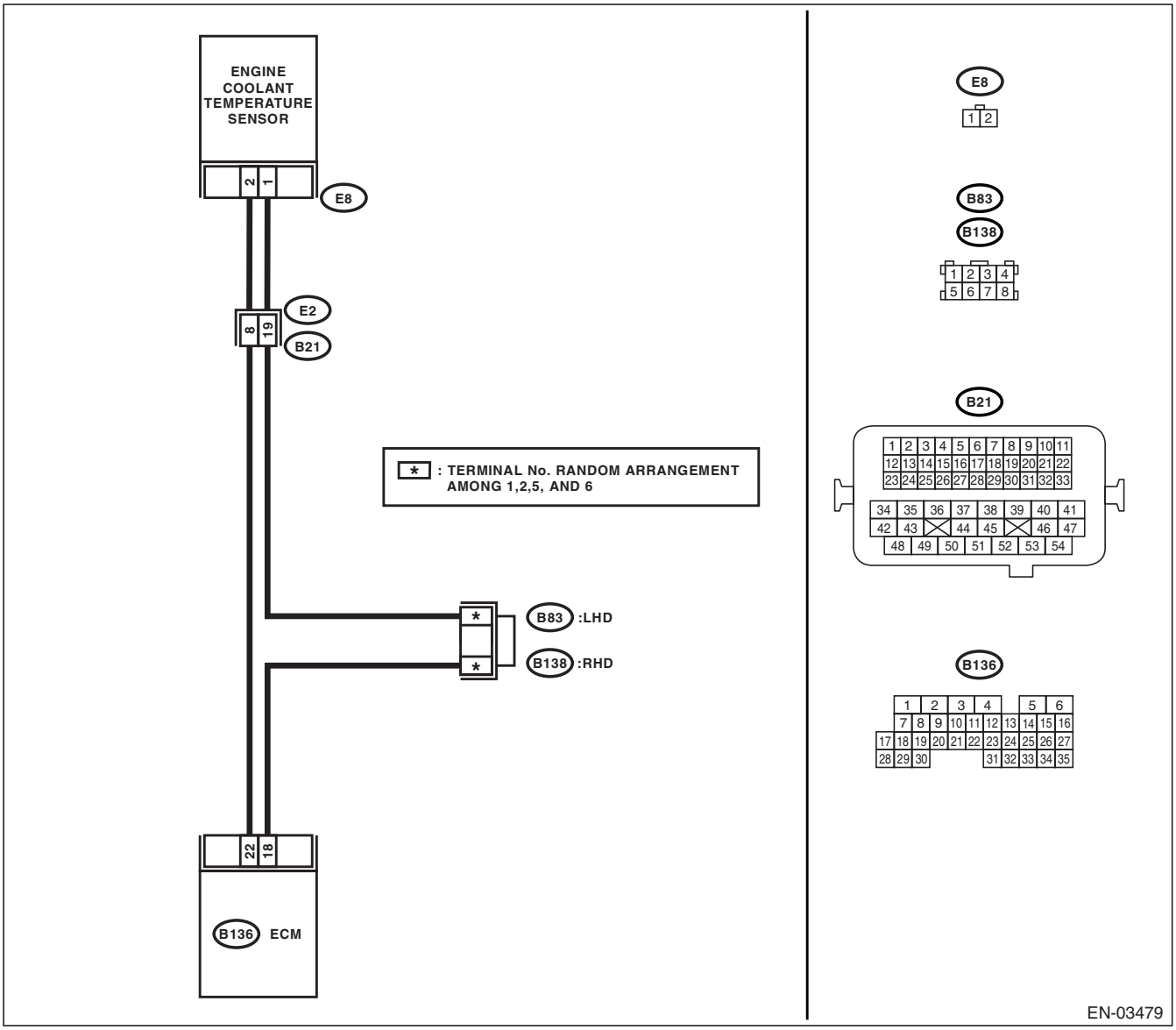
TROUBLE SYMPTOM:

Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H4SO 2.0)-18, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>

O: DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1)

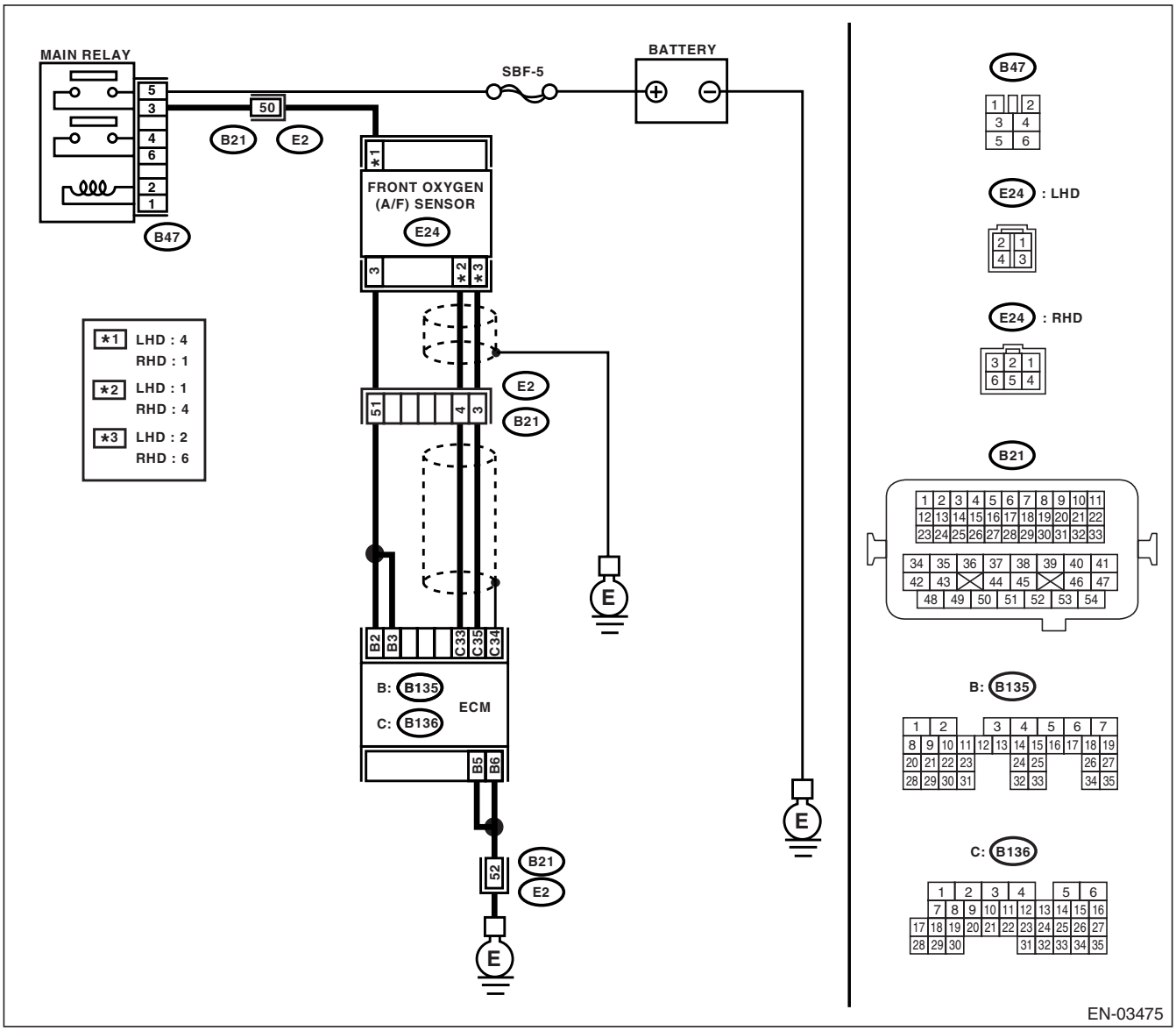
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.85 — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Race the engine at speed from idling to 5,000 rpm for a total of 5 cycles. 2) Read the data of front oxygen (A/F) sensor signal during racing using Subaru Select Monitor or general scan tool. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminal*** ***LHD model*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:*** ***RHD model*** ***(B136) No. 33 — (E24) No. 4:*** ***(B136) No. 35 — (E24) No. 6:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between ECM and front oxygen (A/F) sensor.
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

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

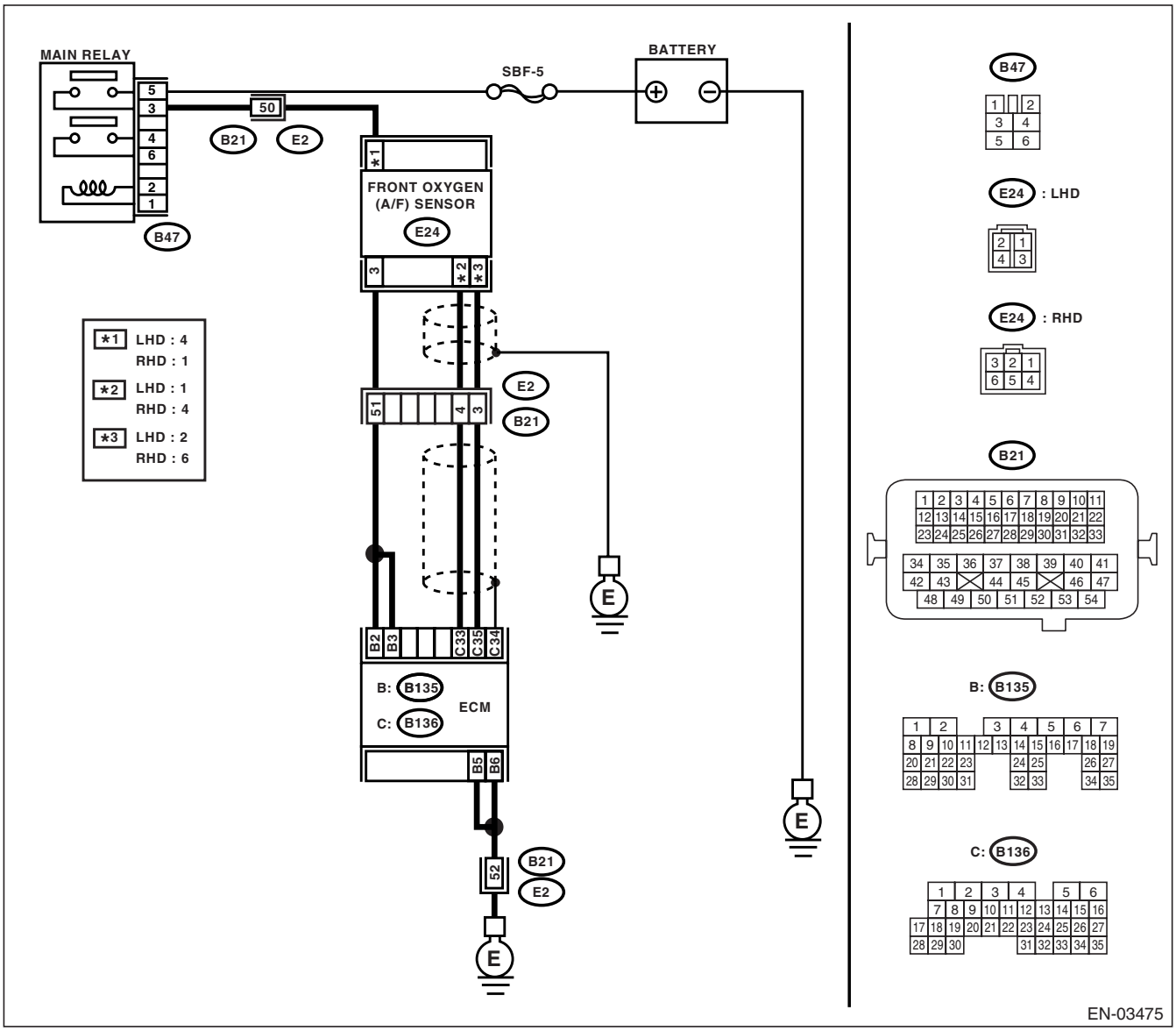
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	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 connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.

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

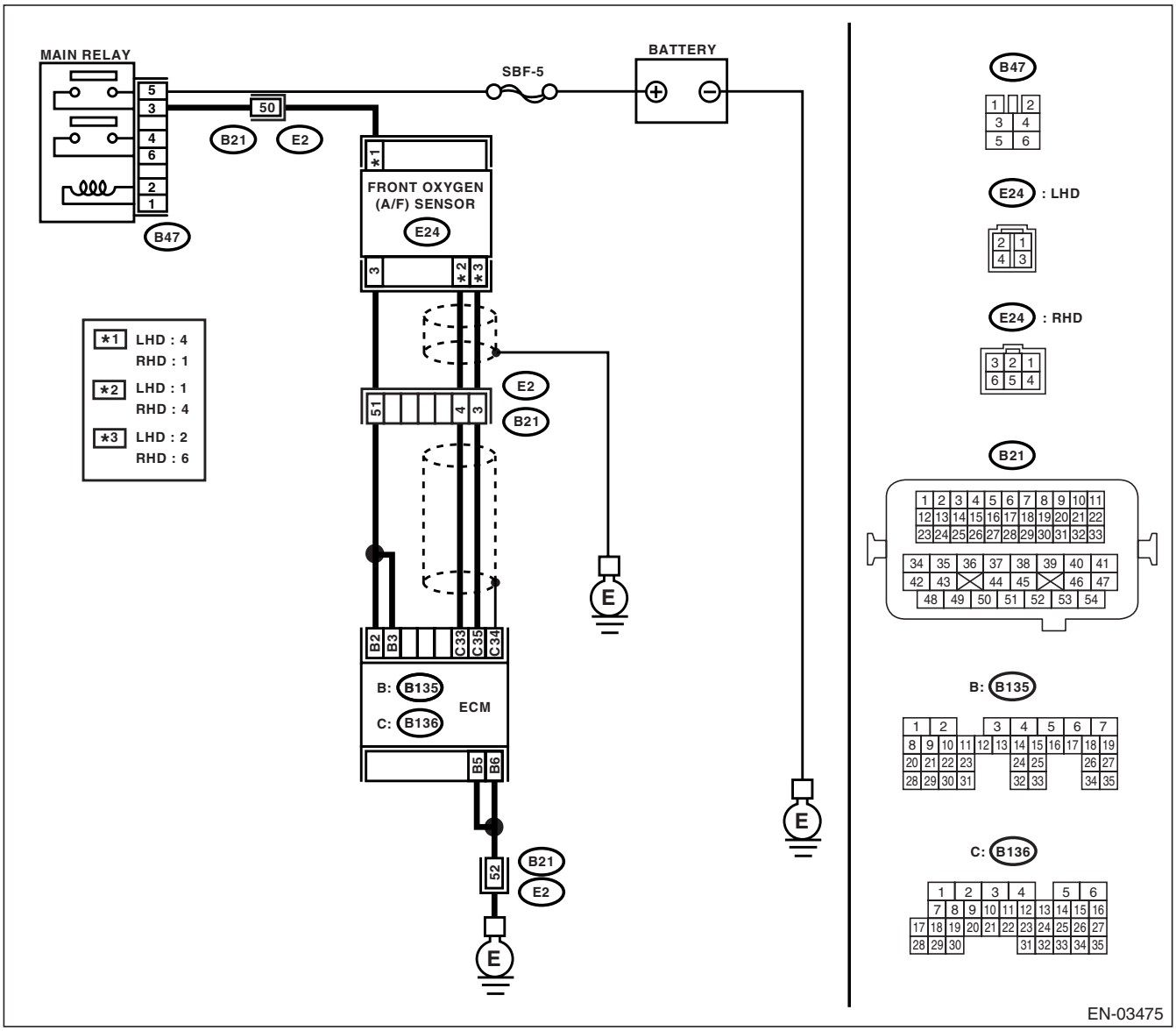
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 33 (+) — Chassis ground (−):*** ***(B136) No. 35 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.

R: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

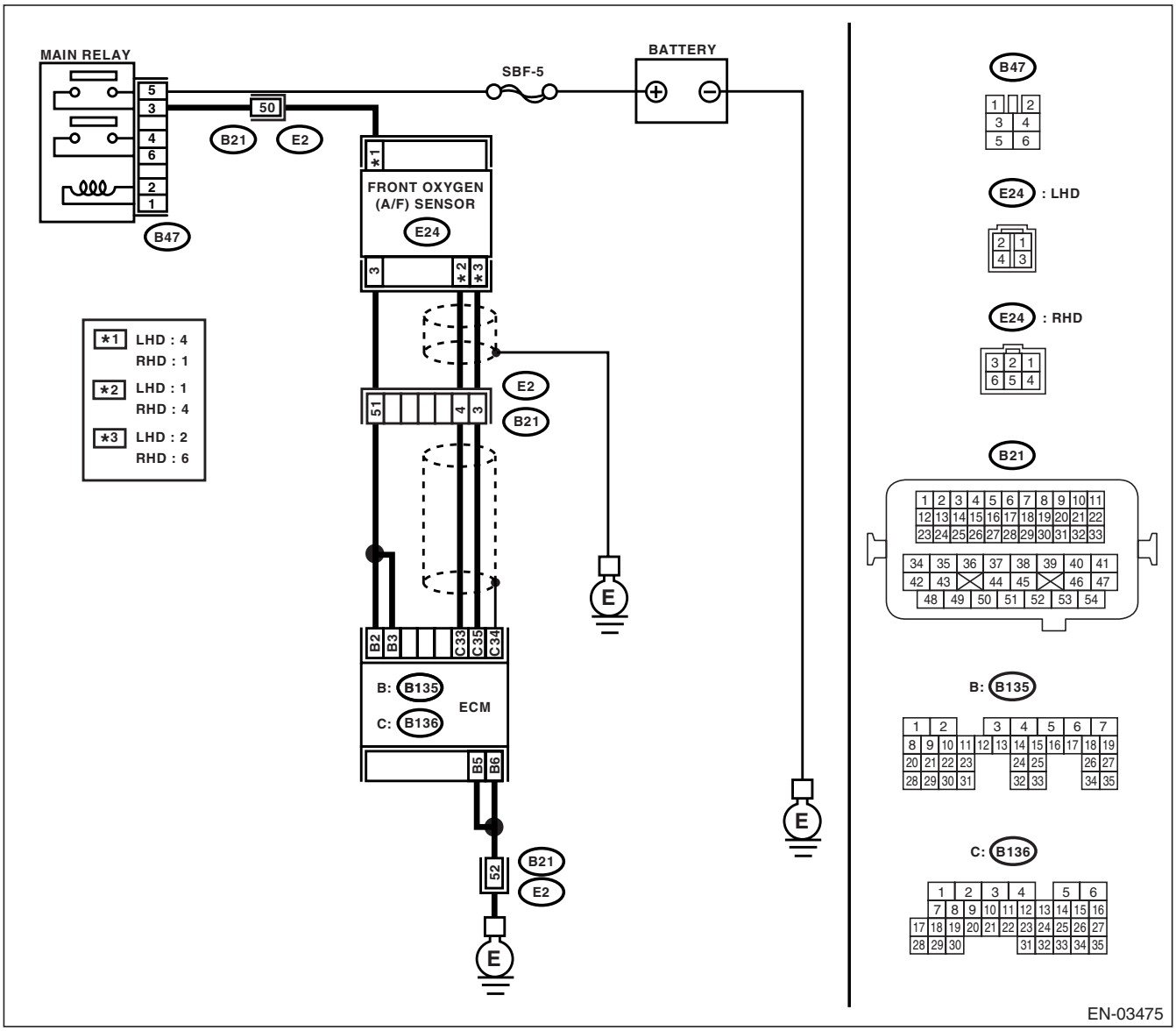
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**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(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

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

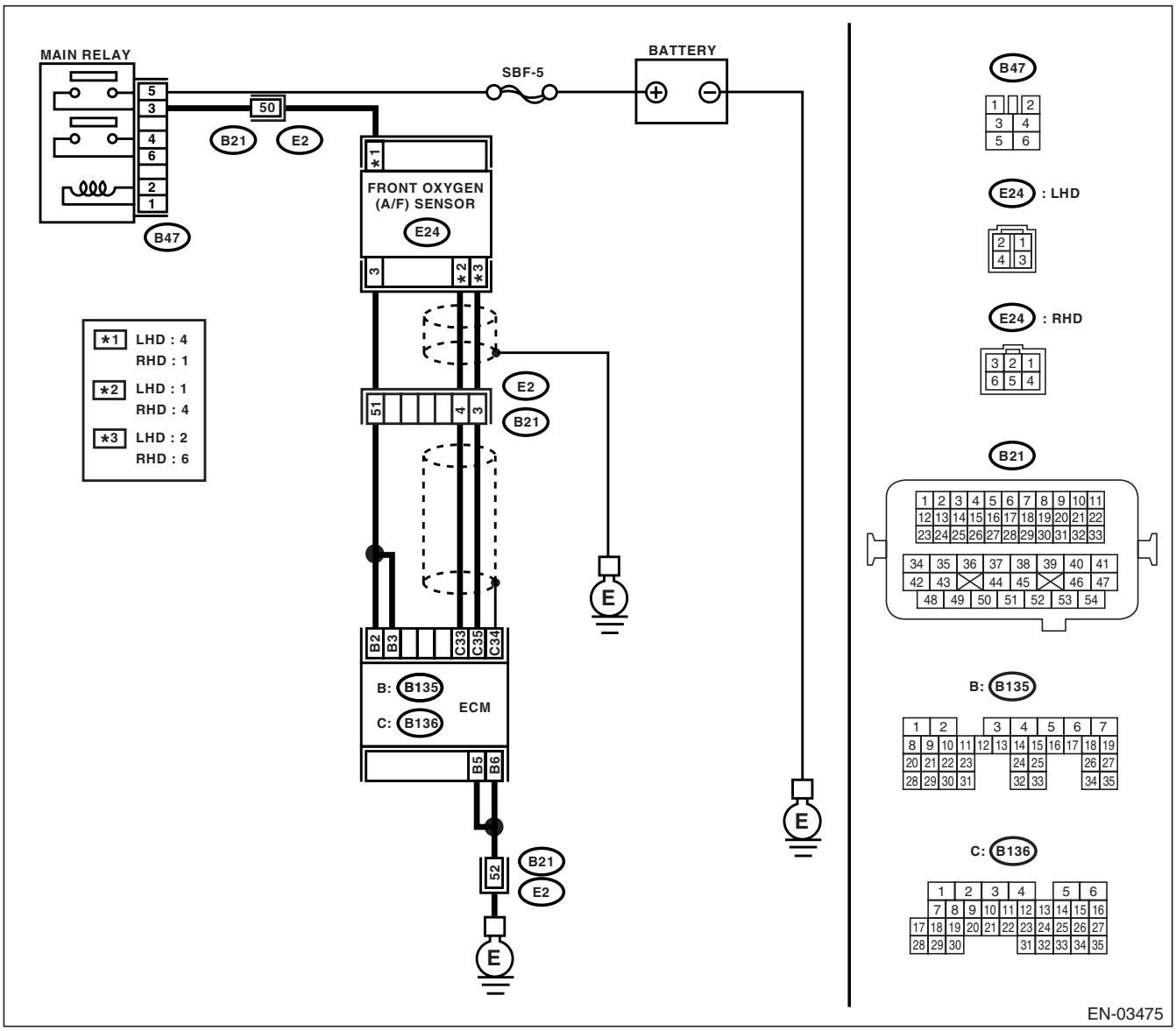
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	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 connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***LHD model*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:*** ***RHD model*** ***(B136) No. 33 — (E24) No. 4:*** ***(B136) No. 35 — (E24) No. 6:***	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 and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

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

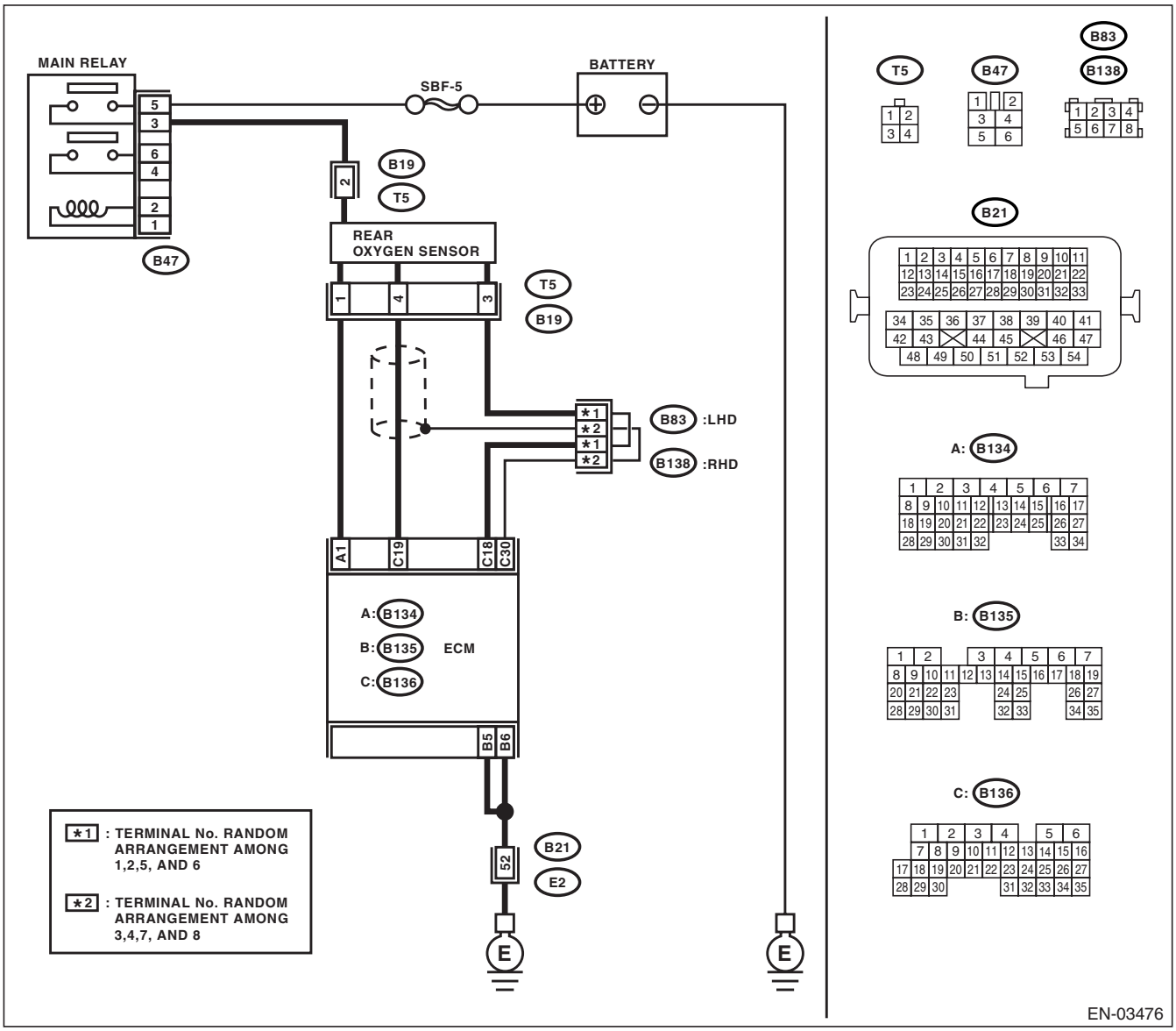
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **5.**	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 and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (B19) No. 4:*** ***(B136) No. 18 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 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 harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

Step		Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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(H4SO 2.0)-33, Rear Oxygen Sensor.>

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

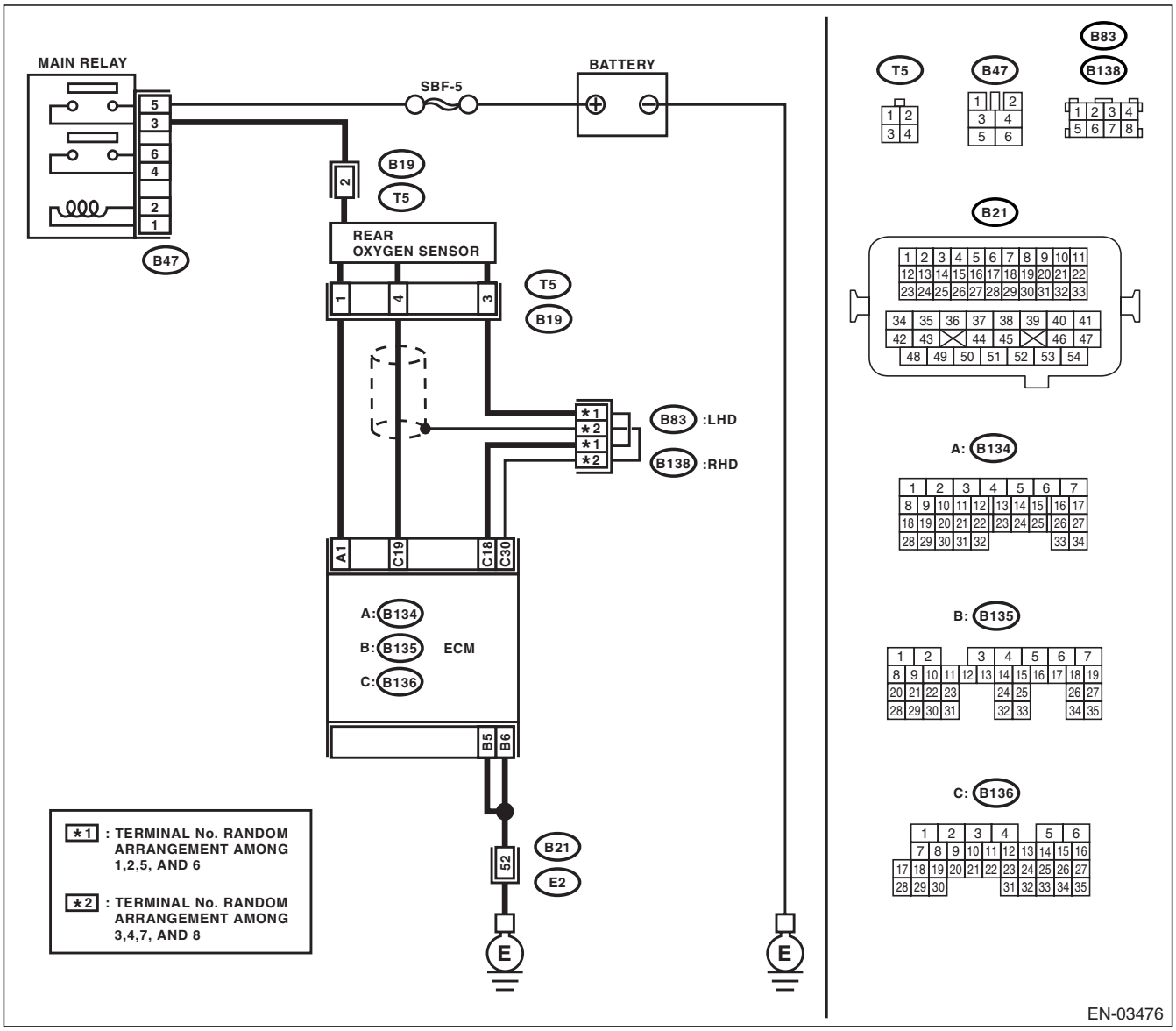
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 250 mV?	Go to step **5.**	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 and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (B19) No. 4:*** ***(B136) No. 18 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 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 harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

Step		Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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(H4SO 2.0)-33, Rear Oxygen Sensor.>

V: DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

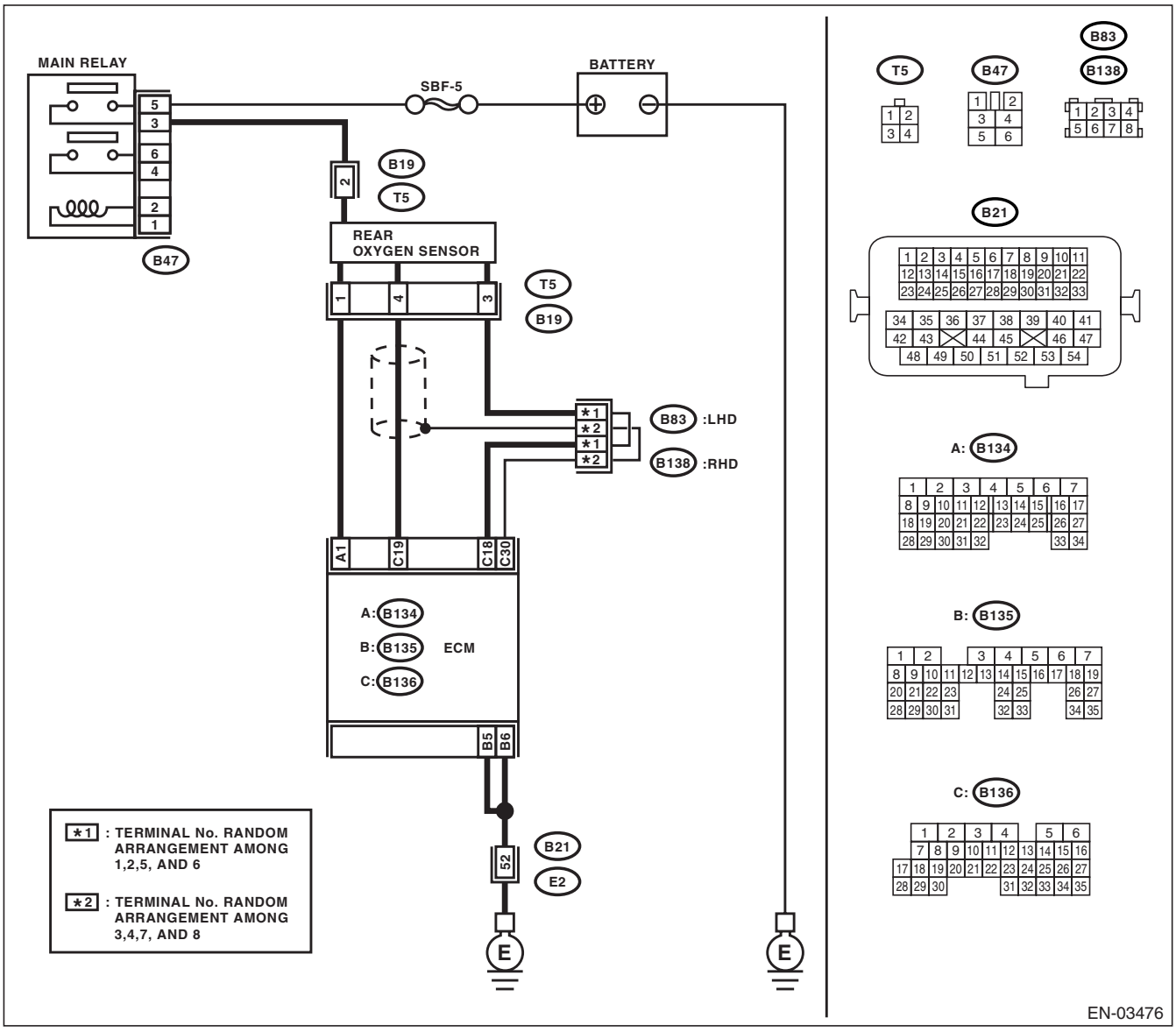
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	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(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (B19) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair short circuit to ground in harness.
4	**CHECK REAR OXYGEN SENSOR DATA.** Measure the resistance between connector terminals of rear oxygen sensor. ***terminals*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>	A temporary poor compact occurs. Check poor contact in connector.

W: DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

X: DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, 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 EGR VALVE.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **4.**
4	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **5.**
5	**CHECK PCV VALVE.**	Is the PCV valve stuck?	Replace the PCV valve.	Go to step **6.**
6	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)?	Go to step **7.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line

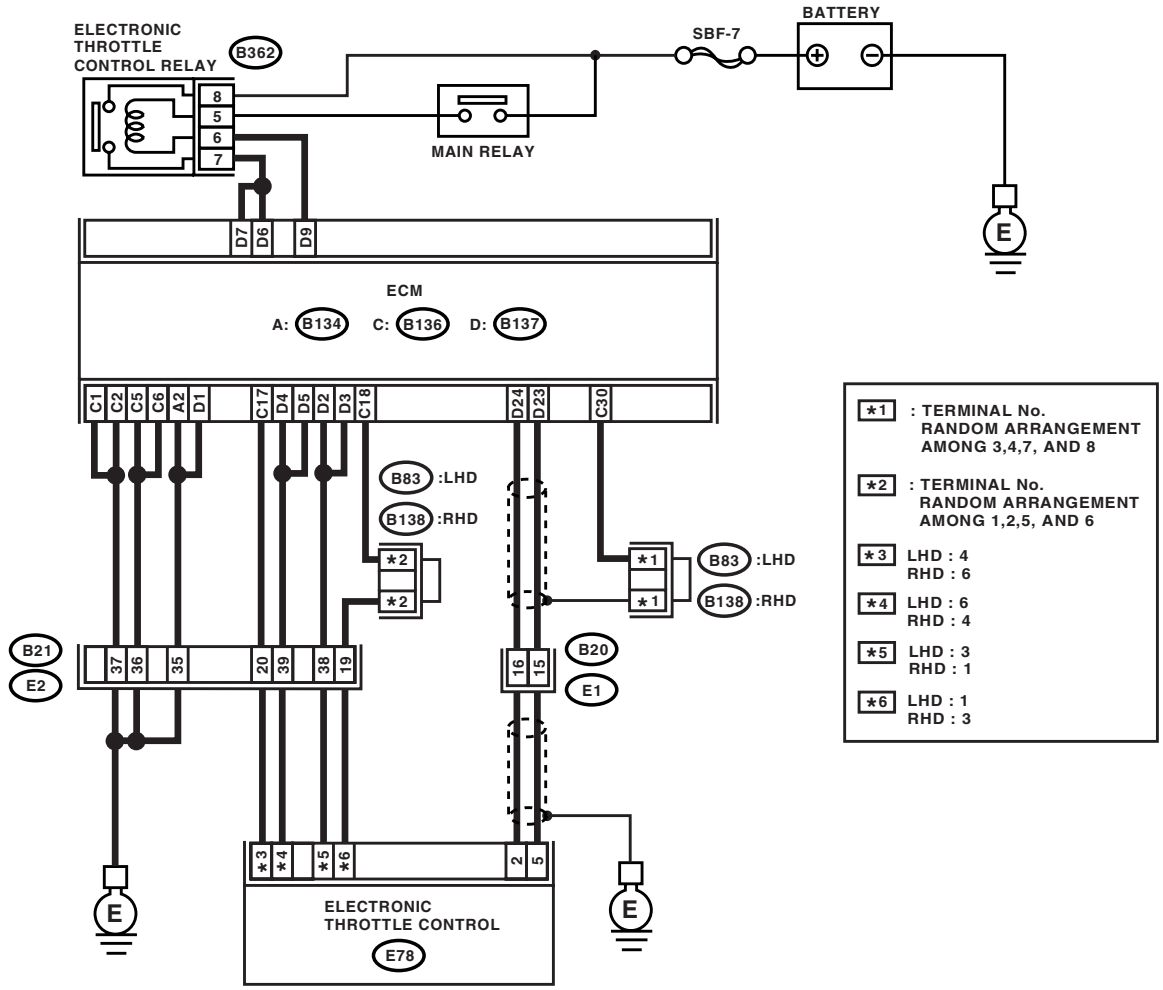
	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.	Is fuel pressure 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)?	Go to step **8.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature 70°C (158°F — 100°C (212°F)?	Go to step **9.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>
9	**CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL.** 1) Start and warm-up the engine until engine coolant temperature is above 60°C (140°F). 2) Place the select lever in “N” or “P” position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of manifold absolute pressure sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measurement value 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg) when idling, and 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when ignition turned ON?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

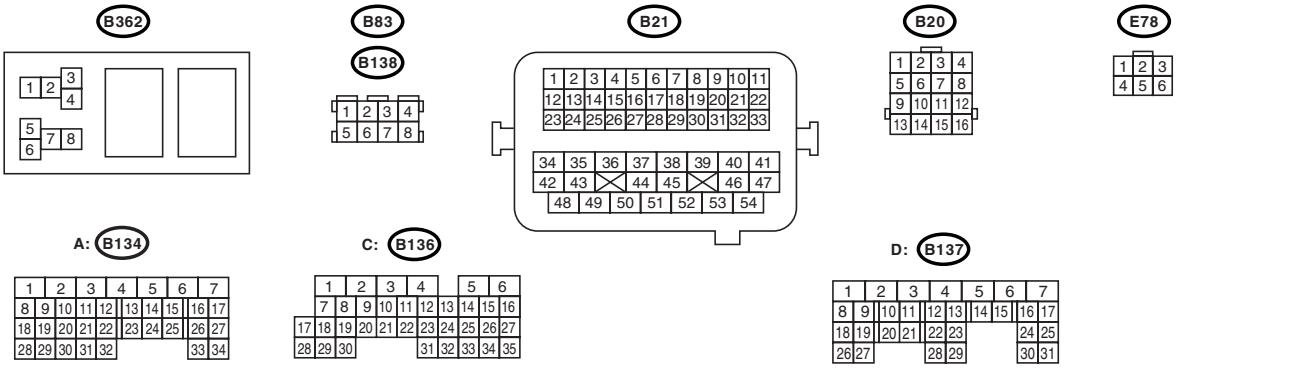
Y: DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





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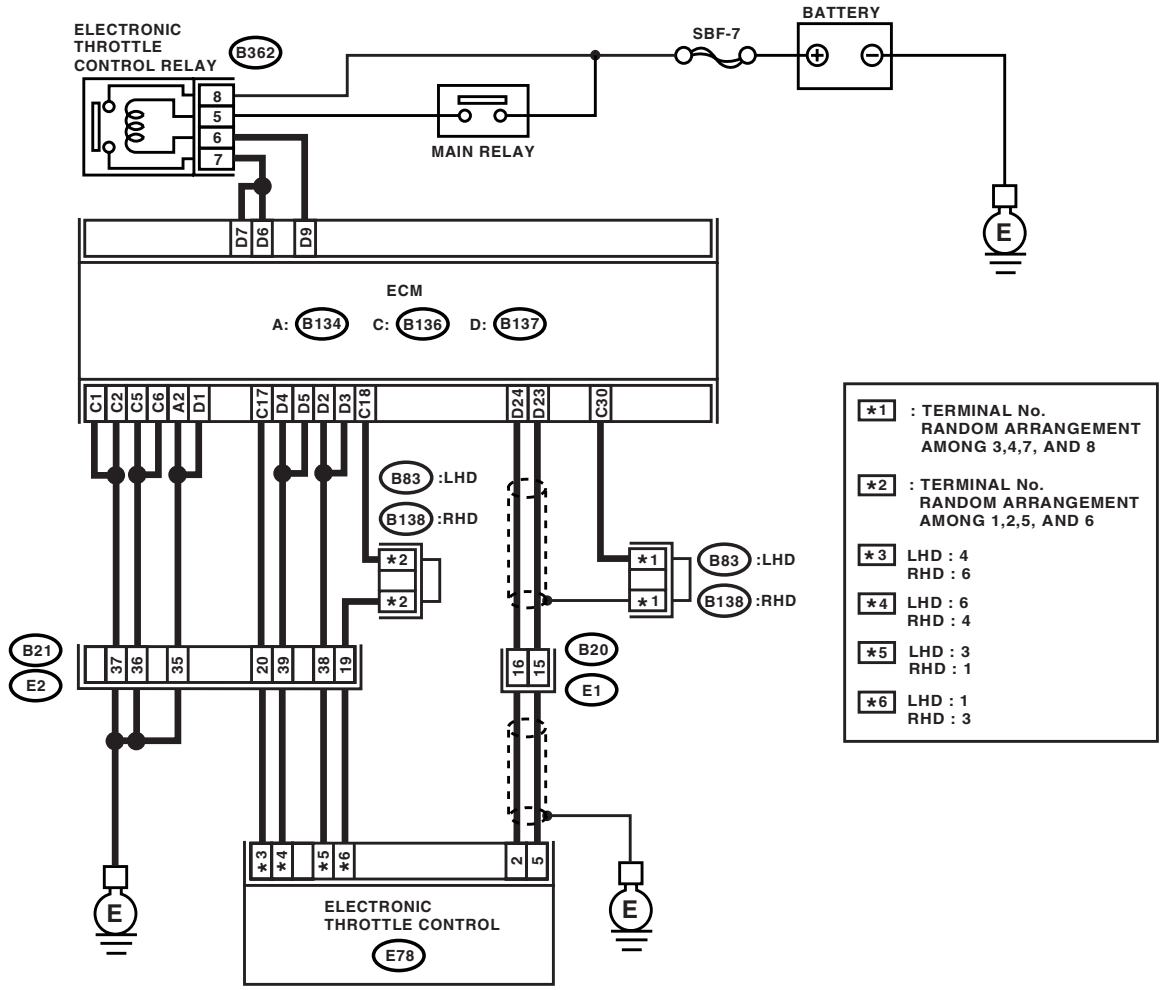
	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 17 — (E78) No. 4:*** ***RHD model*** ***(B136) No. 17 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 24 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

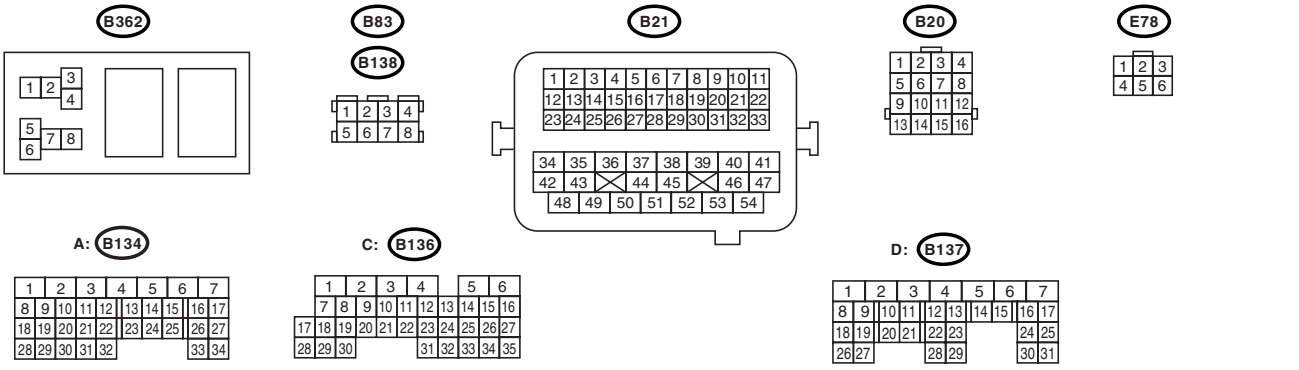
Z: DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 18 — (E78) No. 1:*** ***RHD model*** ***(B136) No. 18 — (E78) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 1 — Engine ground:*** ***RHD model*** ***(E78) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Replace the electronic throttle control.	Sensor power supply circuit may be shorted.

AA:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.0)(diag)-132, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.0)(diag)-132, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.0)(diag)-132, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Detects when malfunction occurs in 2 continuous driving cycles.
- Immediately at fault recognition(A misfire which could damage catalyst occurs.)

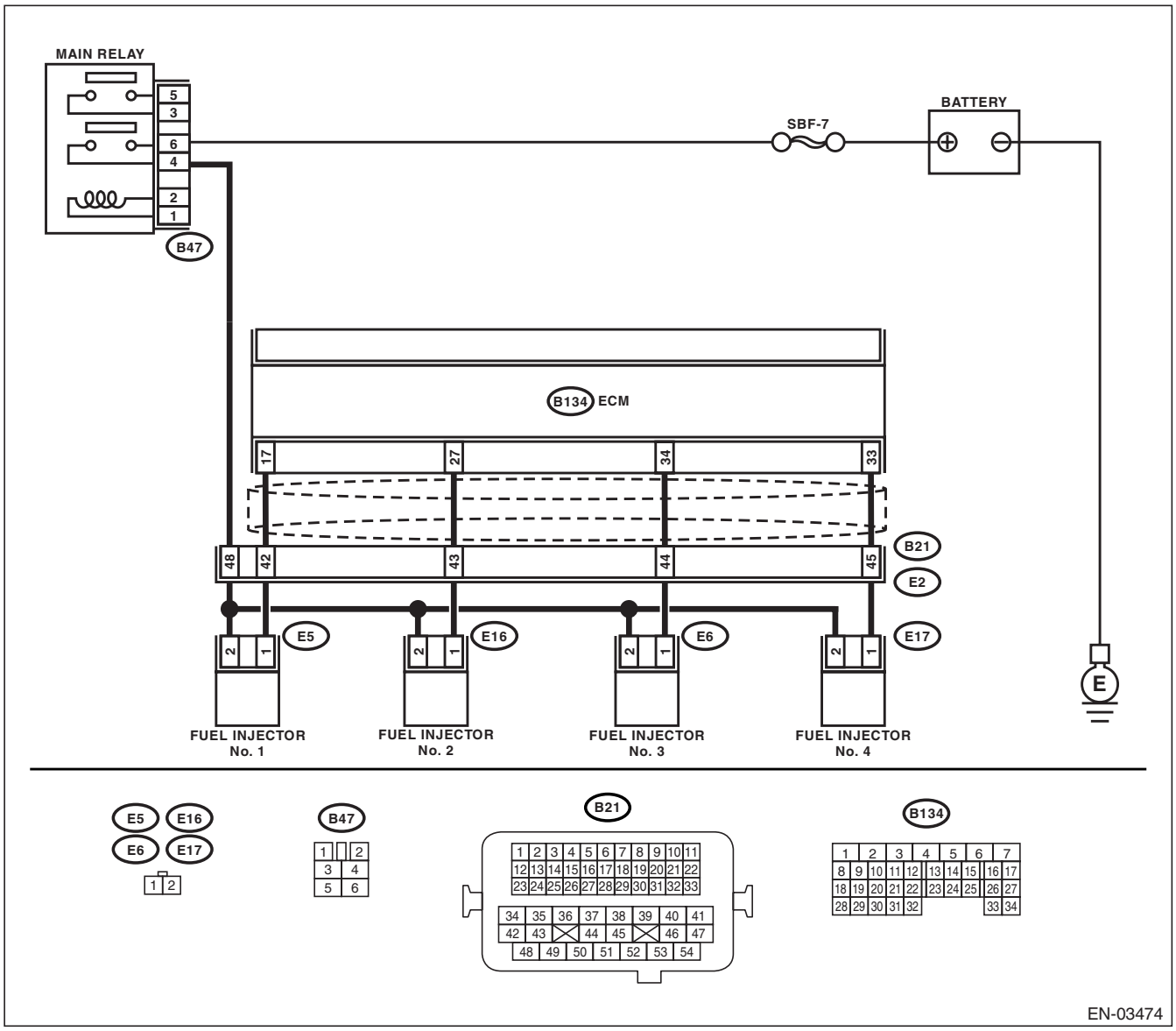
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 (+) — Chassis ground (−):*** ***#2 (B134) No. 27 (+) — Chassis ground (−):*** ***#3 (B134) No. 34 (+) — Chassis ground (−):*** ***#4 (B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between ECM 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 more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit of harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 — (E5) No. 1:*** ***#2 (B134) No. 27 — (E16) No. 1:*** ***#3 (B134) No. 34 — (E6) No. 1:*** ***#4 (B134) No. 33 — (E17) No. 1:***	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 and fuel injector connector • Poor contact in coupling connector
5	**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 **6.**	Replace the faulty fuel injector. <Ref. to FU(H4SO 2.0)-29, Fuel Injector.>

	Step	Check	Yes	No
6	**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 more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM 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 connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 (+) — Chassis ground (–):*** ***#2 (B134) No. 27 (+) — Chassis ground (–):*** ***#3 (B134) No. 34 (+) — Chassis ground (–):*** ***#4 (B134) No. 33 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **8.**
8	**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 less than 1 Ω?	Replace the faulty fuel injector<Ref. to FU(H4SO 2.0)-29, Fuel Injector.> and ECM <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>.	Go to step **9.**
9	**CHECK INSTALLATION 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.	Go to step **10.**
10	**CHECK CRANK SPROCKET.** Remove the timing belt cover.	Is the crank sprocket rusted or does it have broken teeth?	Replace the crank sprocket. <Ref. to ME(H4SO 2.0)-50, Crank Sprocket.>	Go to step **11.**
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Correct the installation condition of timing belt. <Ref. to ME(H4SO 2.0)-43, Timing Belt.>	Go to step **12.**

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel gauge indication higher than the “Lower” level?	Go to step **13.**	Replenish fuel so fuel gauge indication is higher than the “Lower” level. After replenishing fuel, Go to step **13.**
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Perform the clear memory mode using Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Has the cause of misfire been detected while running the engine? Ex. Disconnection of spark plug cord.	Finish diagnostics operation, if the engine has no abnormality.	1. Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in ignitor connector • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector 2. If there is no poor contact, check the followings and contact the SUBARU dealer. • Fuel condition • Whether additive is used or not • Plug condition • Plug cord condition • Engine oil condition

	Step	Check	Yes	No
15	**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 **16.**
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read the DTC. • Subaru Select Monitor <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual. NOTE: Perform diagnosis according to the items listed below.	Does the Subaru Select Monitor or general scan tool display only one DTC?	Go to step **21.**	Go to step **17.**
17	**CHECK ANY OTHER DTC ON DISPLAY.**	Are DTC P0301 and P0302 displayed?	Go to step **22.**	Go to step **18.**
18	**CHECK DTC ON DISPLAY.**	Are DTC P0303 and P0304 displayed?	Go to step **23.**	Go to step **19.**
19	**CHECK DTC ON DISPLAY.**	Are DTC P0301 and P0303 displayed?	Go to step **24.**	Go to step **20.**
20	**CHECK DTC ON DISPLAY.**	Are DTC P0302 and P0304 displayed?	Go to step **25.**	Go to step **26.**
21	**ONLY ONE CYLINDER**	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Spark plug cord • Fuel injector • Compression ratio	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
22	GROUP OF #1 AND #2 CYLINDERS	Are there any faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: (1) Check the following items. • Spark plug • Fuel injector • Ignition coil • Compression ratio (2) If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H4SO 2.0)(diag)-56, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	GROUP OF #3 AND #4 CYLINDERS	Are there any faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: (1) Check the following items. • Spark plug • Fuel injector • Ignition coil (2) If no abnormal is discovered, check for “16. D: IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN(H4SO 2.0)(diag)-56, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	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 • Fuel injector • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
25	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 • Fuel injector • Compression ratio • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	CYLINDER AT RANDOM	Is the engine idle rough?	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-123, 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 • Fuel injector • Compression ratio

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

DTC DETECTING CONDITION:

Immediately at fault recognition

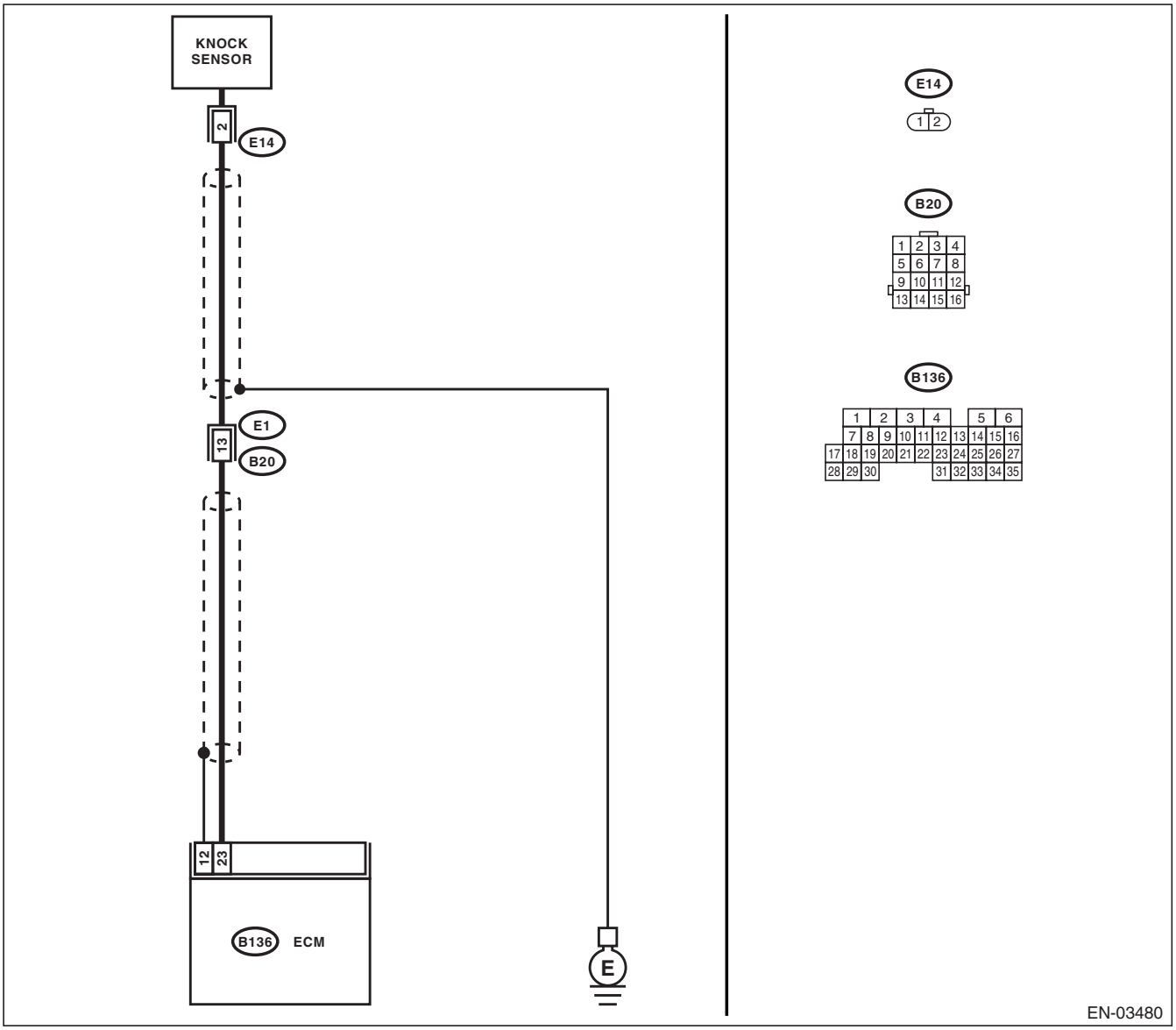
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Poor contact in knock sensor connector
3	**CHECK INSTALLATION CONDITION OF KNOCK SENSOR.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4SO 2.0)-23, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

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

DTC DETECTING CONDITION:

Immediately at fault recognition

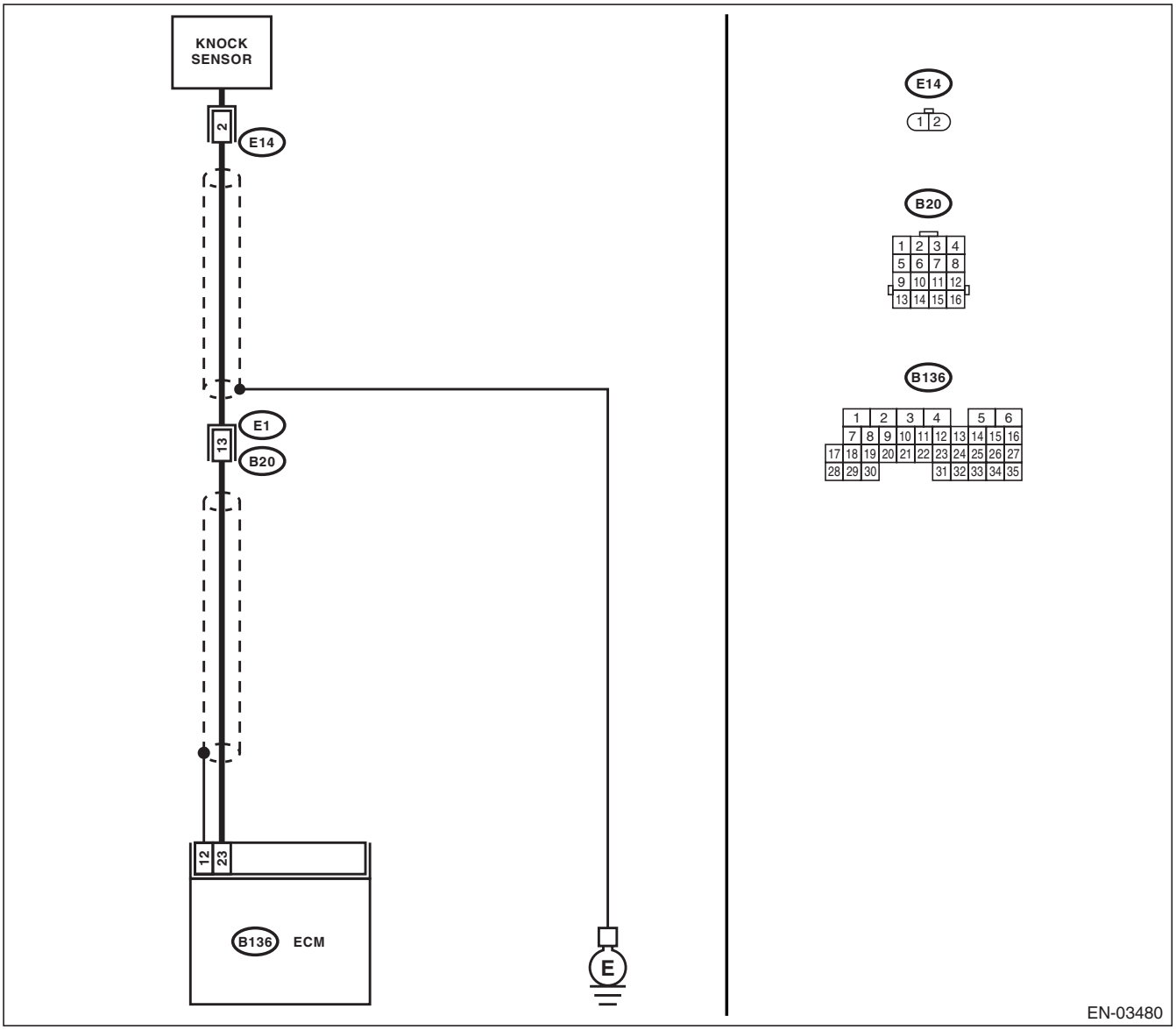
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4SO 2.0)-23, Knock Sensor.>	Repair the ground short circuit of harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit of harness covered with shield.
3	**CHECK INPUT SIGNAL OF ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following item: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AG:DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

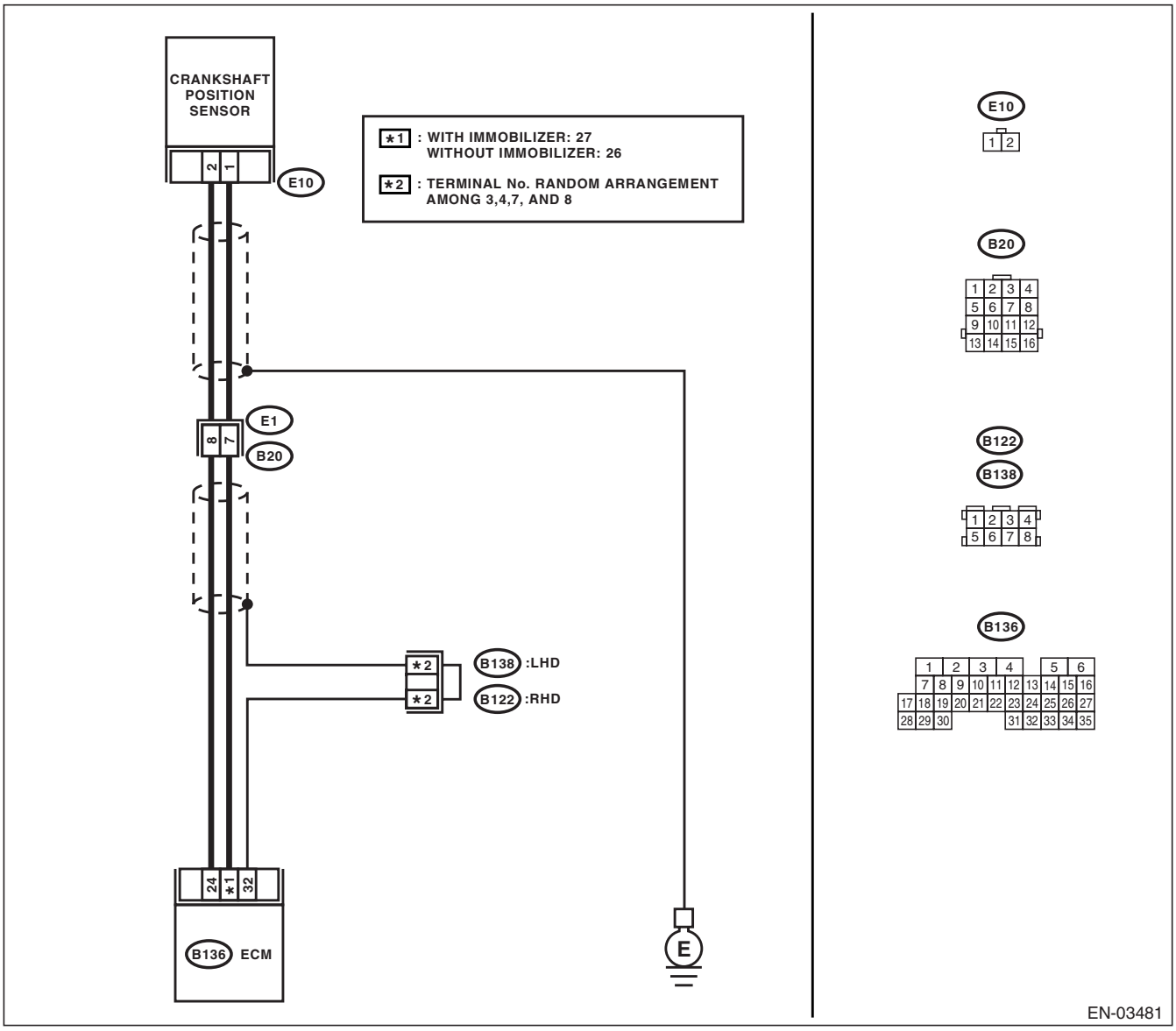
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit of harness with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — 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 crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4SO 2.0)-21, Crankshaft Position Sensor.>

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

DTC DETECTING CONDITION:

Immediately at fault recognition

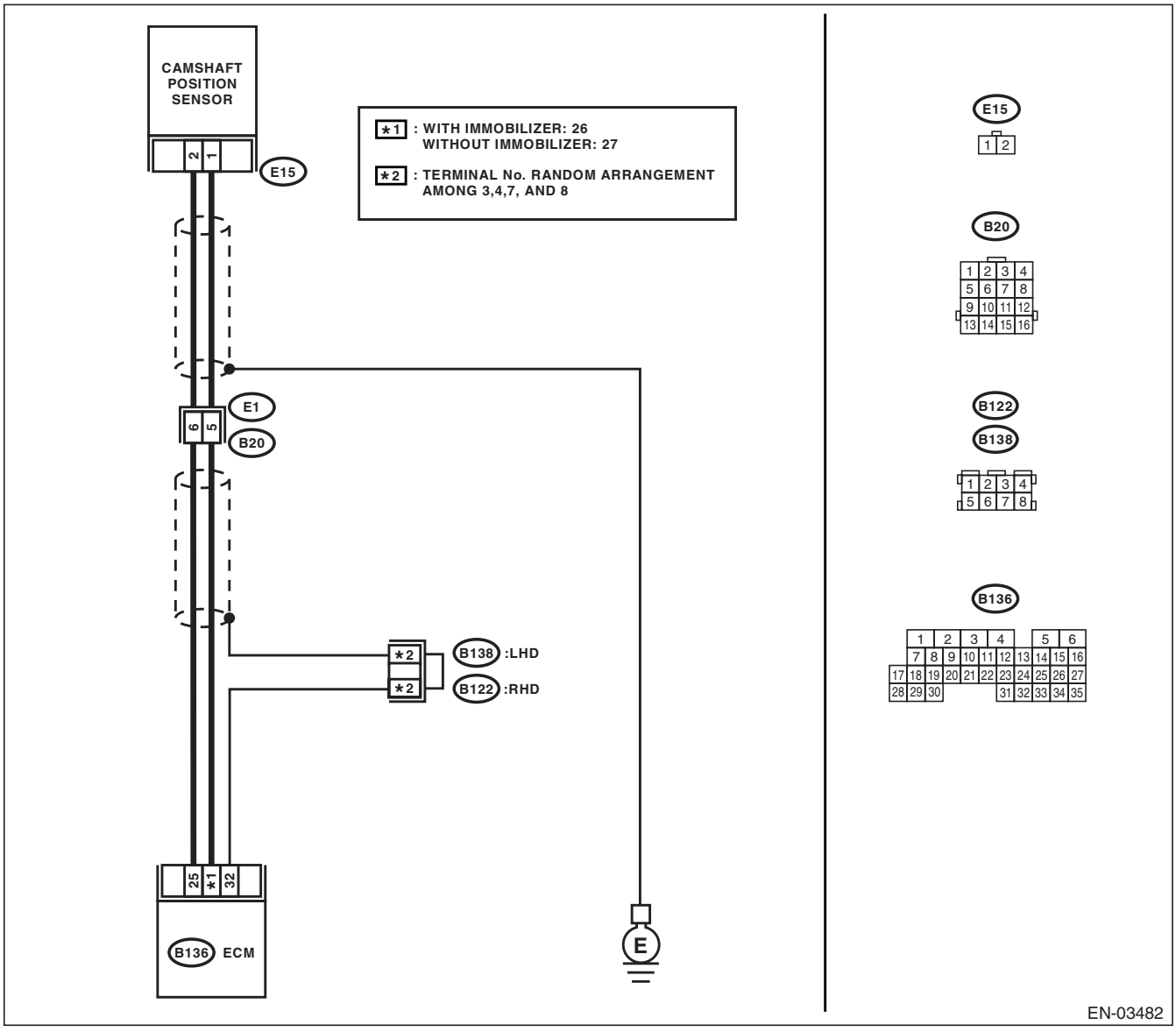
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit of harness with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — 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 camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, Camshaft Position Sensor.>

AI: DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

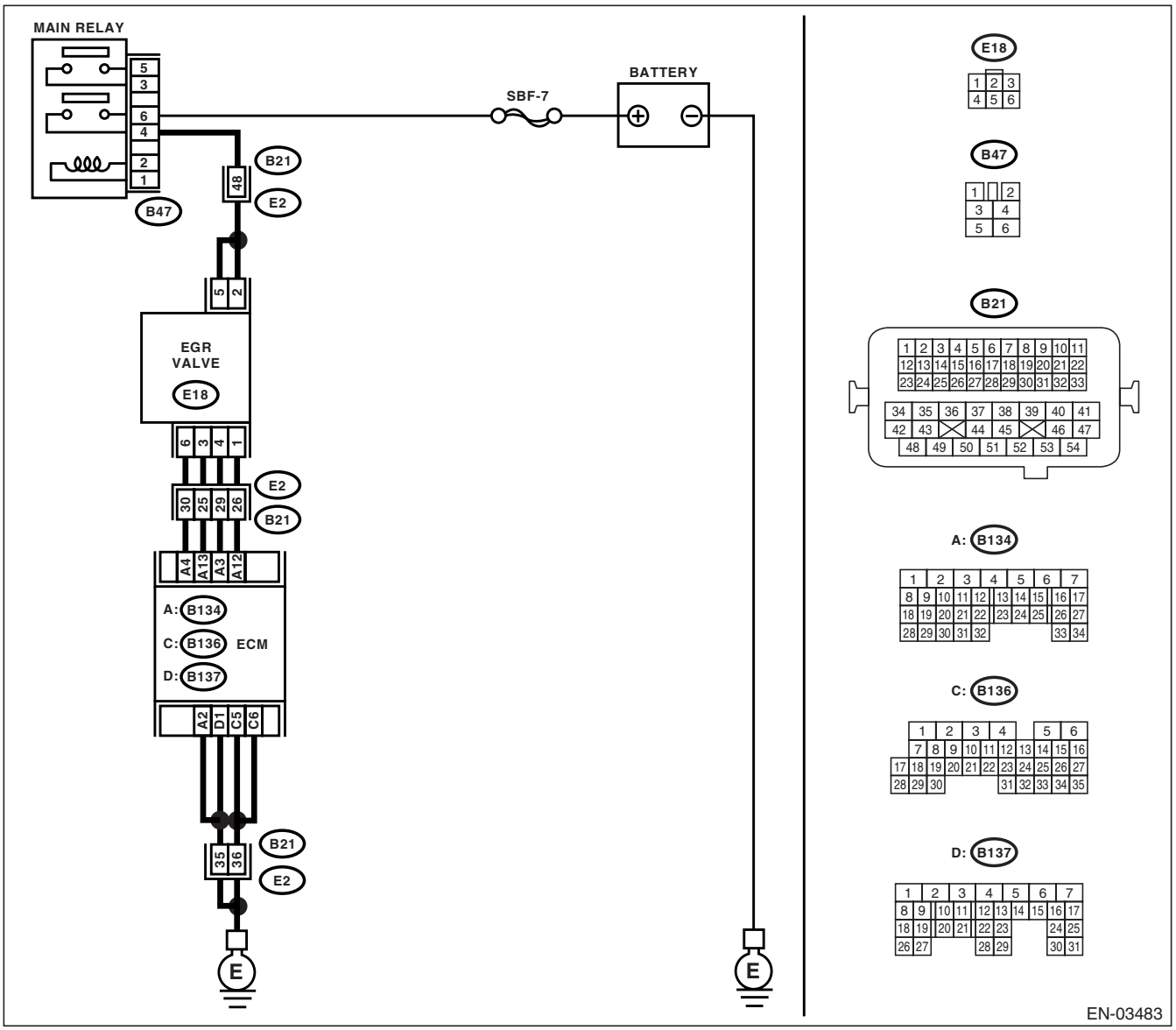
TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed.
- Erroneous idling
- Movement performance problem

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Make sure that the EGR valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step **3.**
3	**CHECK POWER SUPPLY OF EGR SOLENOID VALVE.** 1) Detach the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit of harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there is no foreign material between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	Is the resistance 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.0)-28, EGR Valve.>
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 4 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):*** ***(B134) No. 12 (+) — Chassis ground (−):*** ***(B134) No. 13 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact portion in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 4 — (E18) No. 6:*** ***(B134) No. 12 — (E18) No. 1:*** ***(B134) No. 3 — (E18) No. 4:*** ***(B134) No. 13 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 12 — Chassis ground:*** ***(B134) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit of harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM and EGR solenoid valve connector.	Is there poor contact of ECM or EGR solenoid valve connector?	Repair the poor contact of ECM and EGR solenoid valve connector.	Even if the malfunction indicator light illuminates, the circuit has returned to the specified condition at this time.

AJ:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK1)

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

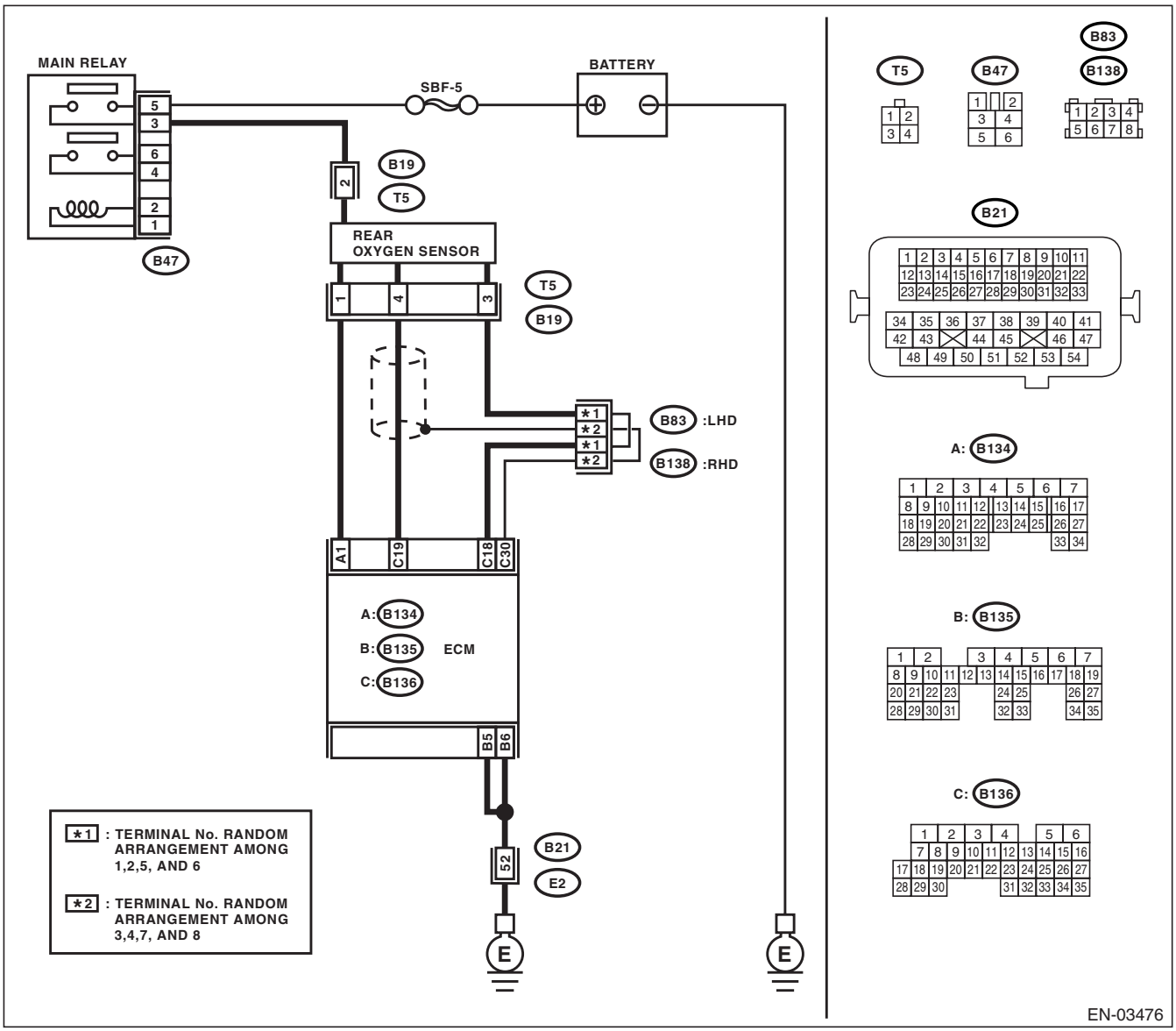
TROUBLE SYMPTOM:

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

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B136) No. 19 — (B19) No. 4:*** ***(B136) No. 18 — (B19) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 30 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
4	**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	Is there a fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4SO 2.0)-2, General Description.>	Go to step **5.**
5	**CHECK CATALYTIC CONVERTER.**	Is there damage at rear face or front face of front catalyst?	Replace the catalytic converter. <Ref. to EC(H4SO 2.0)-3, Front Catalytic Converter.>	Contact the SUBARU Dealer.

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

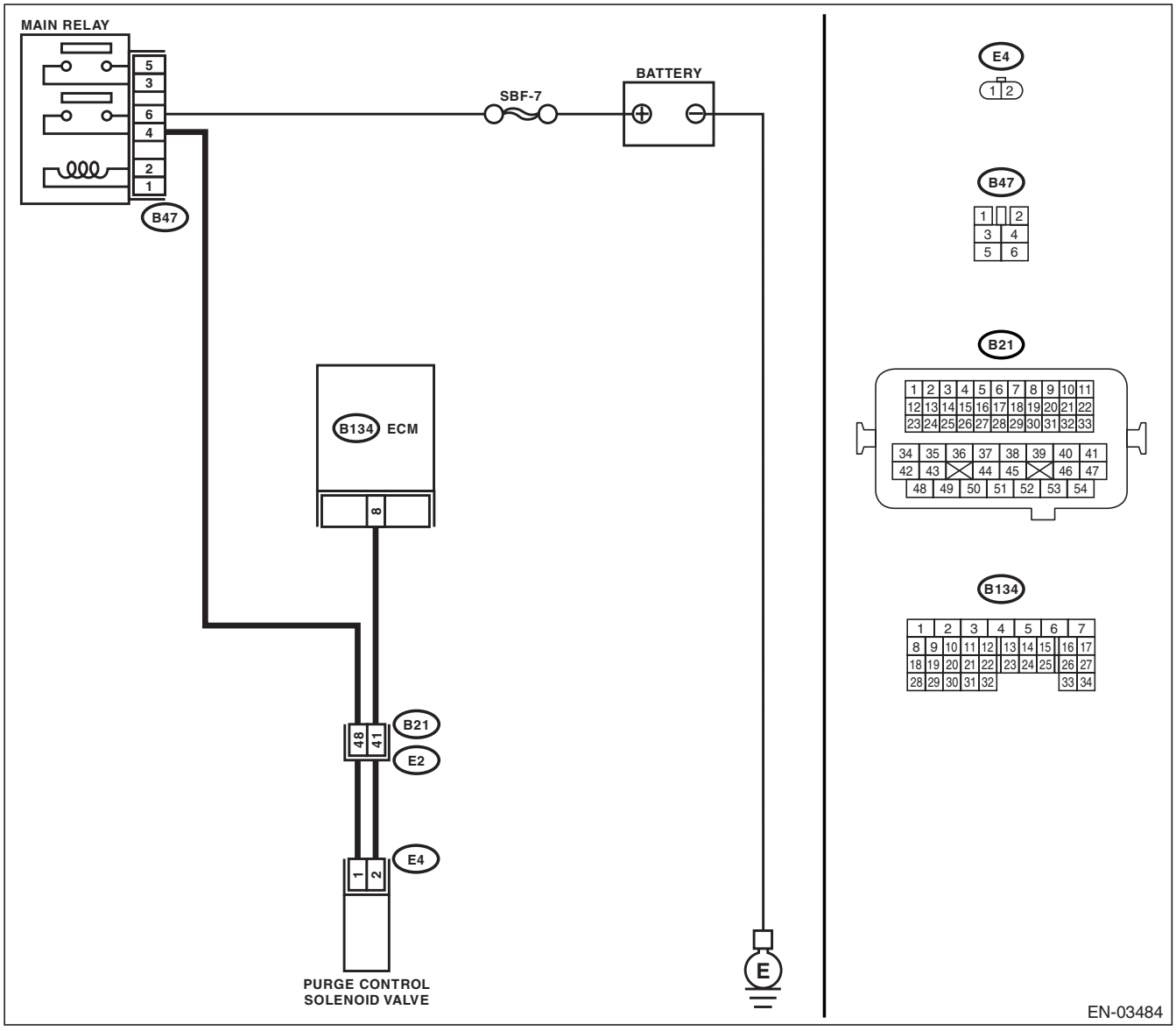
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B134) No. 8 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**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?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit of harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

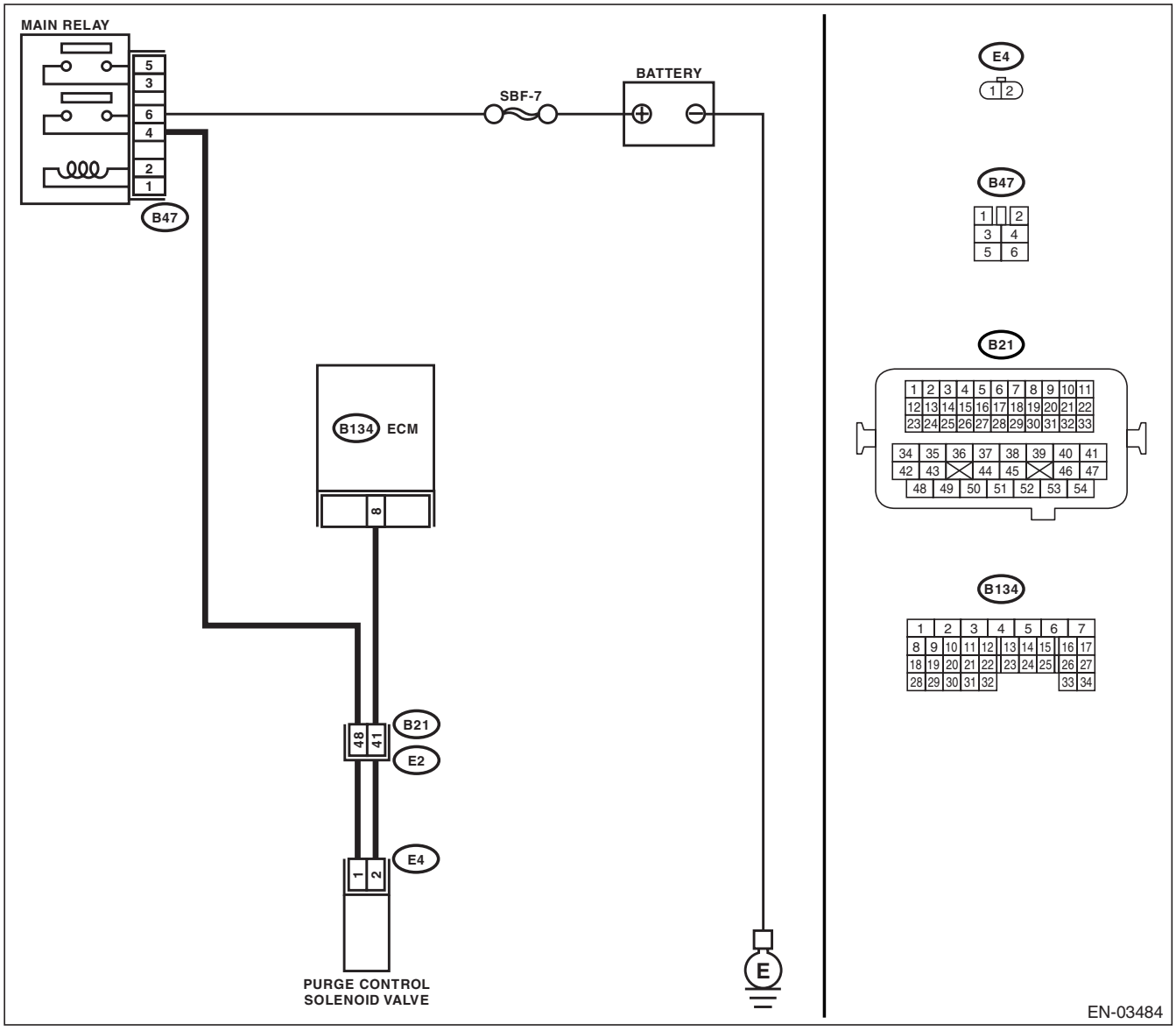
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground while operating the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **5.**
5	**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(H4SO 2.0)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>.	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0462 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0463 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AO:DTC P0500 VEHICLE SPEED SENSOR “A”

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to DTC. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

AP:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

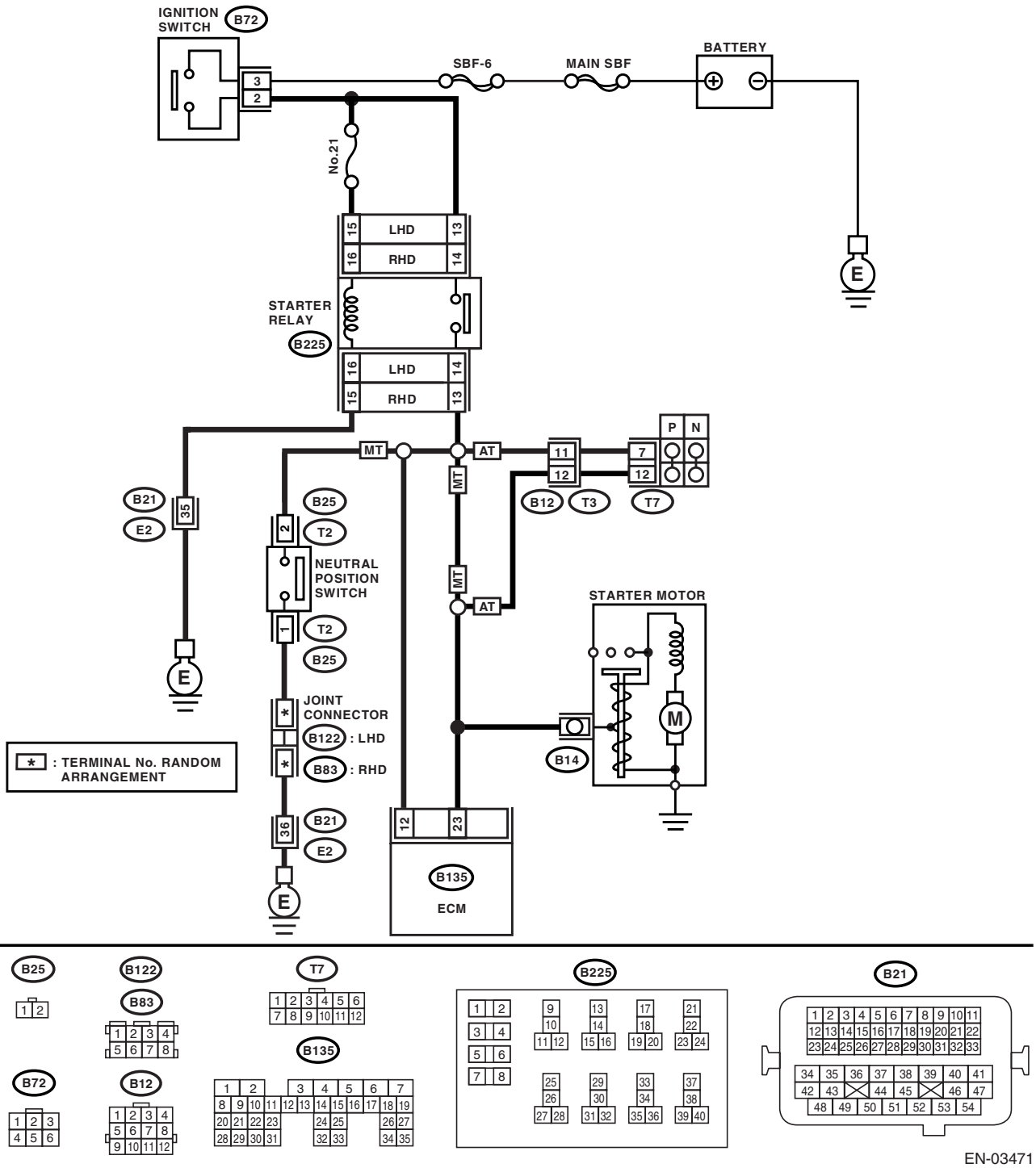
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-03471

Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN IGNITION SWITCH AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ignition switch and ECM.	Repair the poor contact in ECM.

AQ:DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
Engine keeps running at higher speed than specified idle speed.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items. • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections 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. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

AR:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AS:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

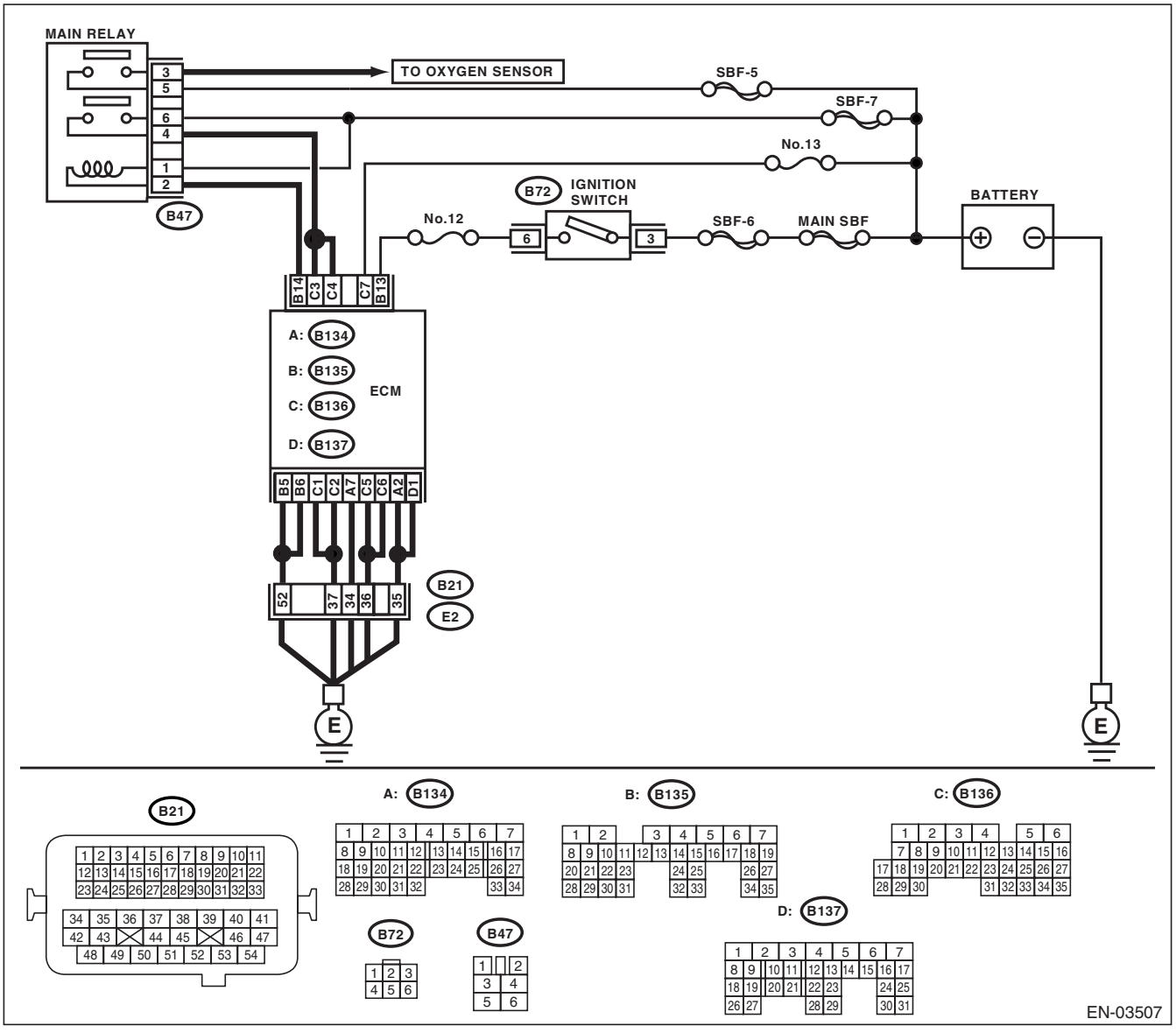
TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AT:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4SO 2.0)(diag)-162, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AU:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

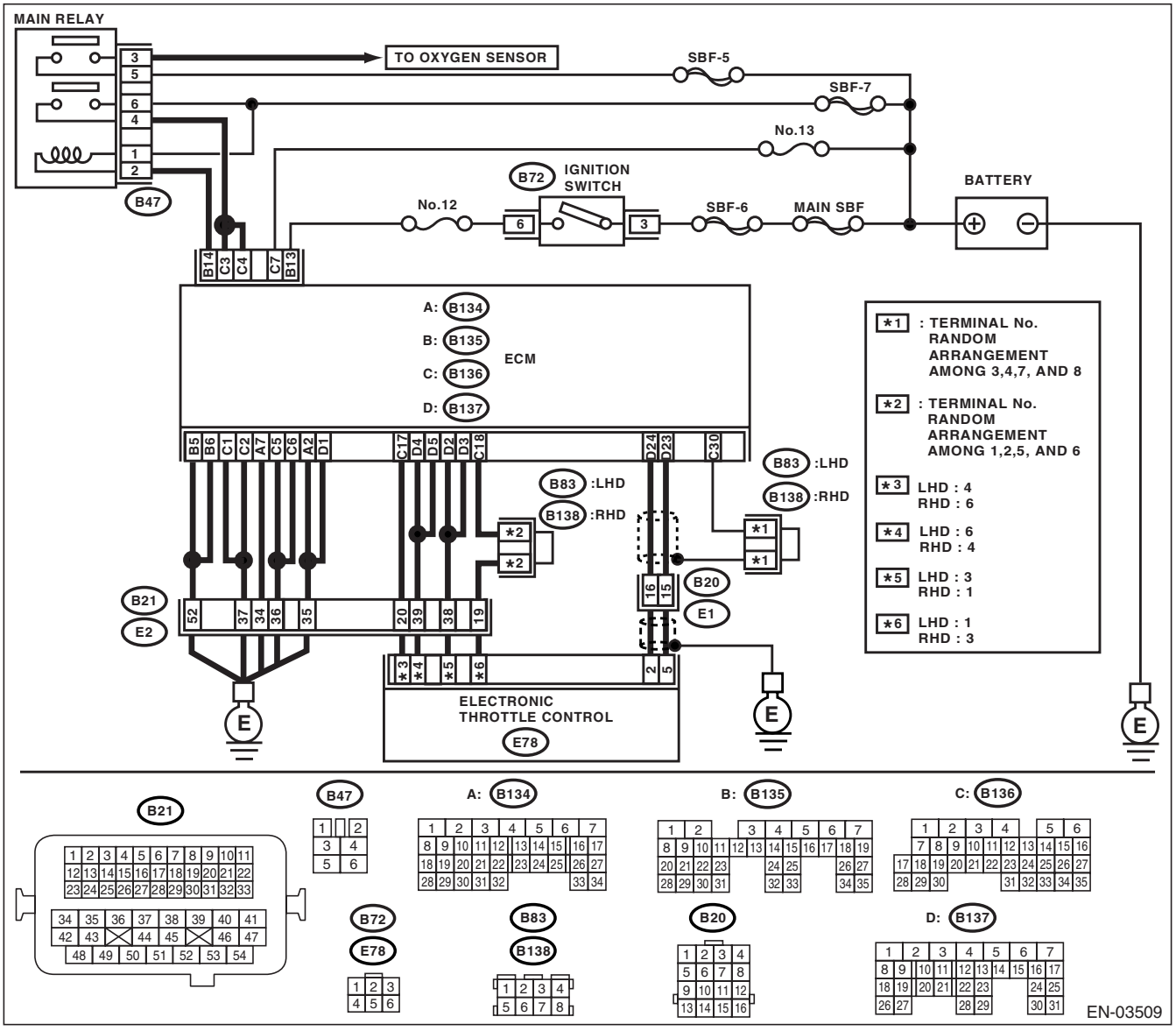
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	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. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — 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. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — 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.** 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 and electronic throttle control connector. ***Connector & terminal*** ***LHD model*** ***(B135) No. 4 — (E24) No. 17:*** ***(E78) No. 1 — (B136) No. 18:*** ***RHD model*** ***(E78) No. 6 — (B136) No. 17:*** ***(E78) No. 3 — (B136) No. 18:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness between ECM and electronic throttle control connector.
4	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (−):*** ***(B136) No. 5 (+) — Chassis ground (−):*** ***(B136) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

AV:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-190, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P0691 FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
- Radiator fan does not operate properly.
- Overheating

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is DTC P0691 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

AX:DTC P0692 FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
- Radiator fan does not operate properly.
- Overheating

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is DTC P0692 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

AY:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

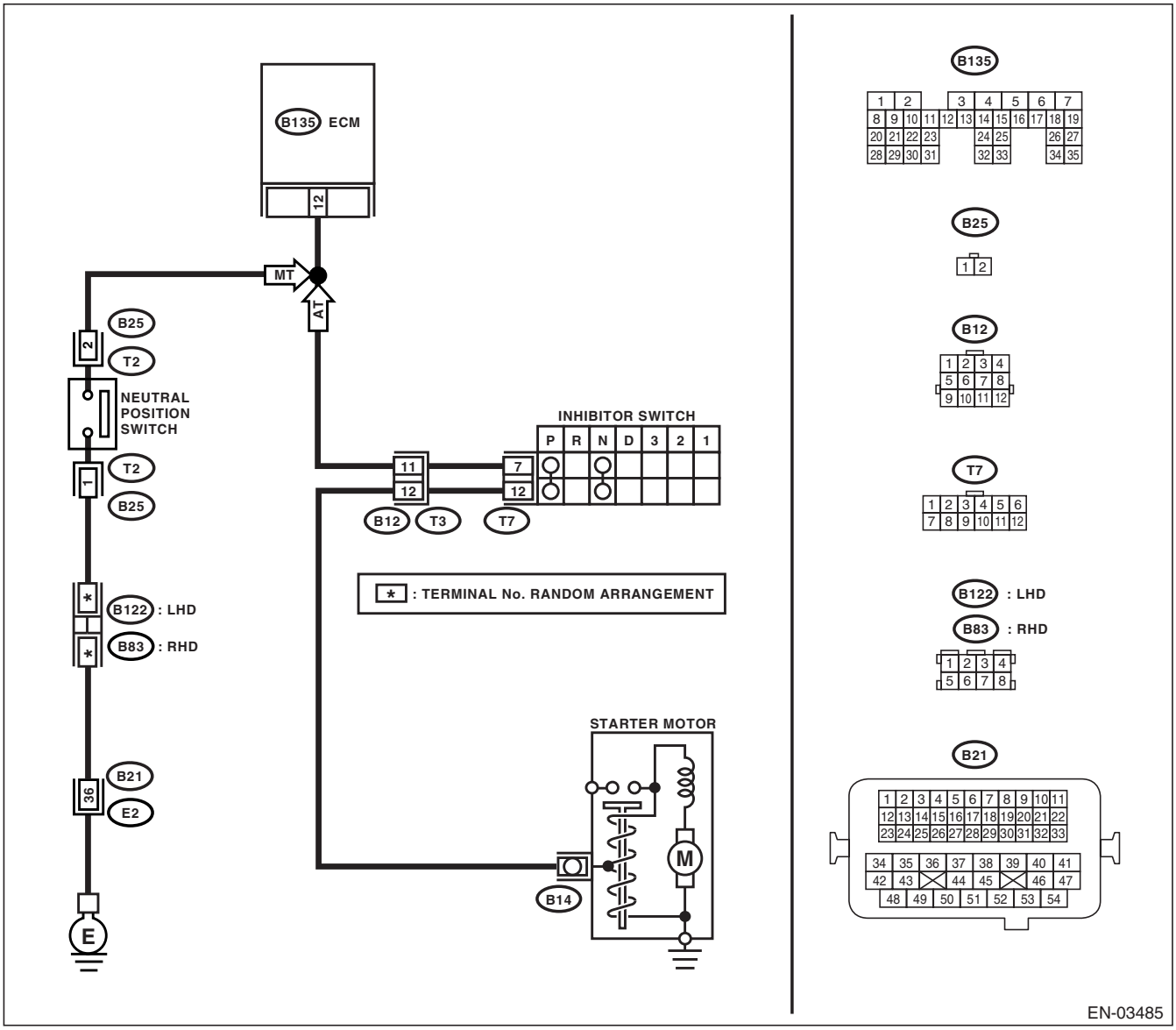
NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

AZ:DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

1. AT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

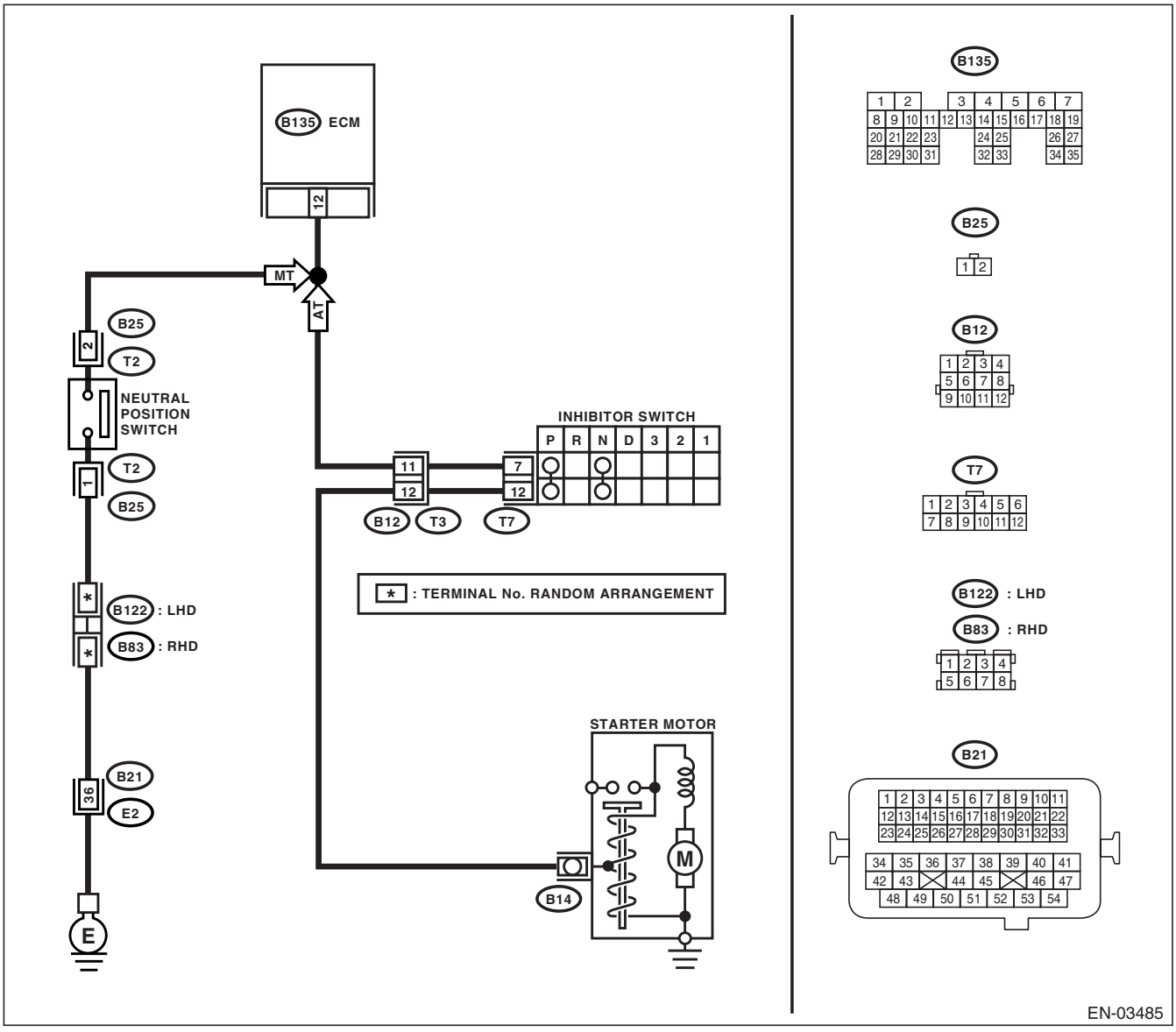
	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the select lever other than "N" and "P" range. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **3.**
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 of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit of harness between ECM and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 11 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between transmission harness connector and inhibitor switch connector.
5	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at other than "N" and "P" range. ***Terminals*** ***(T7) No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the inhibitor switch. <Ref. to 4AT-51, Inhibitor Switch.>
6	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-29, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

2. MT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL OF ECM.** 1) Place the shift lever except in neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Place the shift lever in neutral. 4) Measure the resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the short circuit in transmission harness, or replace the neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever except in neutral. 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in transmission harness, or replace the neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit of harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B135) No. 12 — (B25) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit of harness between ECM and transmission harness connector.
8	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B25) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair the open circuit between transmission harness connector and engine ground terminal.

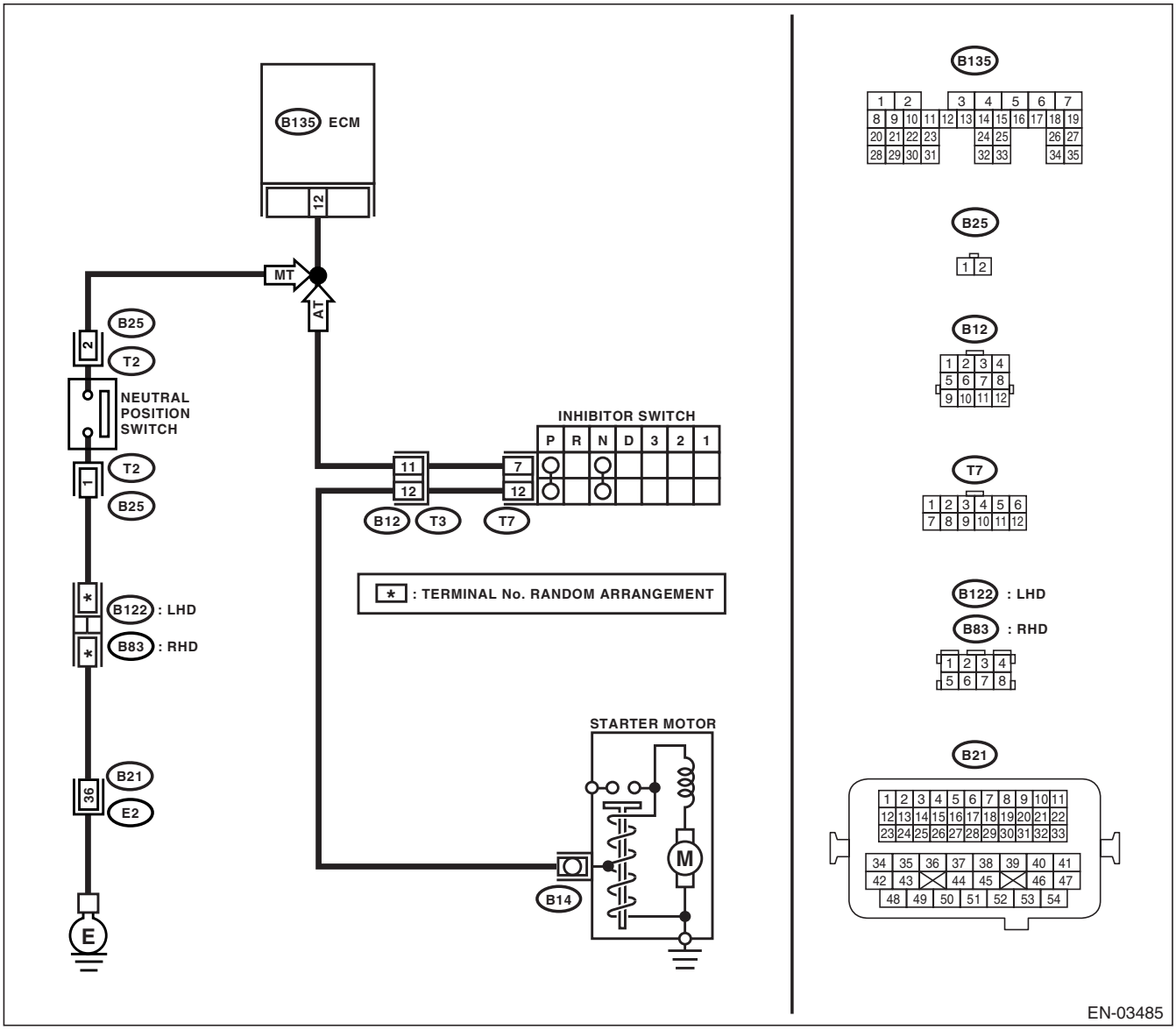
	Step	Check	Yes	No
9	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair the poor contact in transmission harness connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BA:DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

1. AT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	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 "N" and "P" range. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground with select lever at other than "N" and "P" range. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and inhibitor switch connector.	Go to step **6.**
6	**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 and inhibitor switch connector. ***Connector & terminal*** ***(B135) No. 12 — (T7) No. 7:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

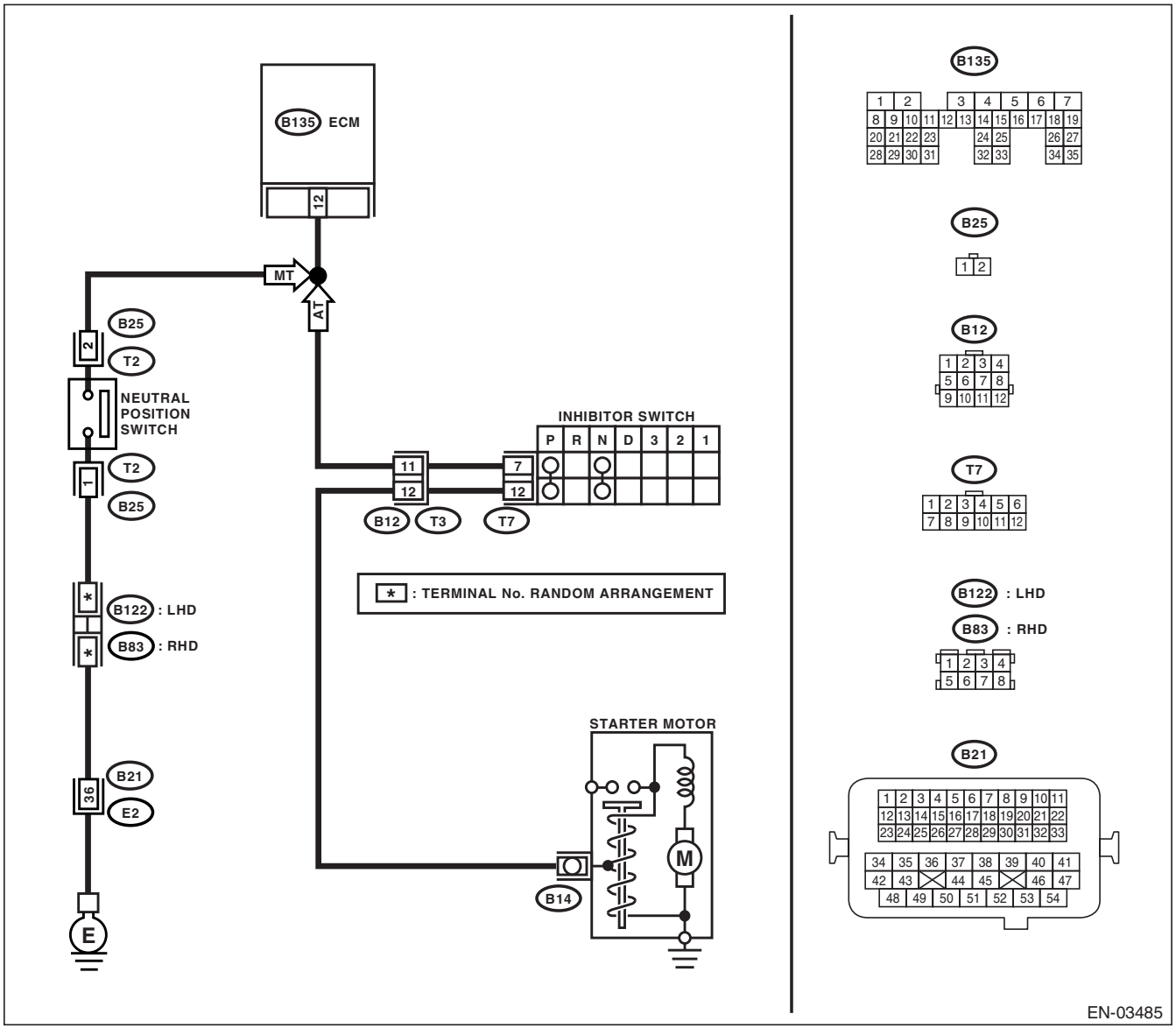
	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 12 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair the open circuit of harness between inhibitor switch connector and ground line. NOTE: In this case, repair the following item: • Open circuit of harness between inhibitor switch connector and ground line
8	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at "N" and "P" range. ***Terminals*** ***(T7) No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the inhibitor switch. <Ref. to 4AT-51, Inhibitor Switch.>
9	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-29, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

2. MT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever except in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL OF ECM.** 1) Place the shift lever in neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever except in neutral. 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in transmission harness or replace the neutral position switch.
5	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B135) No. 12 — (B25) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness between ECM and transmission harness connector.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B25) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between transmission harness connector and engine ground • Poor contact in coupling connector
7	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector.	Repair poor contact in transmission harness connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BB:DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM

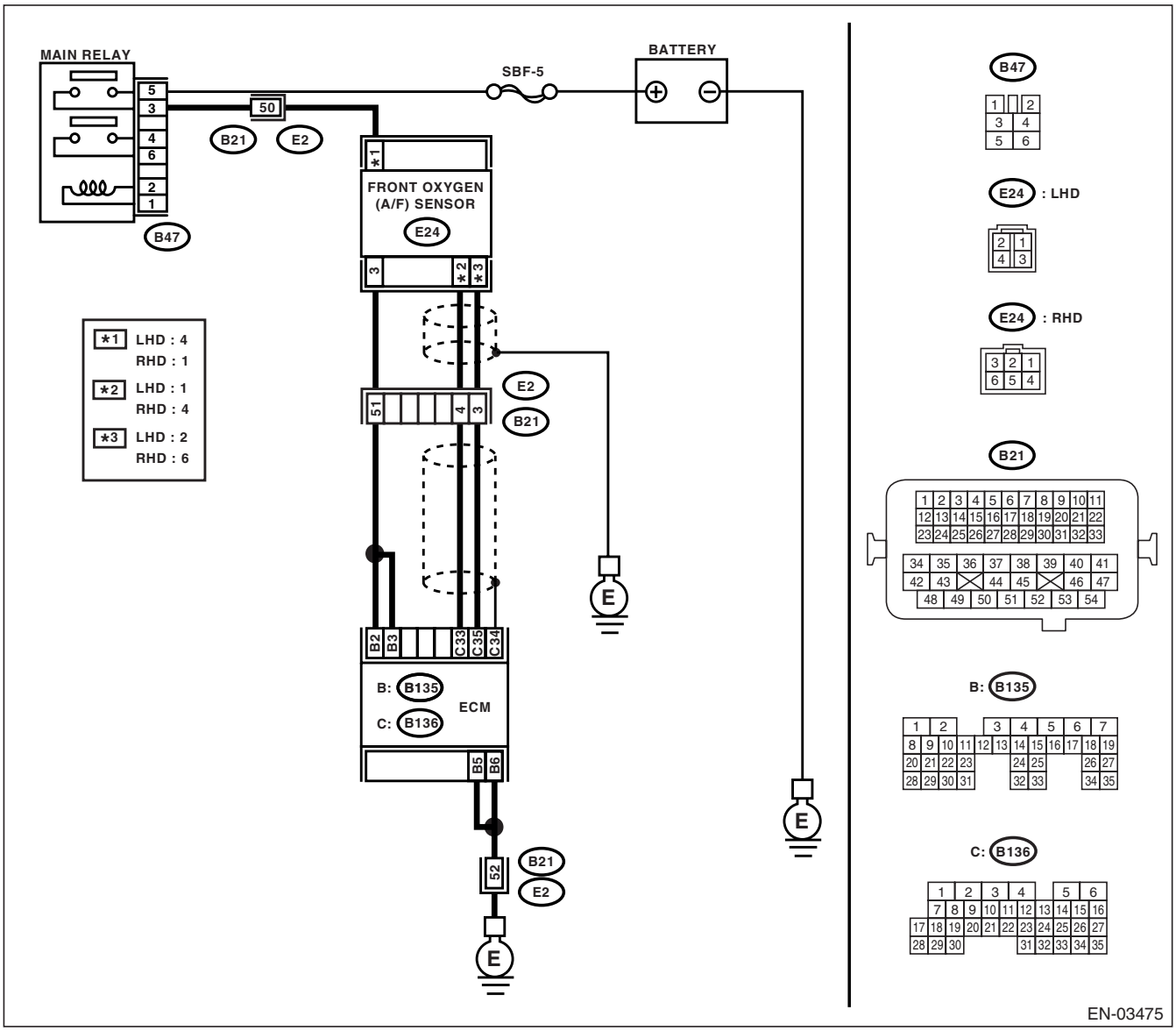
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P1134.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BC:DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1)

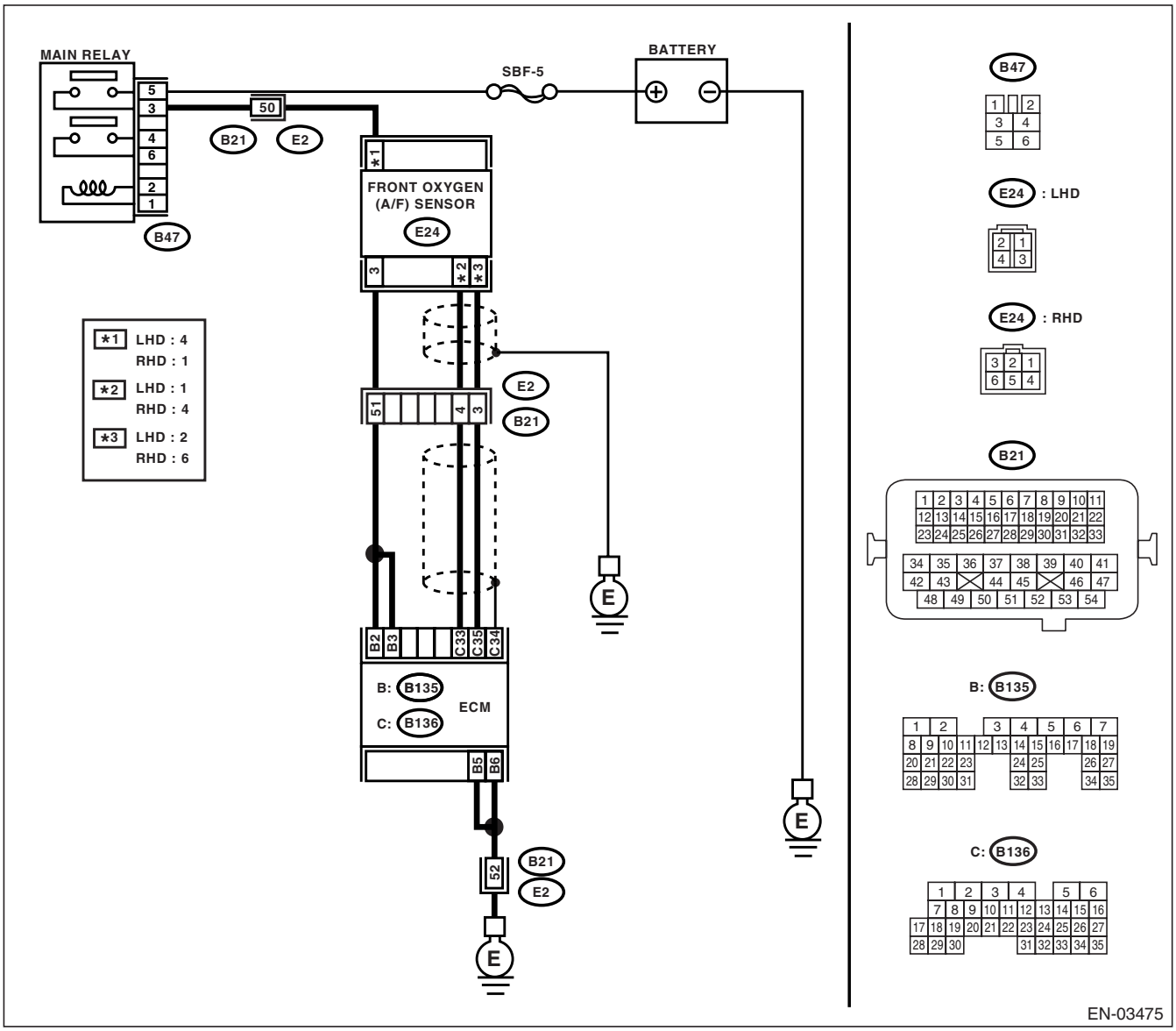
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal during idling using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.85 — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminal*** ***LHD model*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:*** ***RHD model*** ***(B136) No. 33 — (E24) No. 4:*** ***(B136) No. 35 — (E24) No. 6:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit between ECM and front oxygen (A/F) sensor.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between ECM and front oxygen (A/F) sensor.
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

BD:DTC P1160 RETURN SPRING FAILURE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-190, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BE:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-181, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BF:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-183, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BG:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-181, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BH:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-183, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-181, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BJ:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-183, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BK:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

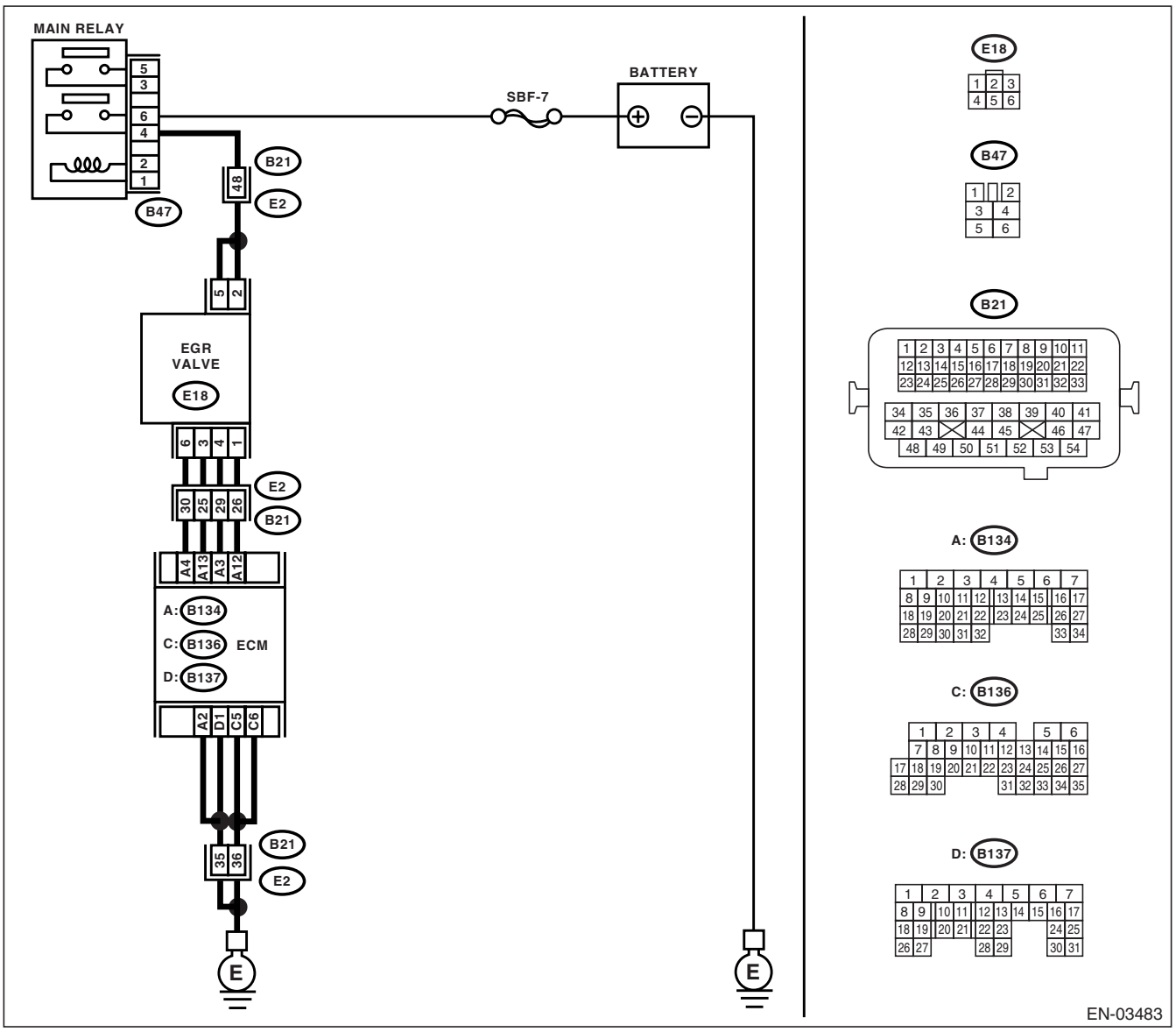
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 13 — (E18) No. 3:*** ***DTC P1494; (B134) No. 12 — (E18) No. 1:*** ***DTC P1496; (B134) No. 3 — (E18) No. 4:*** ***DTC P1498; (B134) No. 4 — (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 and EGR solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 13 — Chassis ground:*** ***DTC P1494; (B134) No. 12 — Chassis ground:*** ***DTC P1496; (B134) No. 3 — Chassis ground:*** ***DTC P1498; (B134) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair the poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.0)-28, EGR Valve.>

BL:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

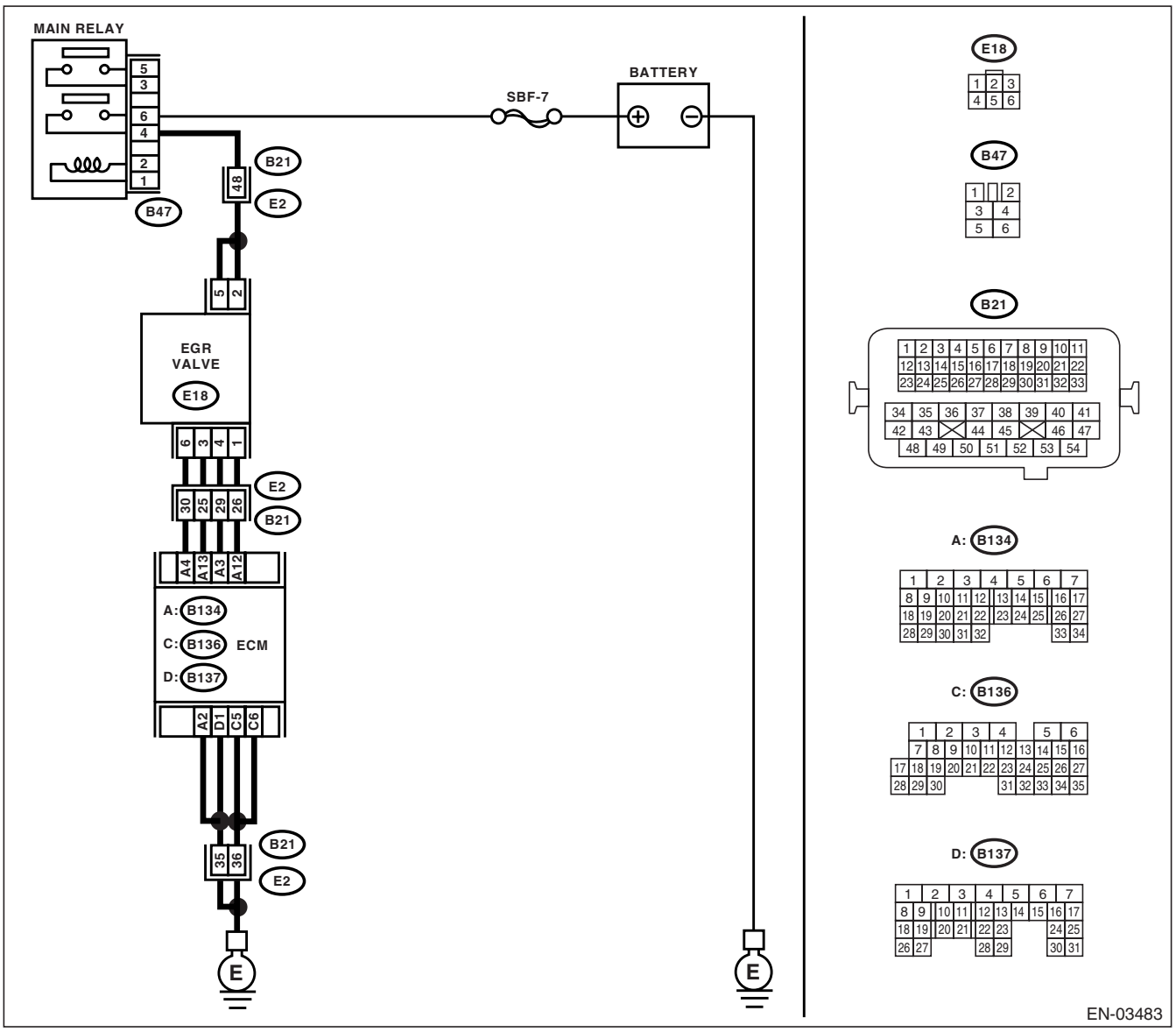
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B137) No. 1 — 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 in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 13 (+) — Chassis ground (−):*** ***DTC P1495; (B134) No. 12 (+) — Chassis ground (−):*** ***DTC P1497; (B134) No. 3 (+) — Chassis ground (−):*** ***DTC P1499; (B134) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and EGR solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BM:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

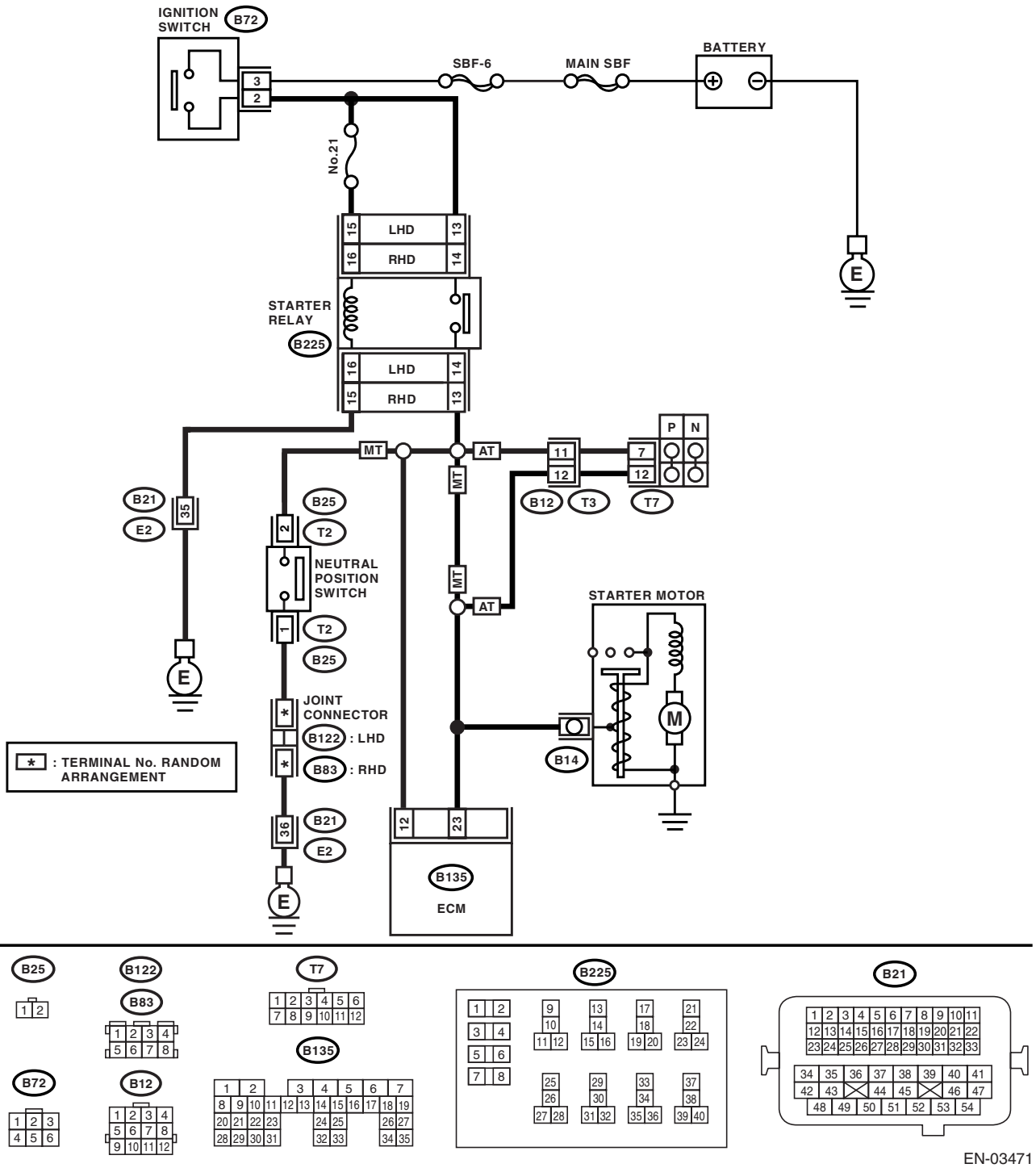
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



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	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to START. NOTE: • For AT model, set the selector lever in the "P" or "N" range. • For MT model, depress the clutch pedal.	Does the starter motor operate?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between ECM and starter motor connector • Poor contact in ECM connector	Check the starter motor circuit. <Ref. to EN(H4SO 2.0)(diag)-51, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BN:DTC P1521 BRAKE CIRCUIT RANGE/PERFORMANCE PROBLEM(HIGH INPUT)

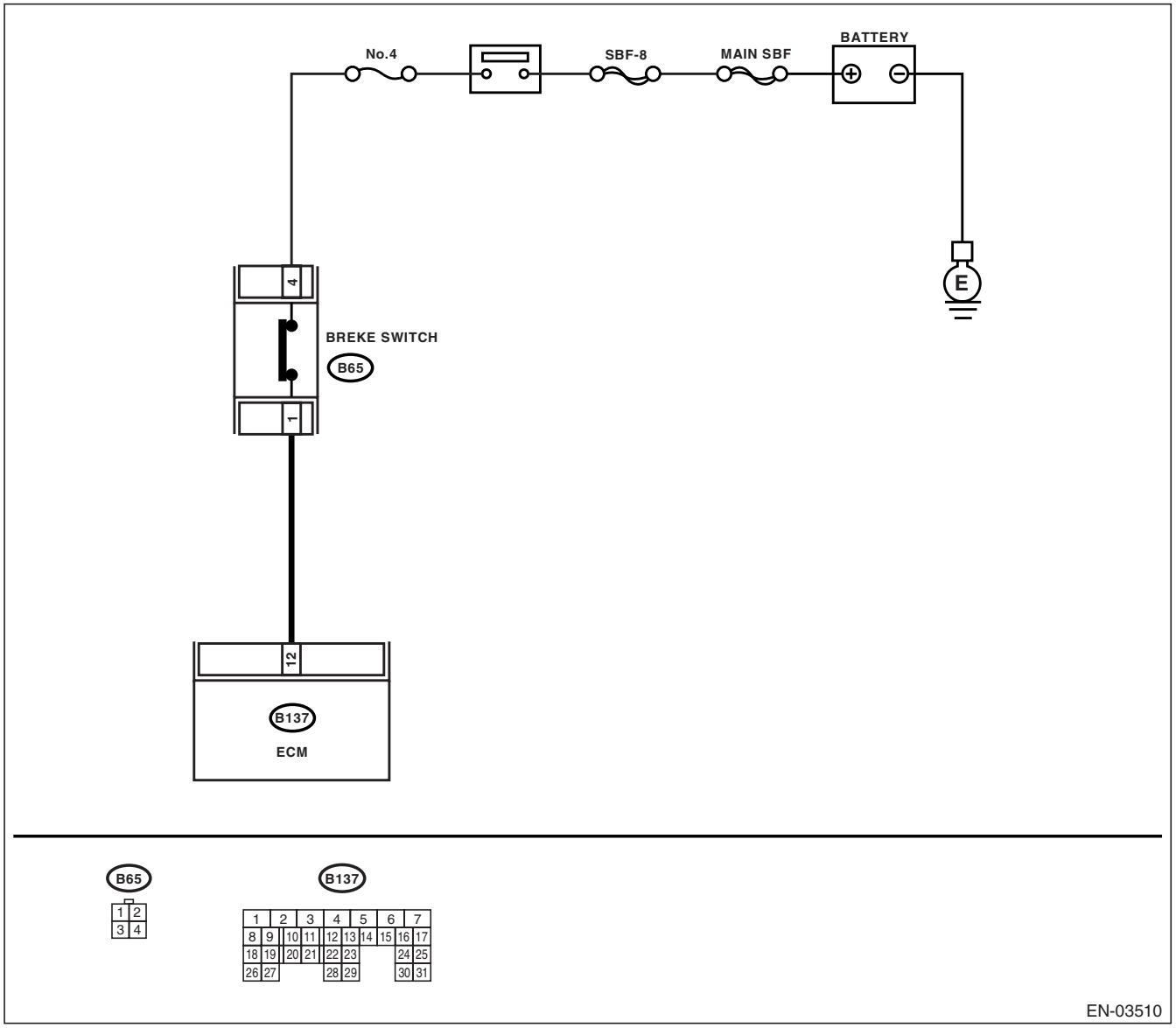
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground with brake pedal depressed. ***Connector & terminal*** ***(B137) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit between ECM and brake switch.	Go to step **3.**
3	**CHECK BRAKE SWITCH.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between brake switch connectors. ***Terminals*** ***(B65) No. 1 — (B65) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the brake switch. <Ref. to CC-6, Stop Light & Brake Switch.>
4	**CHECK BRAKE SWITCH.** Measure the resistance between brake switch connectors with brake pedal depressed. ***Terminals*** ***(B65) No. 1 — (B65) No. 4:***	Is the resistance more than 1 MΩ?	Check poor contact in ECM connector.	Replace the brake switch. <Ref. to CC-6, Stop Light & Brake Switch.>

BO:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

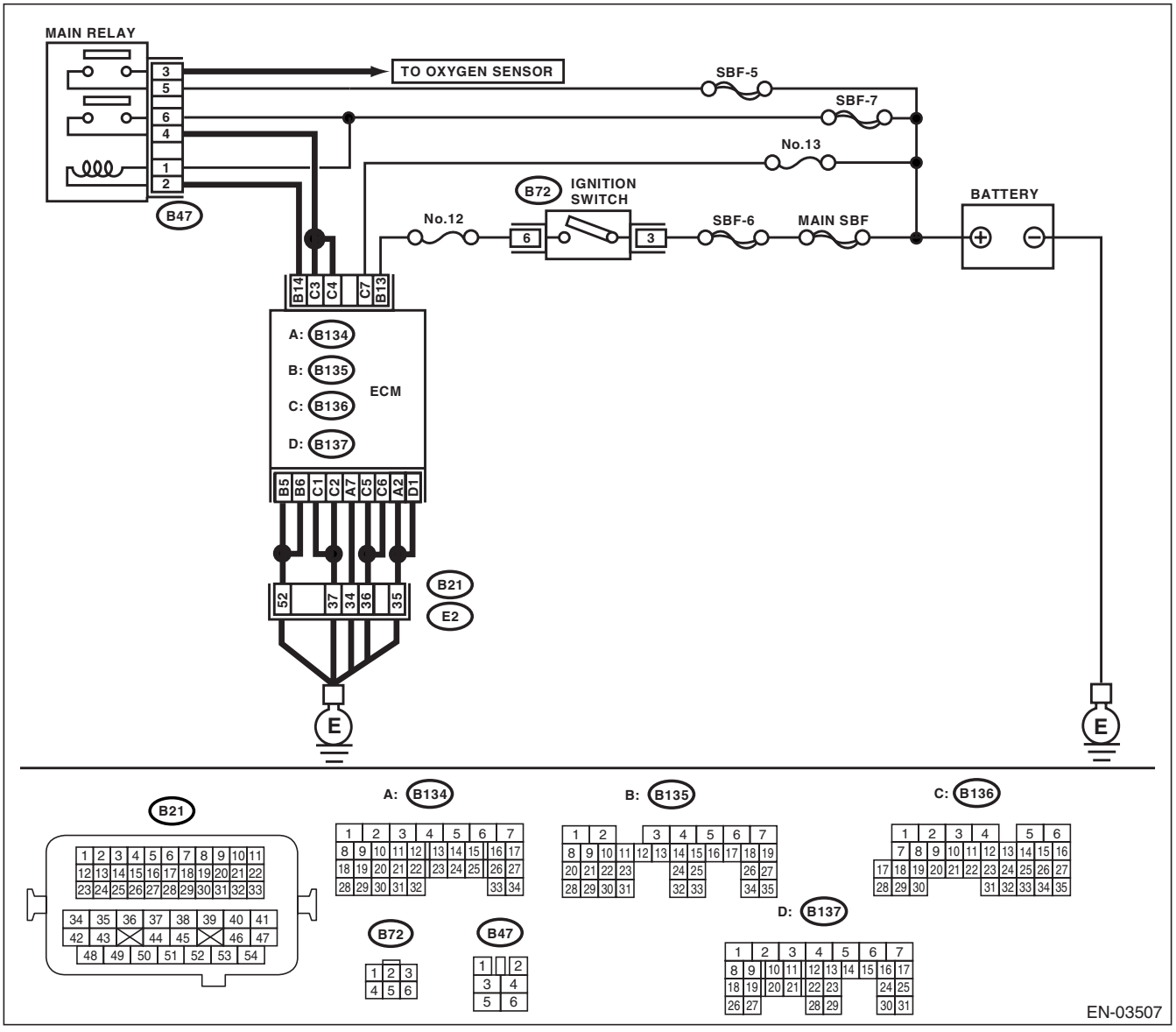
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

BP:DTC P2100 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT/OPEN

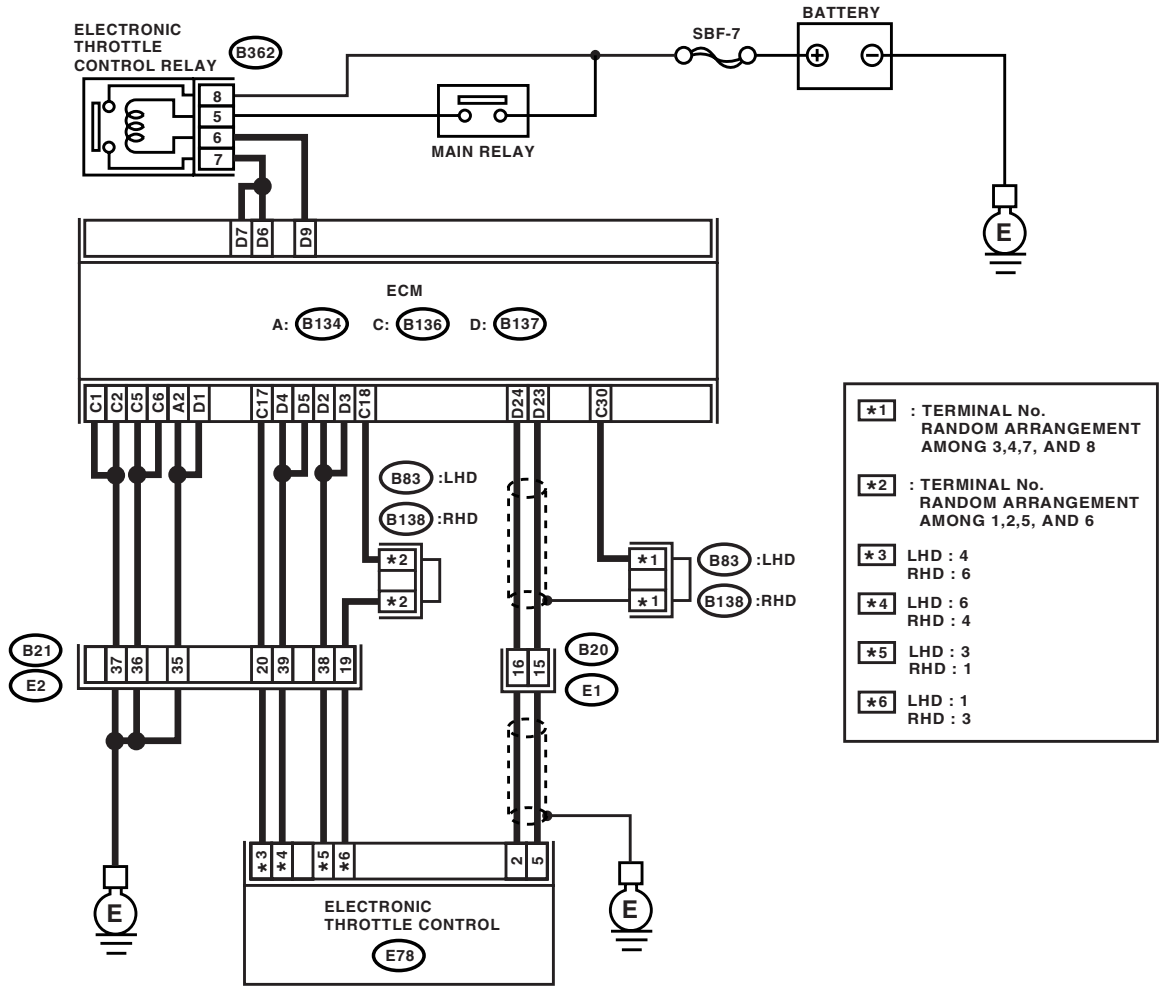
NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-190, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

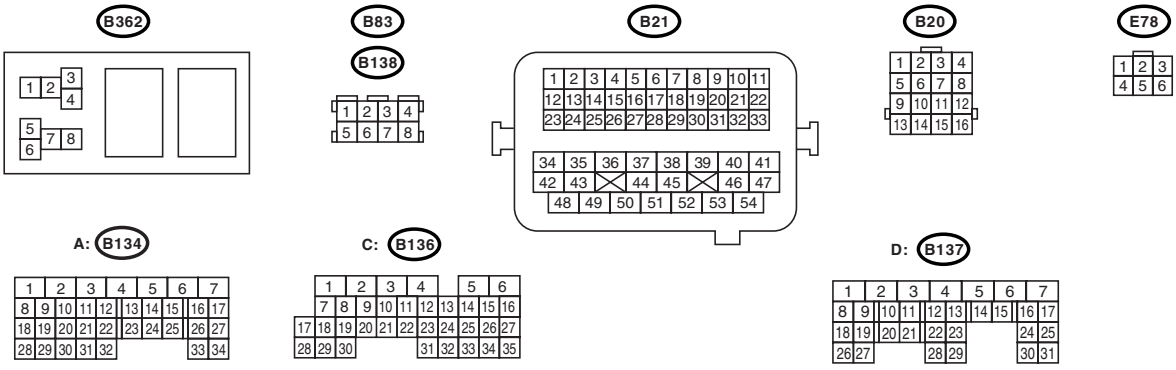
BQ:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	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 electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (–):*** ***(B362) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 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 RELAY.** 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 electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the power supply short circuit of harness between ECM and electronic throttle control.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B137) No. 9 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 7:*** ***(B137) No. 7 — (B362) No. 7:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness between ECM and electronic throttle control relay.
6	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B137) No. 24 (+) — (B136) No. 18 (–):***	Is the voltage more than 0.3 V?	Go to step **7.**	Go to step **9.**

	Step	Check	Yes	No
7	**CHECK SENSOR OUTPUT.** Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B137) No. 23 (+) — (B136) No. 18 (–):***	Is the voltage less than 4.8 V?	Go to step **8.**	Go to step **9.**
8	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **13.**
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 17 — (E78) No. 4:*** ***RHD model*** ***(B136) No. 17 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness connector.
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B137) No. 23 — Chassis ground:*** ***(B137) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the ground short circuit of harness.
11	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (–):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **12.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
12	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 — Engine ground:*** ***(E78) No. 5 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
13	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.5 — 1.0 V?	Go to step **14.**	Go to step **16.**

	Step	Check	Yes	No
14	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.5 — 1.0 V?	Go to step **15.**	Go to step **16.**
15	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **21.**
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 18 — (E78) No. 1:*** ***RHD model*** ***(B136) No. 18 — (E78) No. 3:***	Is the resistance less than 1 Ω?	Go to step **17.**	Repair the open circuit of harness connector.
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 1 — Engine ground:*** ***RHD model*** ***(E78) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **18.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **19.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (−):*** ***(E78) No. 2 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **20.**	Repair the short circuit of harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **21.**	Repair the short circuit to sensor power supply.
21	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except for electric throttle control relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.5 — 1.0 V?	Go to step **22.**	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
22	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.5 — 1.0 V?	Go to step **23.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***LHD model*** ***(B137) No. 2 — (E78) No. 3:*** ***(B137) No. 3 — (E78) No. 3:*** ***(B137) No. 4 — (E78) No. 6:*** ***(B137) No. 5 — (E78) No. 6:*** ***RHD model*** ***(B137) No. 2 — (E78) No. 1:*** ***(B137) No. 3 — (E78) No. 1:*** ***(B137) No. 4 — (E78) No. 4:*** ***(B137) No. 5 — (E78) No. 4:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 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*** ***LHD model*** ***(E78) No. 3 (+) — Engine ground (−):*** ***(E78) No. 6 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 1 (+) — Engine ground (−):*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **25.**	Repair the power supply short circuit of harness between ECM and electronic throttle control.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 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*** ***LHD model*** ***(E78) No. 3 — Engine ground:*** ***(E78) No. 6 — Engine ground:*** ***RHD model*** ***(E78) No. 1 — Engine ground:*** ***(E78) No. 4 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Repair the short circuit of harness.
26	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***LHD model*** ***(E78) No. 3 — (E78) No. 6:*** ***RHD model*** ***(E78) No. 1 — (E78) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **27.**	Repair the short circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 1 — Chassis ground:*** ***(B134) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **28.**	Repair the open circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***LHD model*** ***No. 3 — No. 6:*** ***RHD model*** ***No. 1 — No. 4:***	Is the resistance less than 5 Ω?	Go to step **29.**	Replace the electronic throttle control.

	Step	Check	Yes	No
29	**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? Specification: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the electronic throttle control.

BR:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

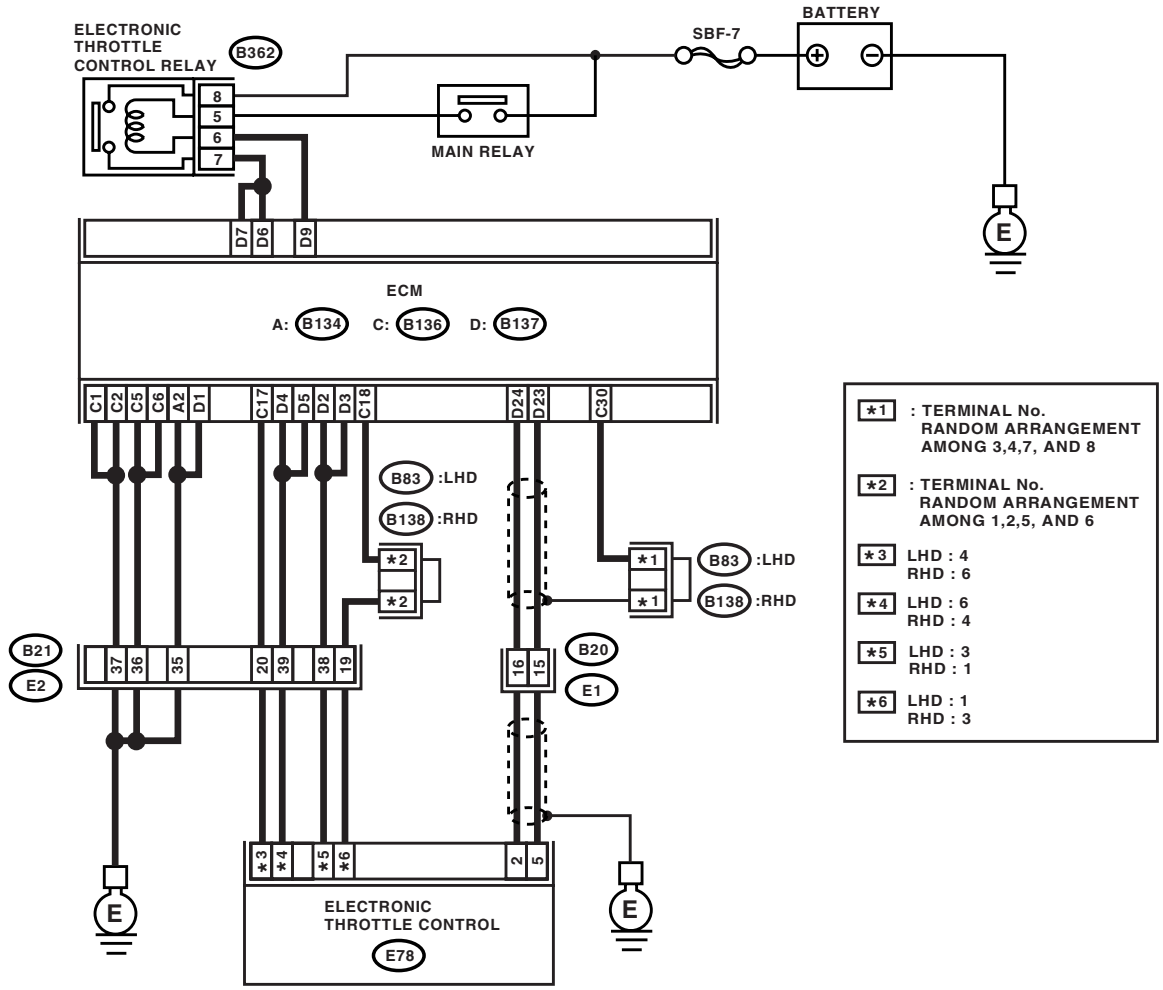
TROUBLE SYMPTOM:

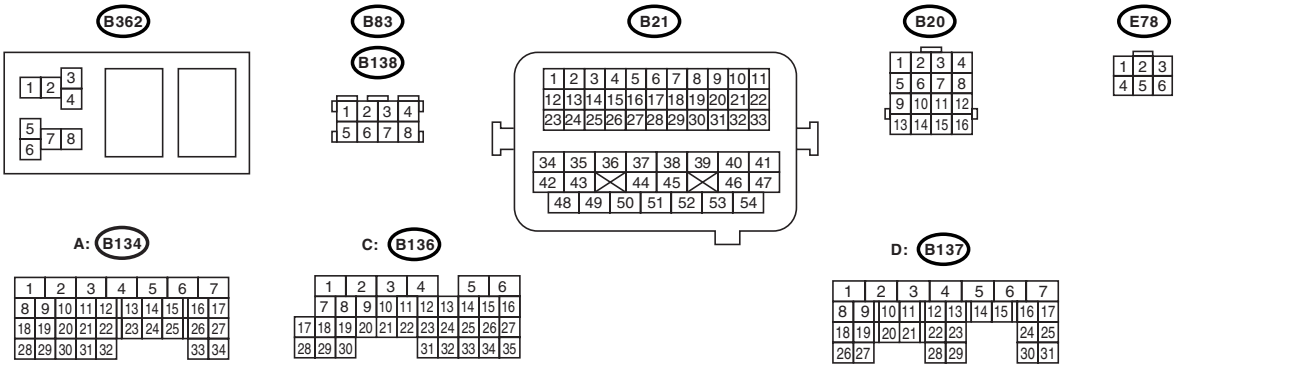
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	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 electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 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 RELAY.** 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 electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B137) No. 9 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 7:*** ***(B137) No. 7 — (B362) No. 7:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the open circuit of harness between ECM and electronic throttle control relay.

BS:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

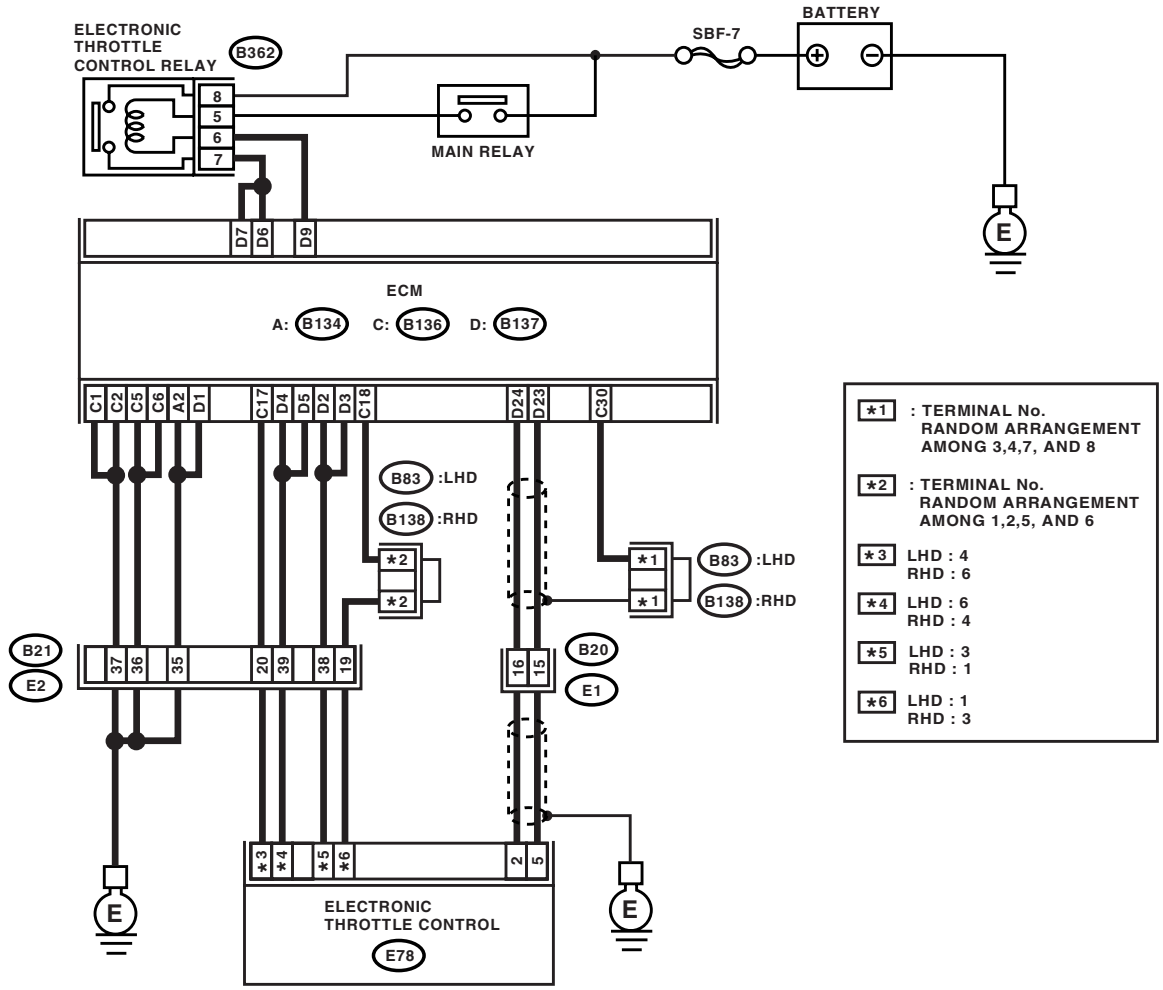
TROUBLE SYMPTOM:

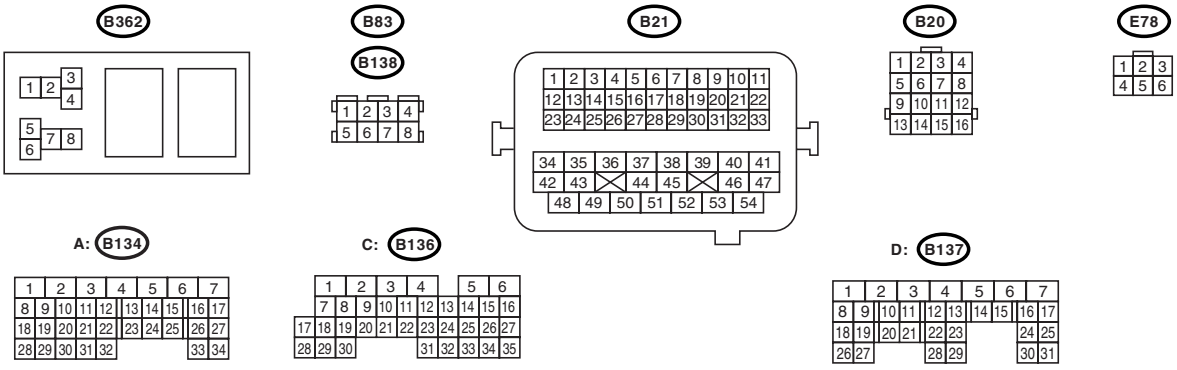
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	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. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the 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*** ***(B362) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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*** ***(B137) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the ground short circuit of harness between ECM and electronic throttle control relay.

BT:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-190, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BU:DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-190, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BV:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

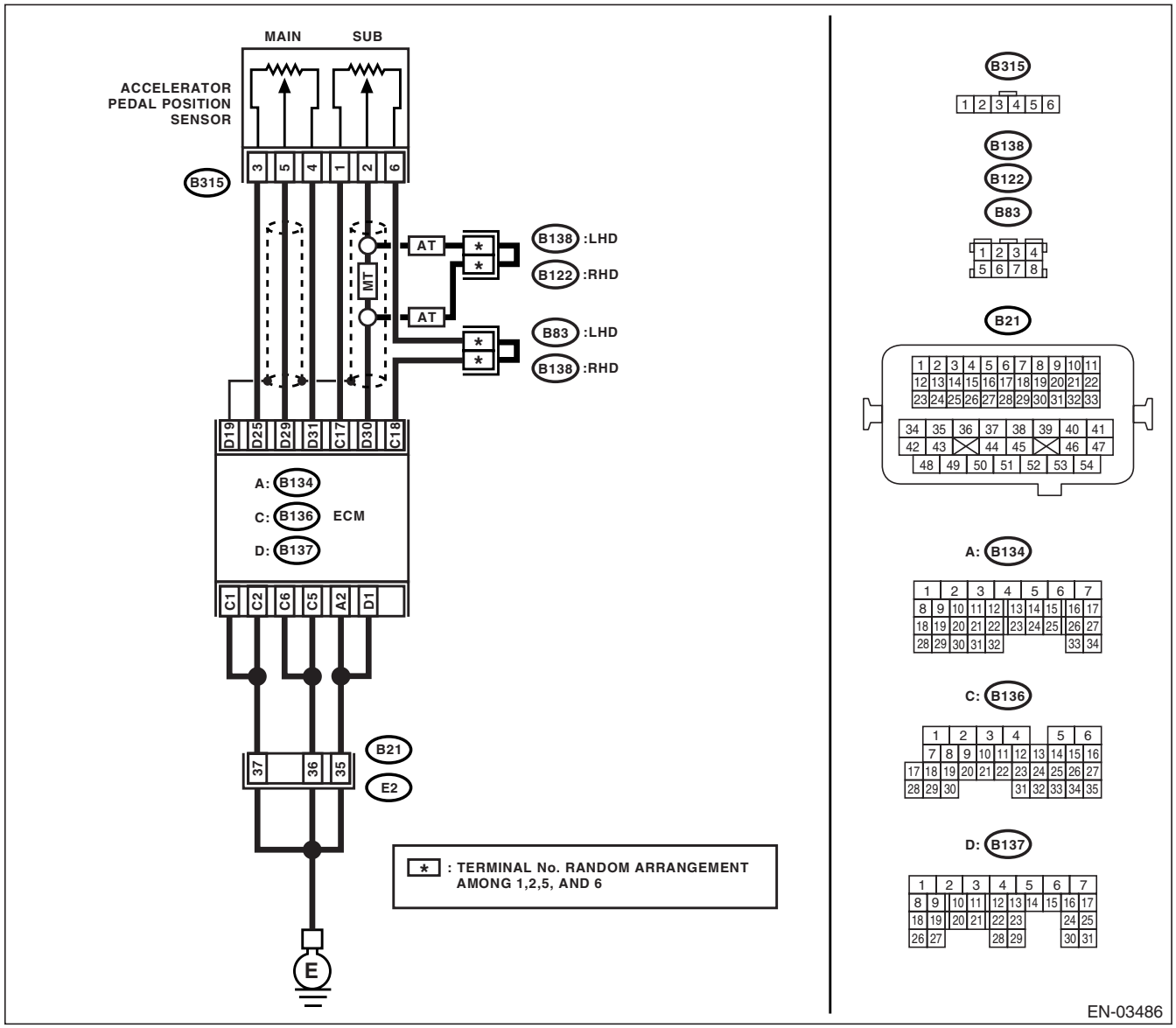
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B315) No. 5:*** ***(B137) No. 25 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:*** ***(B137) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator pedal position sensor.
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

BW:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

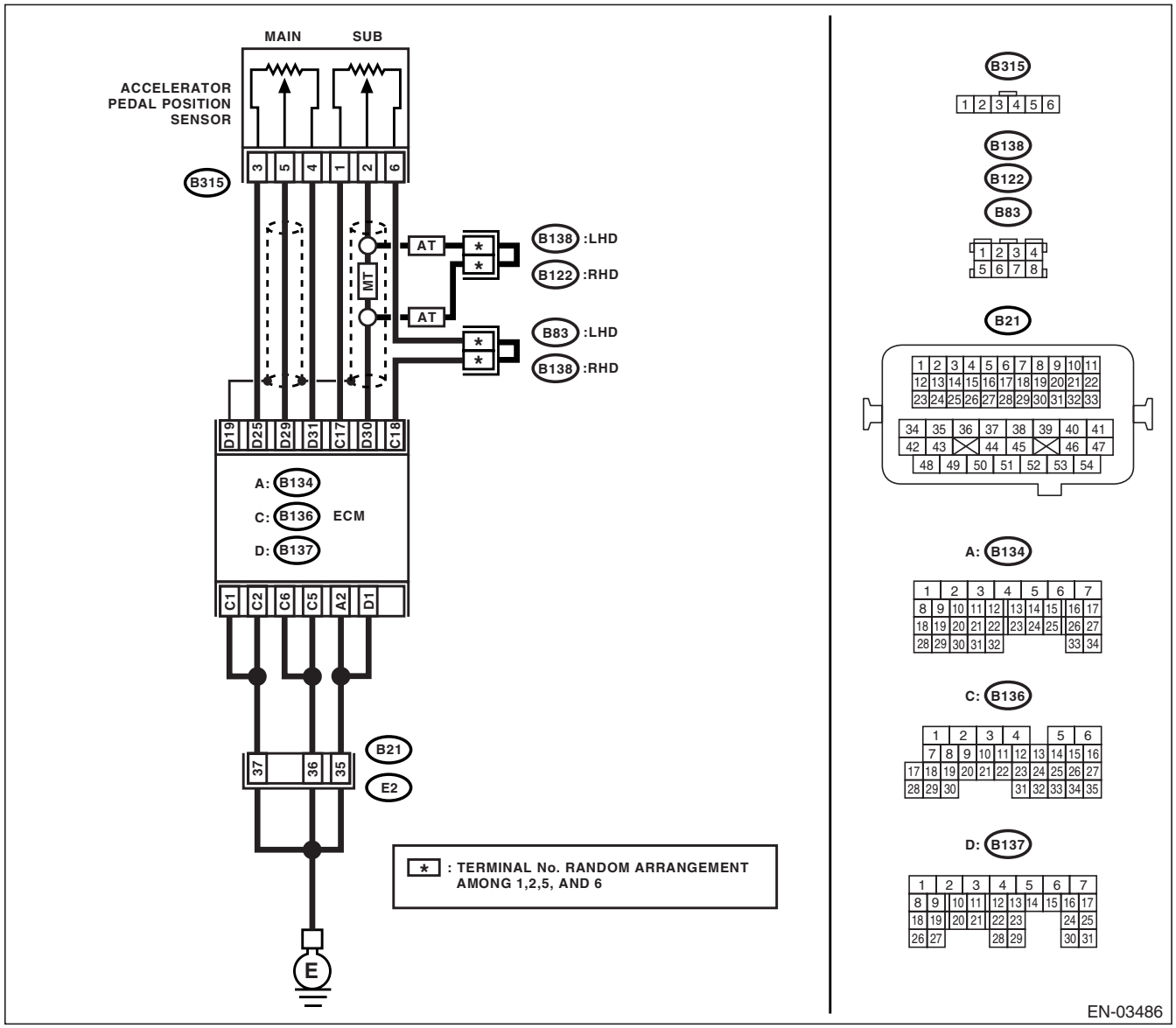
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

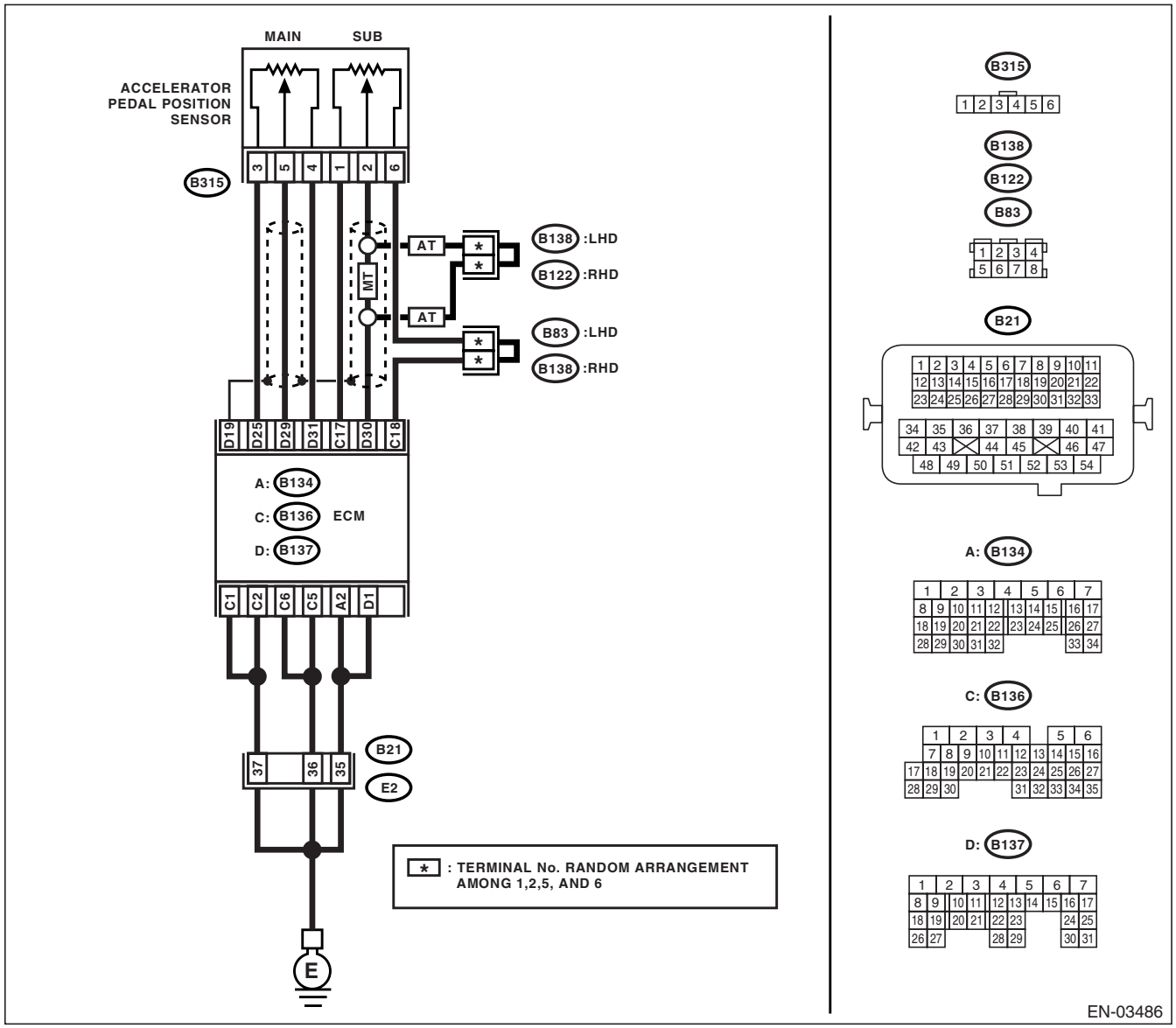


	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B137) No. 31 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 29 — (B137) No. 25:*** ***(B137) No. 29 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

BX:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B137) No. 30 — (B315) No. 2:*** ***(B136) No. 17 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 30 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **7.**	Replace the accelerator pedal position sensor.
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

BY:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

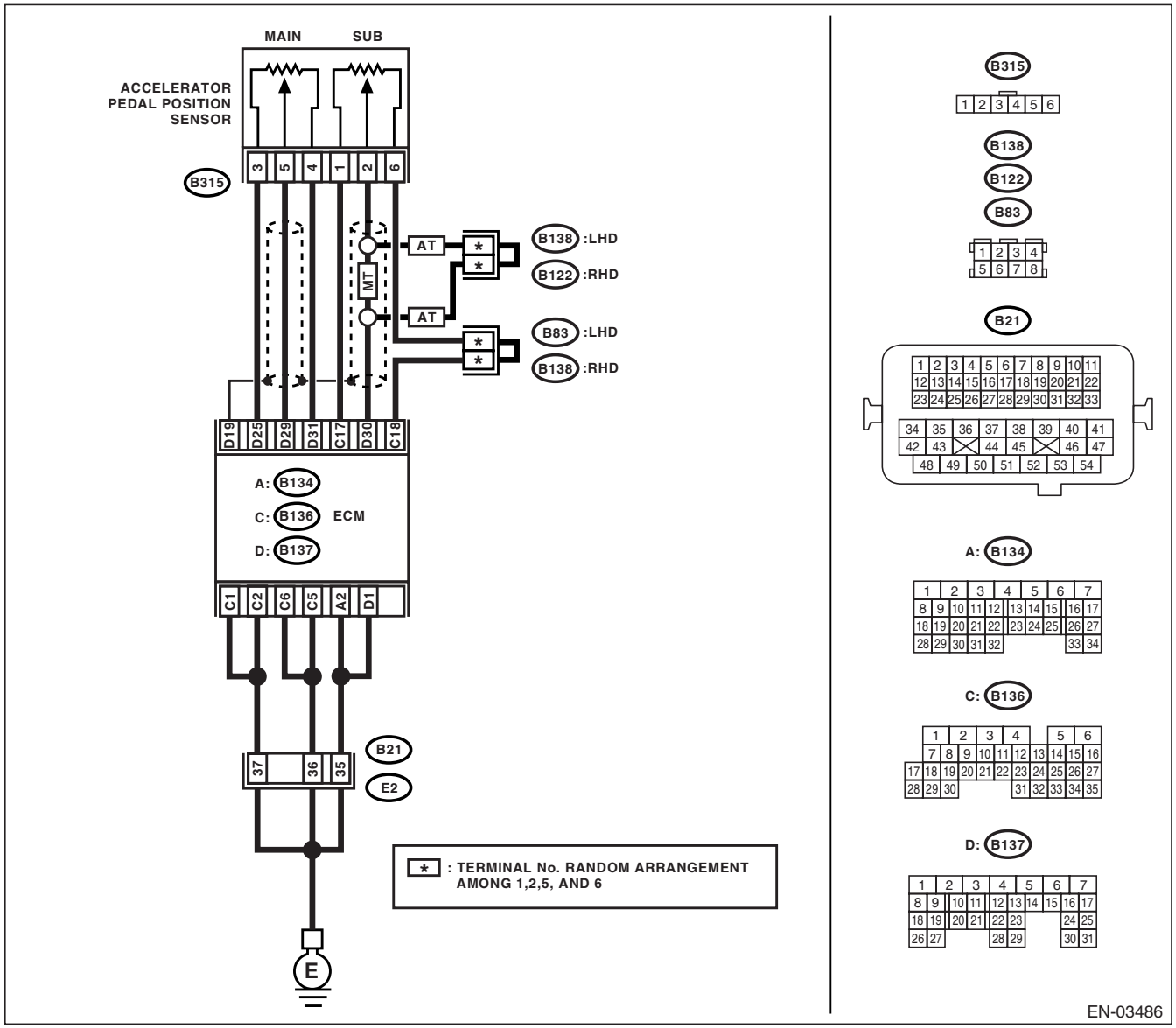
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



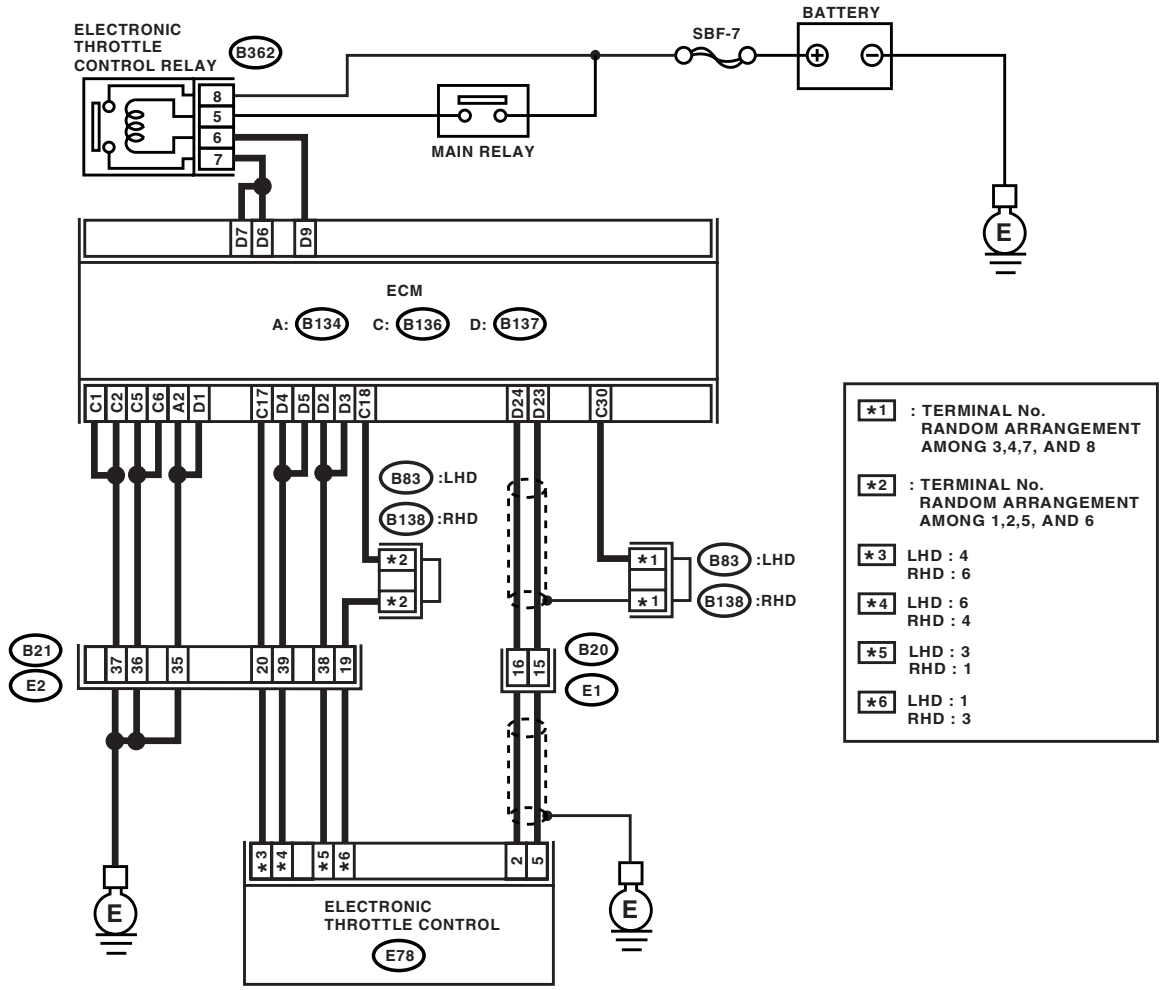
	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 18 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 30 — (B137) No. 25:*** ***(B137) No. 30 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

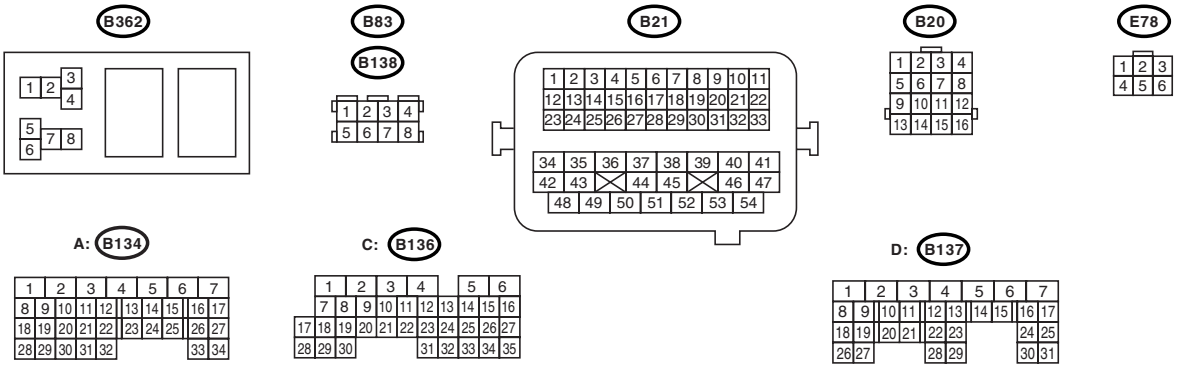
BZ:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE CORRELATION

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03508

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **4.**
2	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 17 — (E78) No. 4:*** ***RHD model*** ***(B136) No. 17 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 23 — Chassis ground:*** ***(B137) No. 24 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

	Step	Check	Yes	No
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 — Engine ground:*** ***(E78) No. 2 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
8	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **9.**	Go to step **11.**
9	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **10.**	Go to step **11.**
10	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***LHD model*** ***(B136) No. 17 — (E78) No. 4:*** ***RHD model*** ***(B136) No. 17 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit of harness connector.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 1 — Engine ground:*** ***RHD model*** ***(E78) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

	Step	Check	Yes	No
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***LHD model*** ***(E78) No. 4 (+) — Engine ground (−):*** ***RHD model*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **14.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (−):*** ***(E78) No. 2 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the short circuit of harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Repair the short circuit to sensor power supply.
16	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E78) No. 5 — (E78) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the short circuit of harness.

CA:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" / "E" VOLTAGE CORRELATION

DTC DETECTING CONDITION:

Immediately at fault recognition

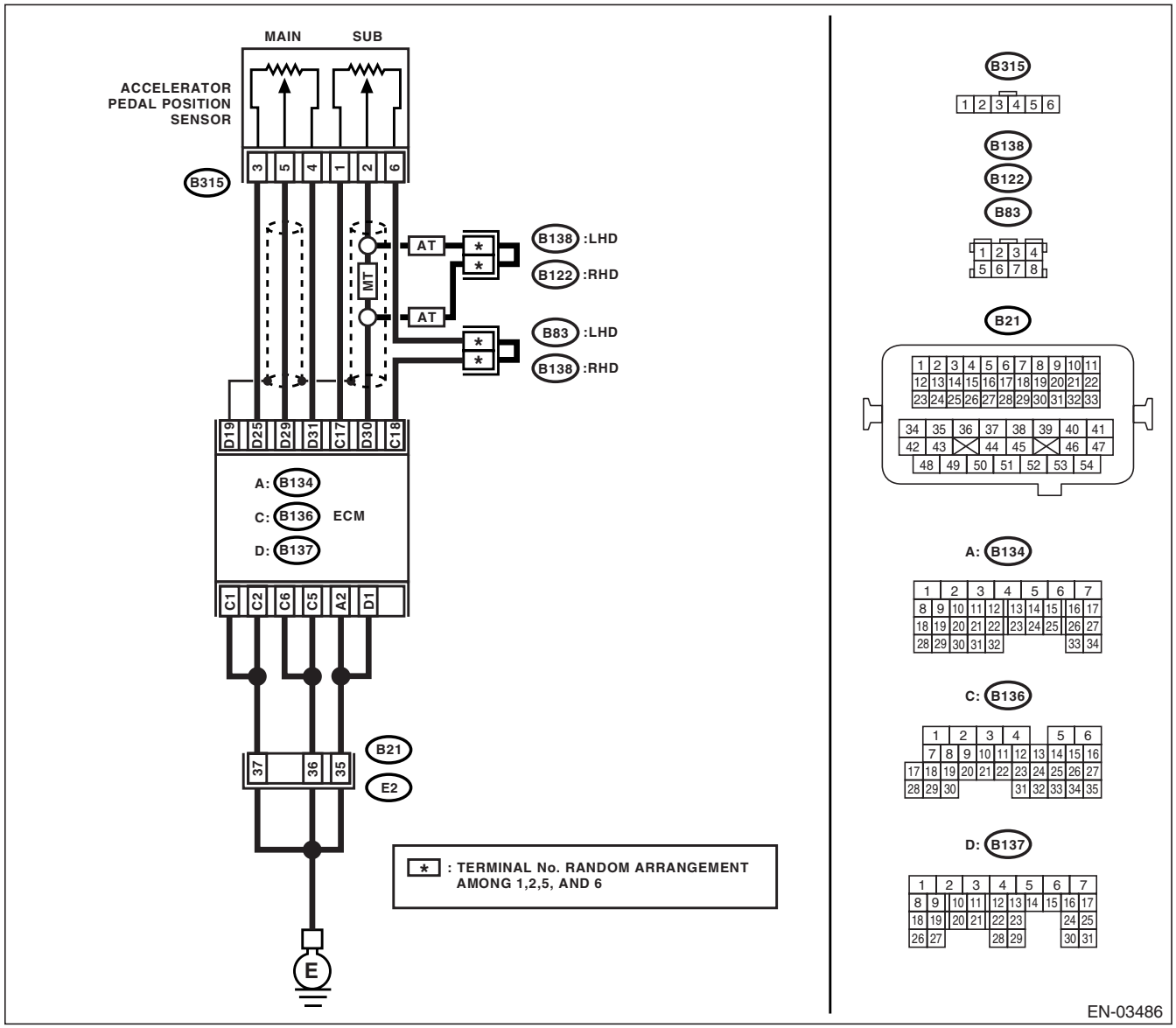
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal and sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **12.**
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B315) No. 5:*** ***(B137) No. 25 — (B315) No. 3:*** ***(B137) No. 30 — (B315) No. 2:*** ***(B136) No. 17 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:*** ***(B137) No. 25 — Chassis ground:*** ***(B137) No. 30 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator pedal position sensor.
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **9.**	Replace the accelerator pedal position sensor.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **10.**	Replace the accelerator pedal position sensor.
10	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **11.**	Replace the accelerator pedal position sensor.
11	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **12.**	Replace the accelerator pedal position sensor.
12	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **13.**	Go to step **14.**
13	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **18.**
14	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B137) No. 31 — (B315) No. 4:*** ***(B136) No. 18 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **17.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 29 — (B137) No. 25:*** ***(B137) No. 29 — (B136) No. 17:*** ***(B137) No. 30 — (B137) No. 25:*** ***(B137) No. 30 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the short circuit to sensor power supply.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between connector terminals of accelerator pedal position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the short circuit of harness between ECM connector and accelerator pedal position sensor connector.

CB:DTC P2503 CHARGING SYSTEM VOLTAGE LOW

NOTE:
For diagnostic procedure, refer to DTC P0559. <Ref. to EN(H4SO 2.0)(diag)-222, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CC:DTC P2504 CHARGING SYSTEM VOLTAGE HIGH

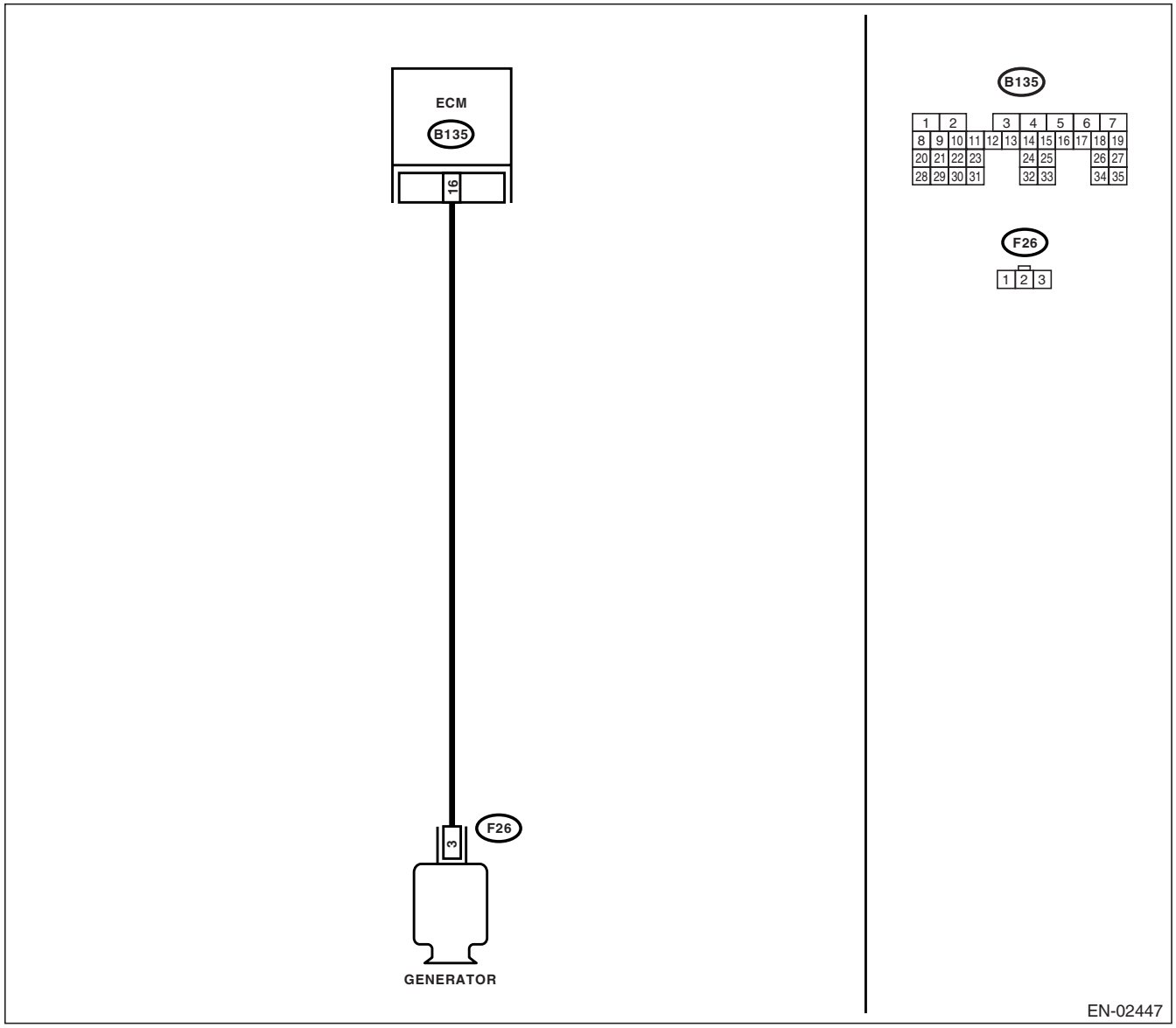
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator. ***Connector & terminal*** ***(B135) No. 16 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair the poor contact in connector.	Repair the open circuit of harness between ECM and generator connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and generator connector • Poor contact in coupling connector

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO 2.0)-89, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) 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)
2. Rough idling	1) Manifold absolute pressure sensor 2) 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 valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Intake air temperature sensor 5) EGR valve
4. Poor acceleration	1) Manifold absolute pressure sensor 2) 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) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) EGR valve
5. Engine stalls, engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) 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 valve

Symptom	Problem parts
6. Surging	1) 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 valve
7. Spark knock	1) 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 valve
8. After burning in exhaust system	1) 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 ignitor assembly and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.

FUEL INJECTION (FUEL SYSTEMS)

FU(H4SO 2.5)

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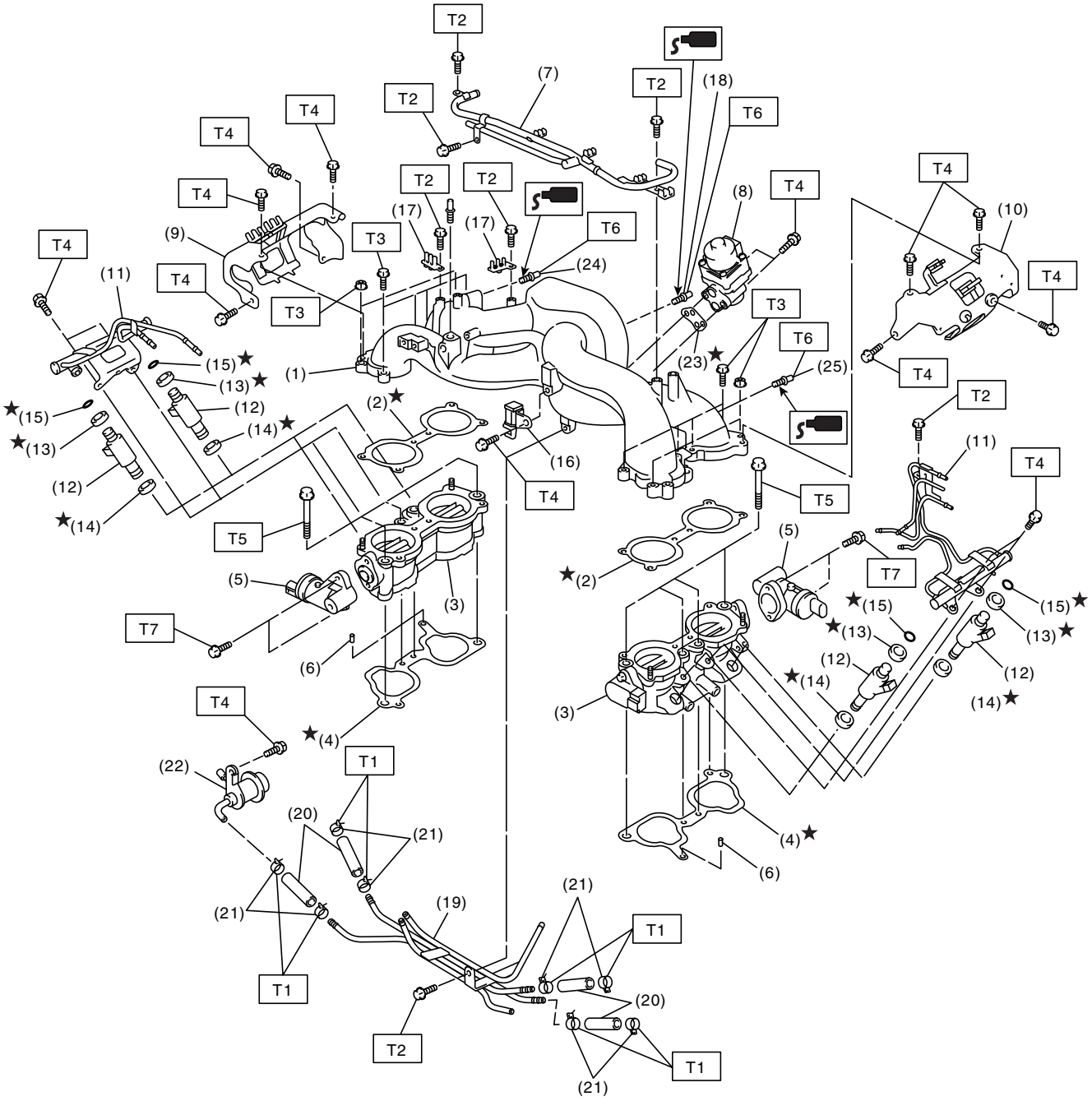
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	441 — 686 kPa (4.50 — 7.00 kgf/cm^2, 64.0 — 99.5 psi)
	Discharge rate	75 ℓ (19.8 US gal, 16.5 Imp gal)/h or more [12 V at 300 kPa (3.06 kgf/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

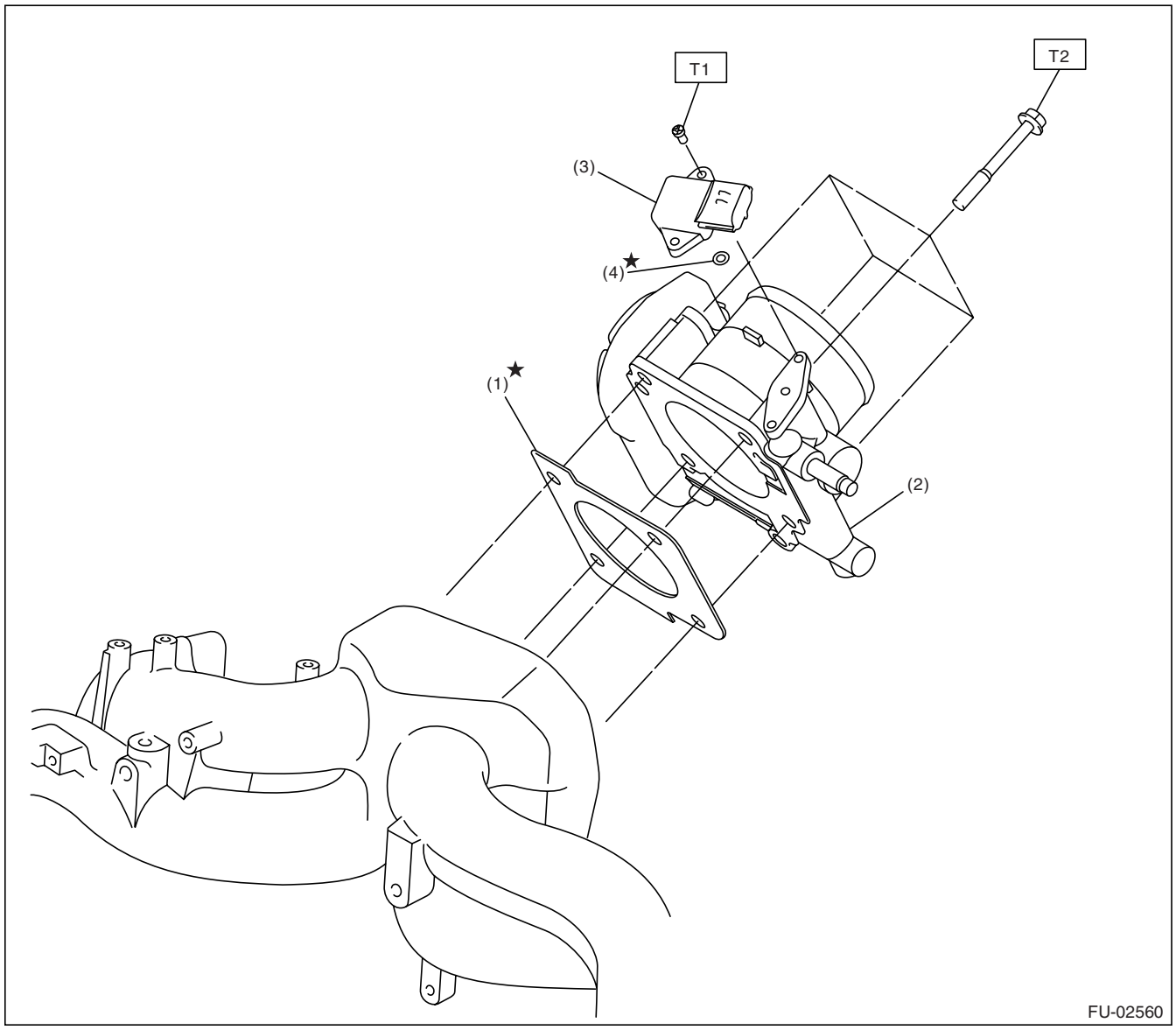
1. INTAKE MANIFOLD



(1) Intake manifold
(2) Gasket (EC, EK, K4, EH and ER model)
(3) Tumble generator valve ASSY (EC, EK, K4, EH and ER model)
(4) Gasket
(5) Tumble generator valve actuator (EC, EK, K4, EH and ER model)
(6) Guide pin
(7) PCV pipe (EC, EK, K4, EH and ER model)
(8) EGR valve (EC, EK, K4, EH and ER model)
(9) Fuel pipe protector RH
(10) Fuel pipe protector LH
(11) Fuel injector pipe
(12) Fuel injector
(13) O-ring
(14) O-ring
(15) O-ring
(16) Purge control solenoid valve
(17) Plug cord holder
(18) Nipple
(19) Fuel pipe ASSY
(20) Fuel hose
(21) Clip
(22) Pressure regulator
(23) Gasket (EC, EK, K4, EH and ER model)
(24) Nipple (RHD model)
(25) Nipple (LHD model)

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***1.25 (0.13, 0.94)***
T2:	***6.4 (0.65, 4.7)***
T3:	***8.75 (0.89, 6.5)***
T4:	***19 (1.9, 14)***
T5:	***25 (2.5, 18)***
T6:	***17 (1.7, 12.5)***
T7:	***6 (0.61, 4.4)***

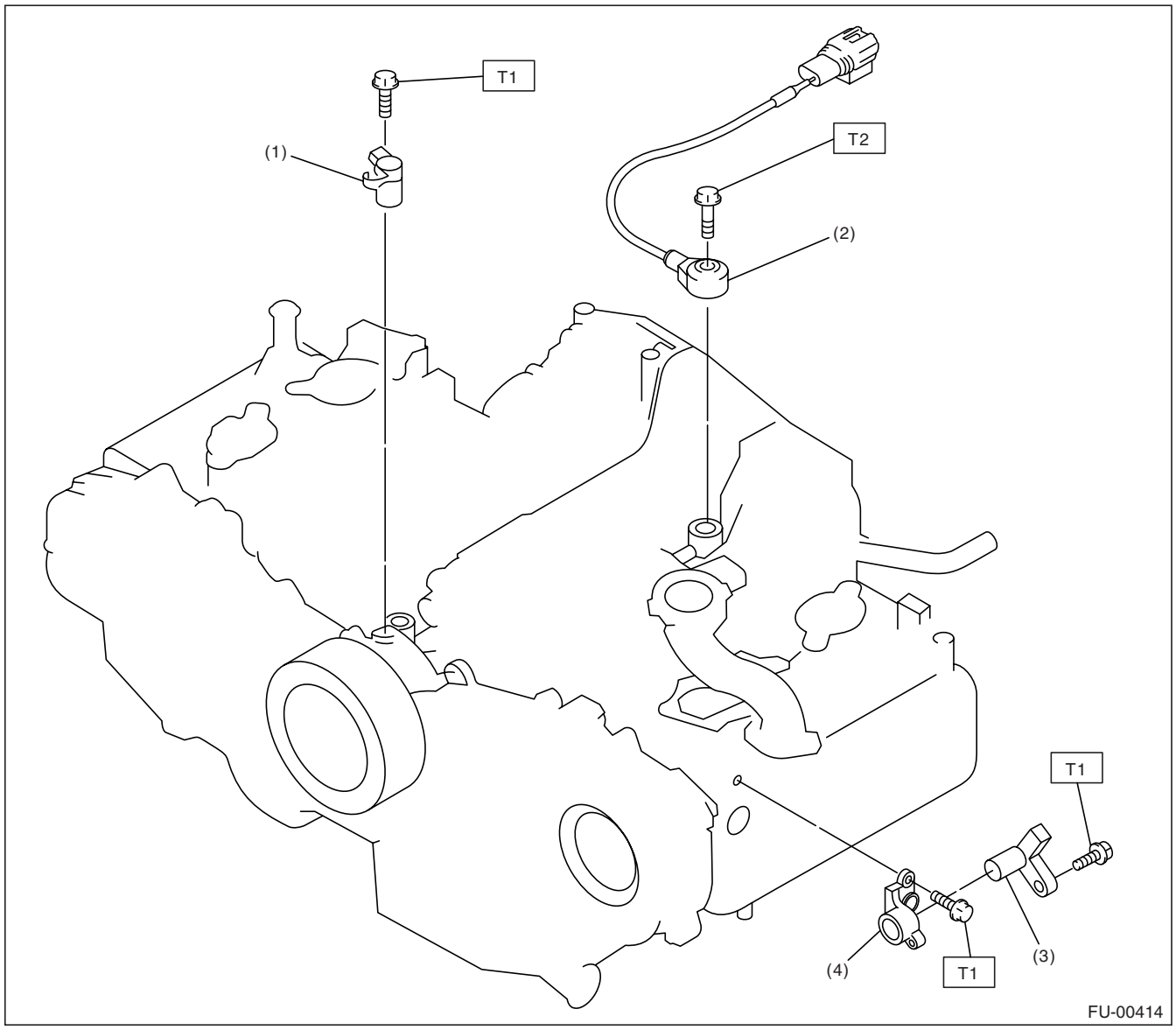
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle body
(3) Manifold absolute pressure sensor
(4) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2 (0.2, 1.5)
T2: 8 (0.8, 5.9)

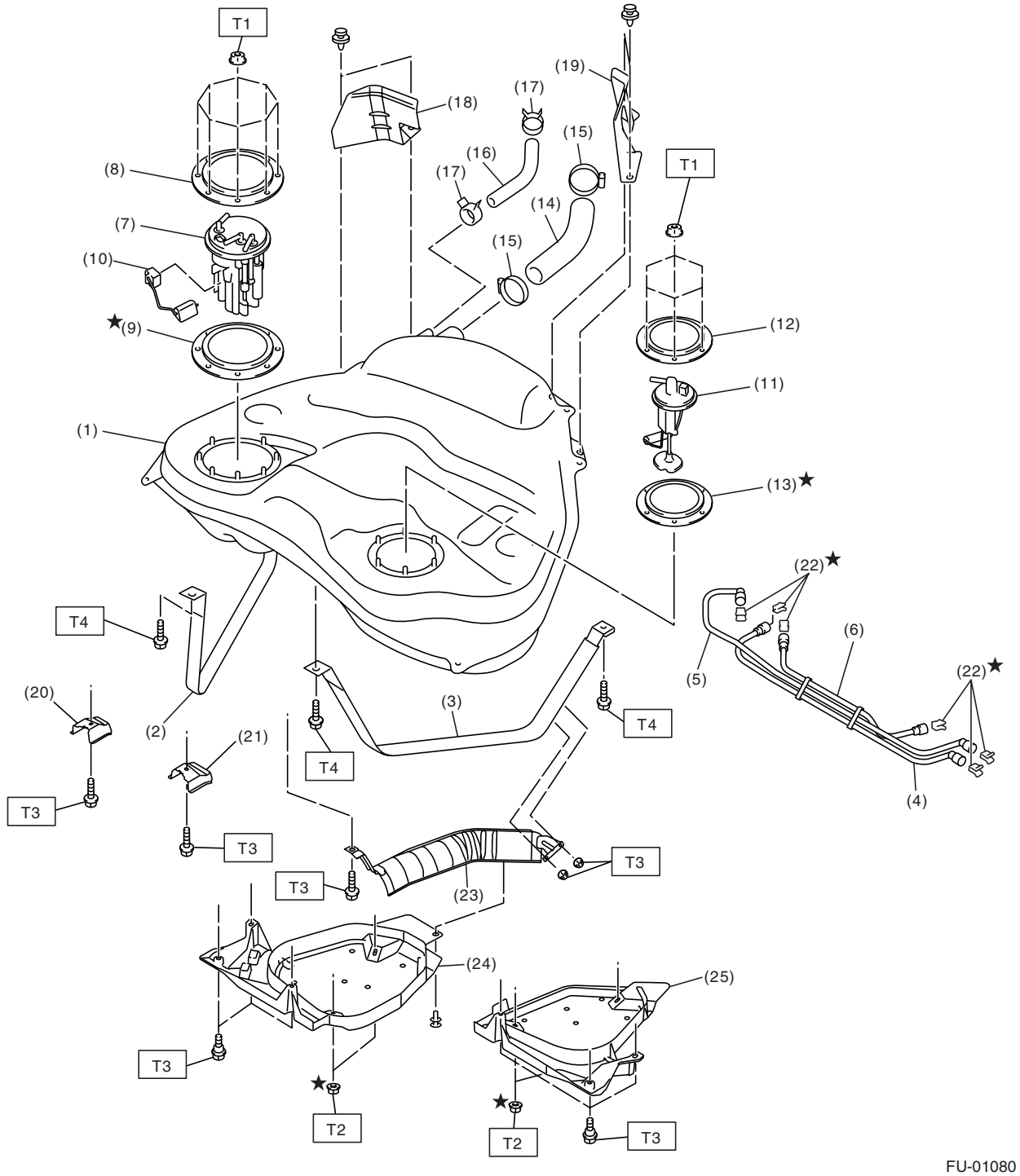
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.7)

4. FUEL TANK

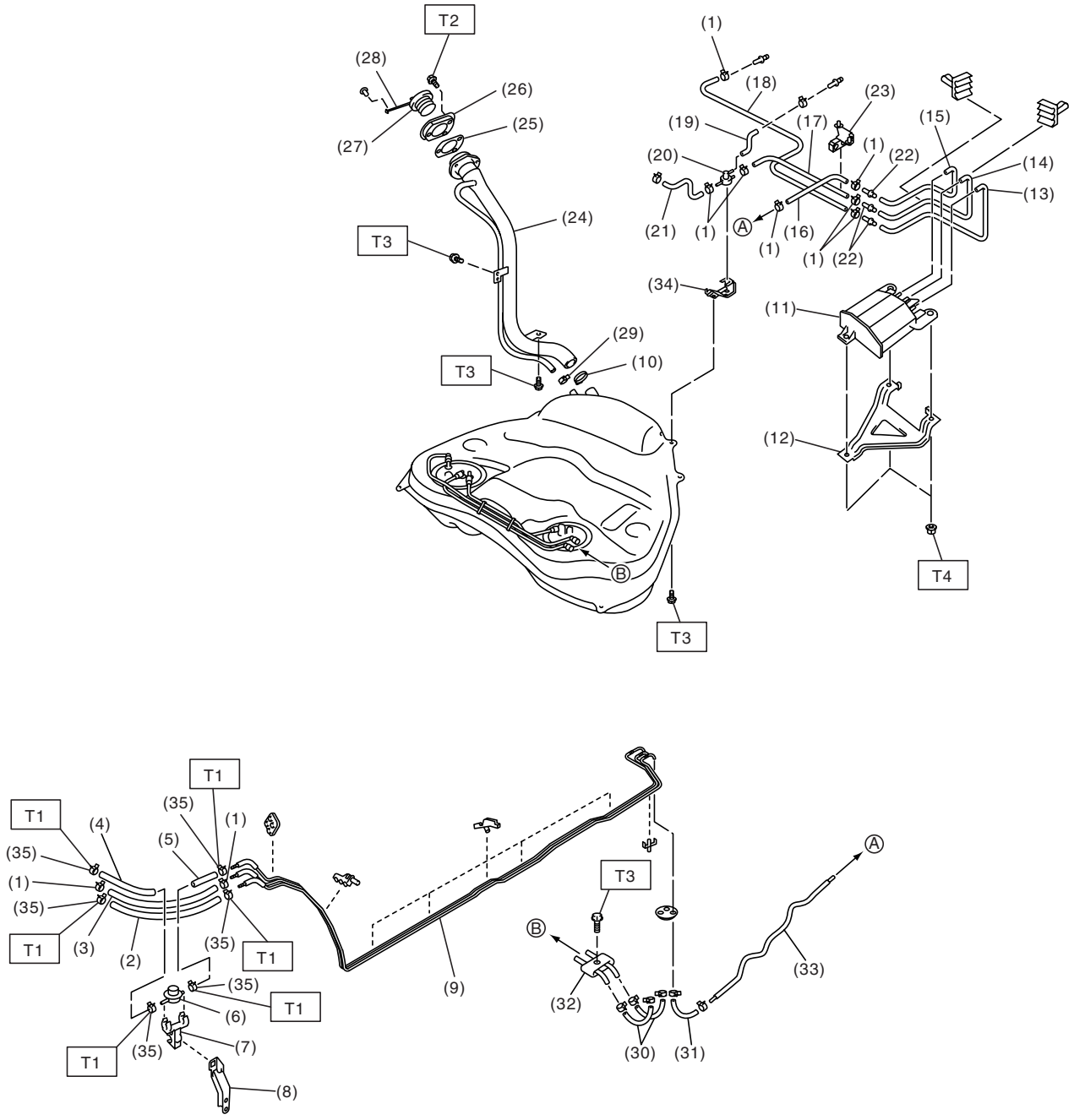


FU-01080

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump ASSY
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Fuel tank protector RH (Rear)
(19) Fuel tank protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***4.4 (0.45, 3.2)***
T2:	***9 (0.9, 6.6)***
T3:	***17.5 (1.78, 12.9)***
T4:	***33 (3.4, 24.3)***

5. FUEL LINE



FU-02591

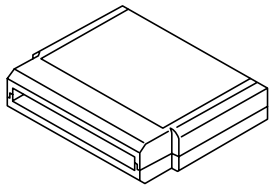
(1) Clip
(2) Fuel return hose
(3) Evaporation hose A
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel damper
(7) Fuel damper holder
(8) Fuel damper bracket
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Connector
(33) Purge pipe
(34) Two-way valve bracket
(35) Clamp

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*1.25 (0.13, 0.94)*
T2:	*4.4 (0.45, 3.2)*
T3:	*7.5 (0.76, 5.5)*
T4:	*8.3 (0.85, 6.1)*

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

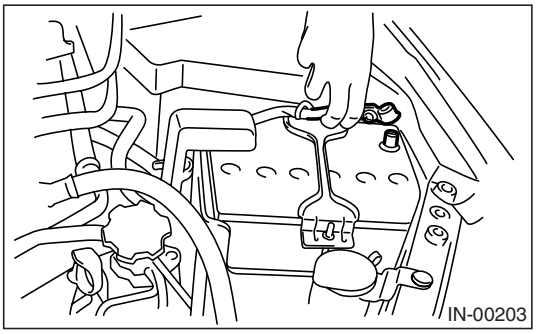
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

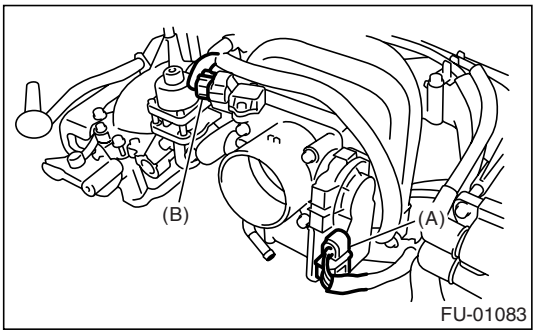
2. Throttle Body

A: REMOVAL

1) Disconnect the ground cable from battery.

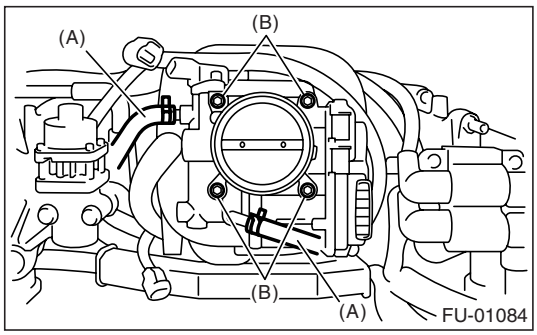


2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
3) Disconnect the connectors from the throttle position sensor and manifold absolute pressure sensor.



(A) Throttle position sensor
(B) Manifold absolute pressure sensor

4) Disconnect the engine coolant hoses (A) from throttle body.
5) Remove the bolts (B) which secure throttle body to intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

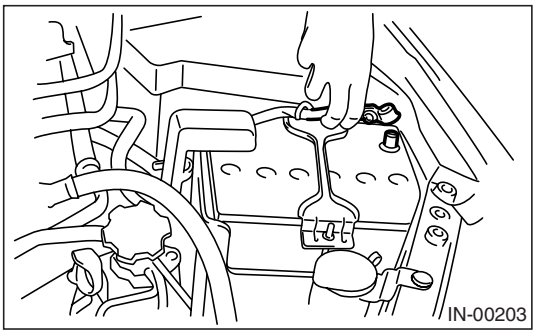
NOTE:
Use a new gasket.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

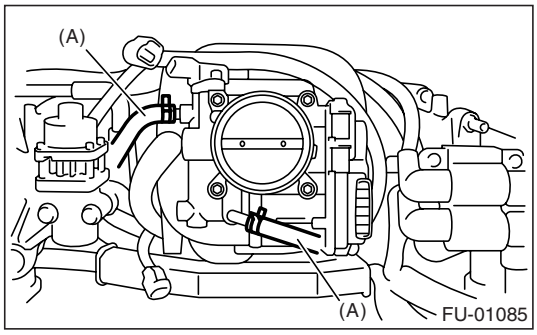
3. Intake Manifold

A: REMOVAL

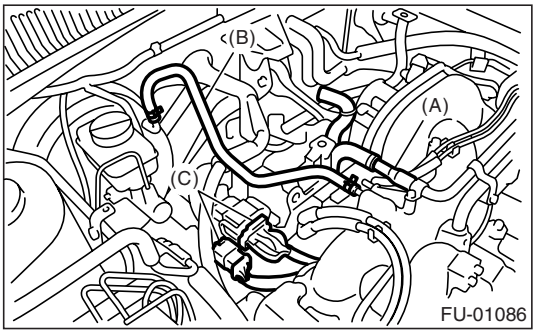
1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



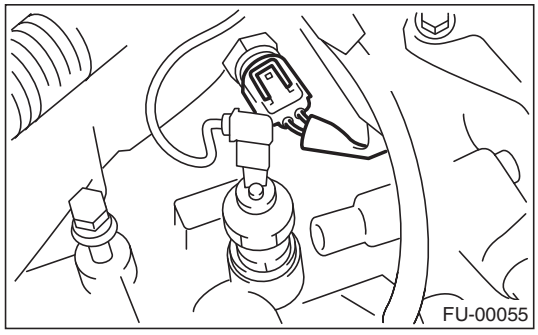
4) Remove the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, REMOVAL, Air Intake Chamber.>
5) Disconnect the spark plug cords from spark plugs.
6) Disconnect the engine coolant hoses (A) from throttle body.



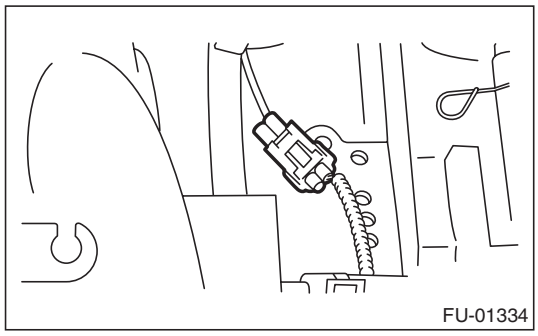
7) Disconnect the PCV hose (A) from intake manifold.
8) Disconnect the brake booster hose (B).
9) Disconnect the engine harness connectors (C) from bulkhead harness connectors.



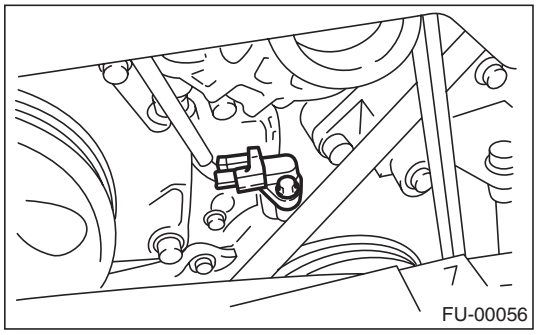
10) Disconnect the connectors from engine coolant temperature sensor.



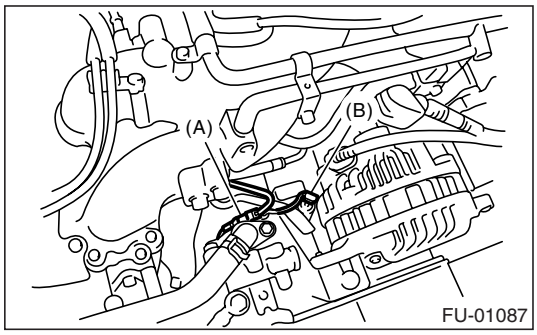
11) Disconnect the knock sensor connector.



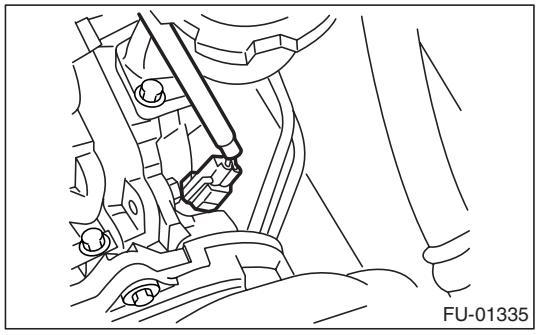
12) Disconnect the connector from crankshaft position sensor.



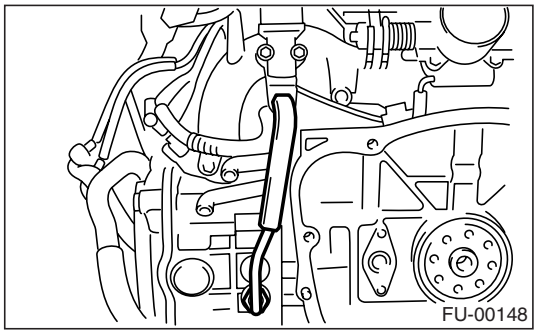
13) Disconnect the connector from power steering pump switch (A).
14) Disconnect the connector from oil pressure switch (B).



15) Disconnect the connector from camshaft position sensor.

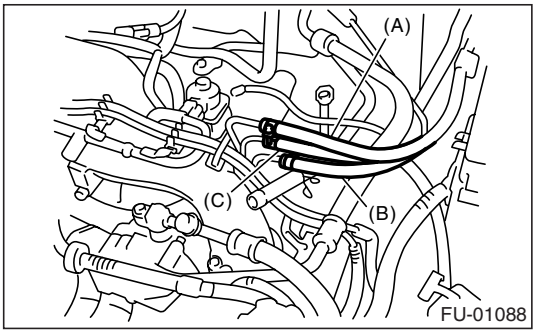


16) Remove the EGR pipe from intake manifold. (EC, EK, K4, EH and ER model)



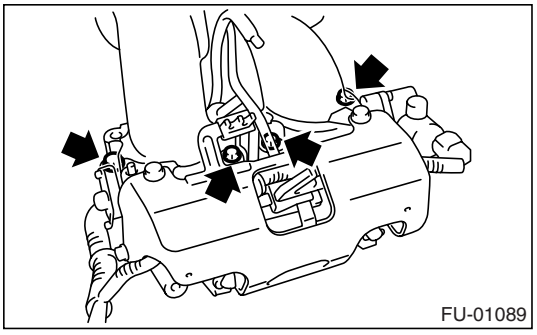
17) Disconnect the fuel hose from fuel pipe.

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



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

18) Remove the bolts which secure intake manifold to cylinder head.



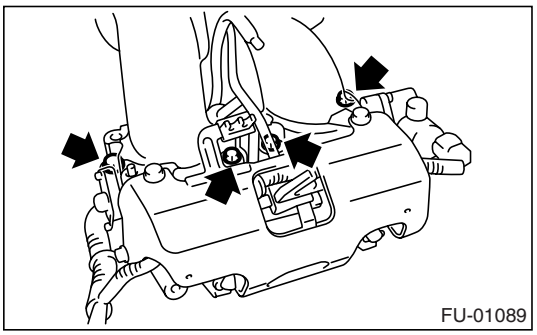
19) Remove the intake manifold.

B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

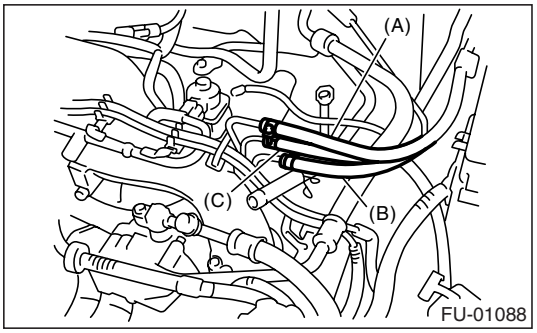
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



2) Connect the fuel hoses.

NOTE:
If fuel hoses or clamps are damaged, replace them with new ones.

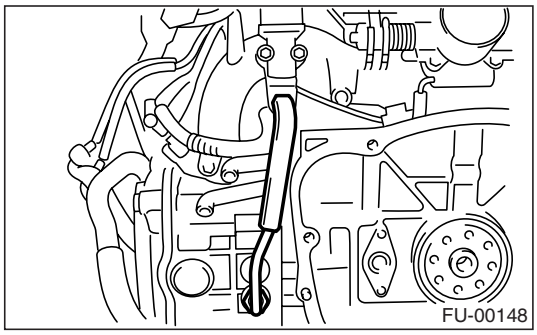


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

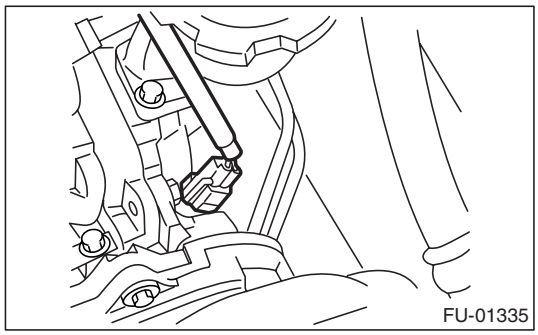
Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

3) Install the EGR pipe to intake manifold. (EC, EK, K4, EH and ER model)

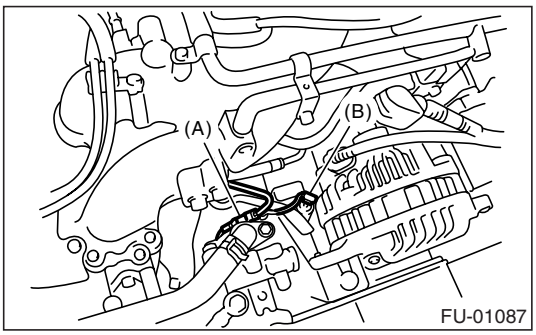
Tightening torque:
34 N·m (3.4 kgf-m, 24.6 ft-lb)



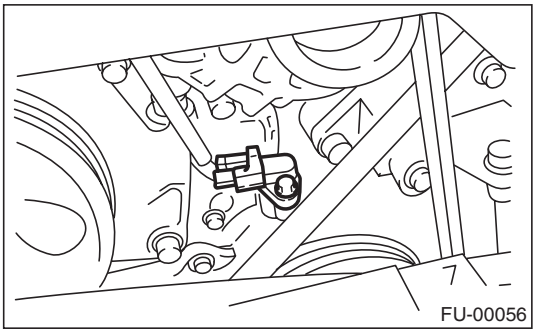
4) Connect the connector to camshaft position sensor.



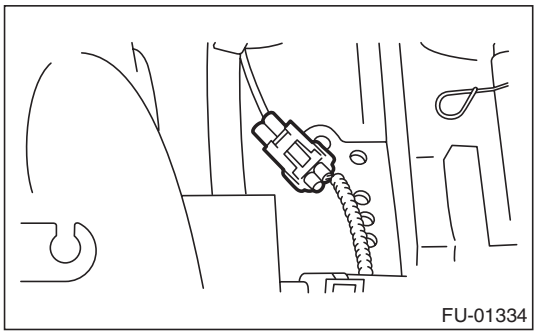
5) Connect the connector to power steering pump switch (A).
6) Connect the connector to oil pressure switch (B).



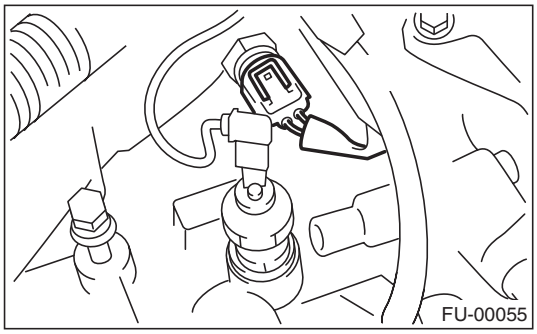
7) Connect the connector to crankshaft position sensor.



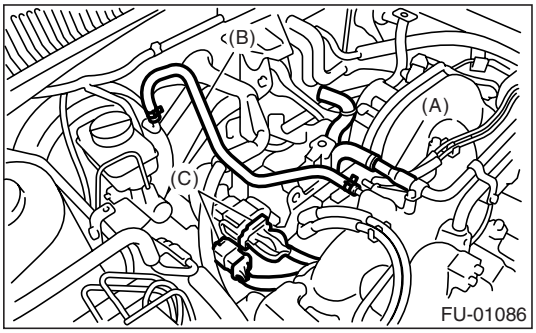
8) Connect the knock sensor connector.



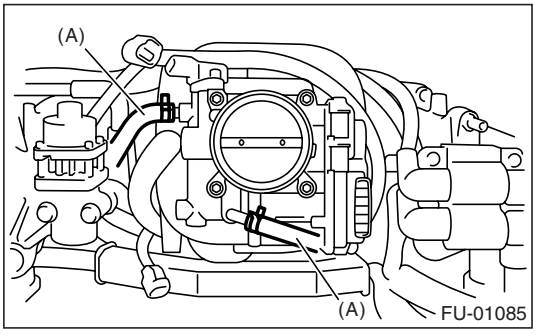
9) Connect the connectors to engine coolant temperature sensor.



10) Connect the PCV hose (A) to intake manifold.
11) Connect the brake booster hose (B).
12) Connect the engine harness connectors (C) to bulkhead harness connectors.

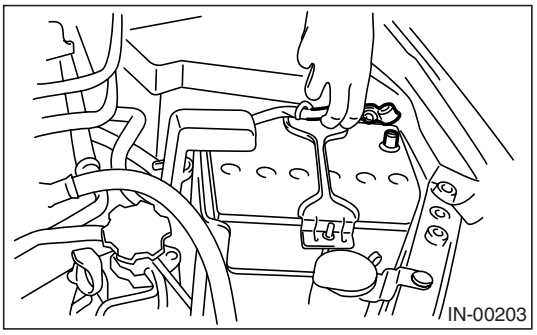


13) Connect the engine coolant hoses (A) to throttle body.



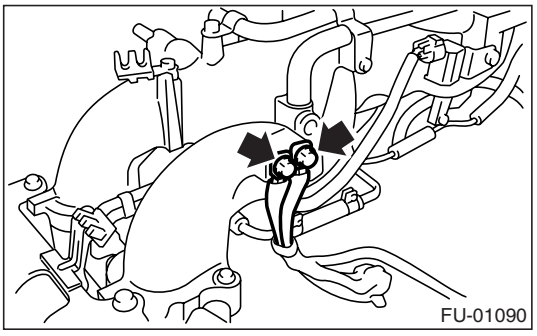
14) Connect the spark plug cords to spark plugs.

15) Install the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Intake Chamber.>
16) Install the fuse of fuel pump to main fuse box.
17) Connect the ground cable to battery.

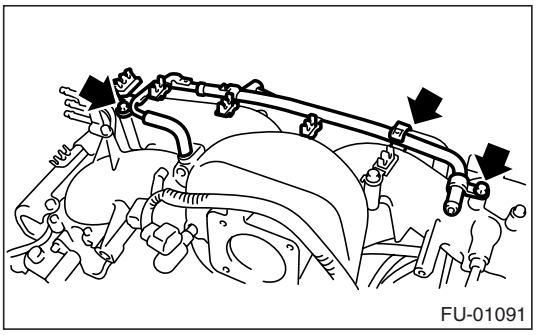

IN-00203

C: DISASSEMBLY

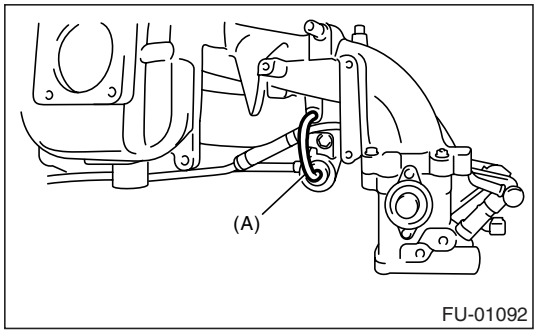
1) Disconnect the engine ground terminal from intake manifold.


FU-01090

2) Remove the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, REMOVAL, Ignition Coil and Ignitor Assembly.>
3) Remove the throttle body. <Ref. to FU(H4SO 2.5)-11, REMOVAL, Throttle Body.>
4) Remove the EGR valve. (EC, EK, K4, EH and ER model) <Ref. to FU(H4SO 2.5)-31, REMOVAL, EGR Valve.>
5) Remove the PCV pipe. (EC, EK, K4, EH and ER model)

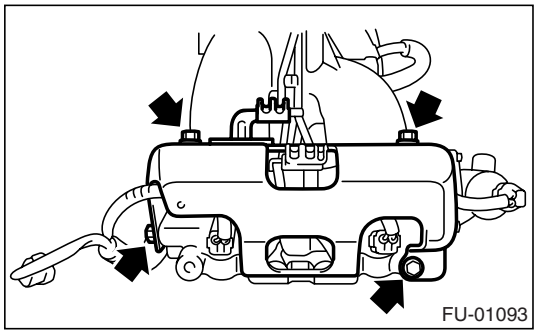

FU-01091

6) Disconnect the pressure regulator vacuum hose (A) from intake manifold.

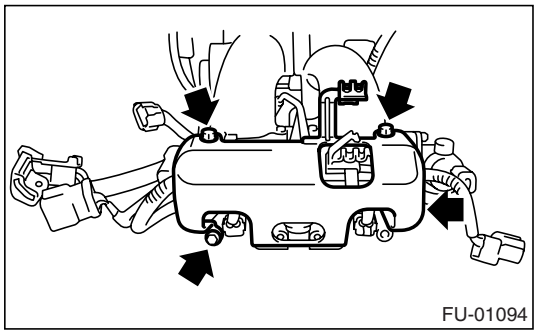


FU-01092

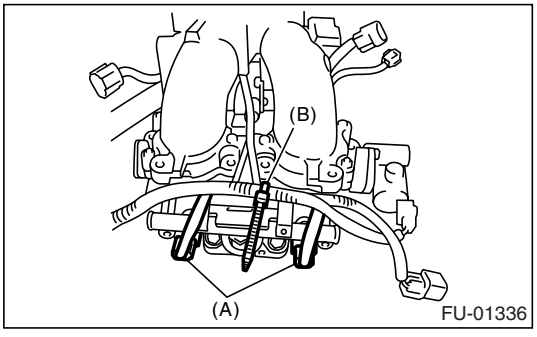
7) Remove the fuel pipe protector LH.


FU-01093

8) Remove the fuel pipe protector RH.


FU-01094

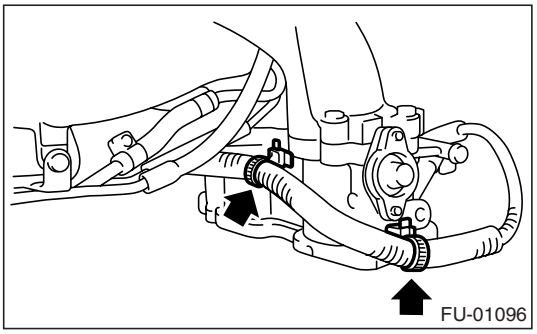
9) Disconnect the connectors (A) from fuel injector.
10) Remove the harness band (B) which holds the engine harness to injector pipe.



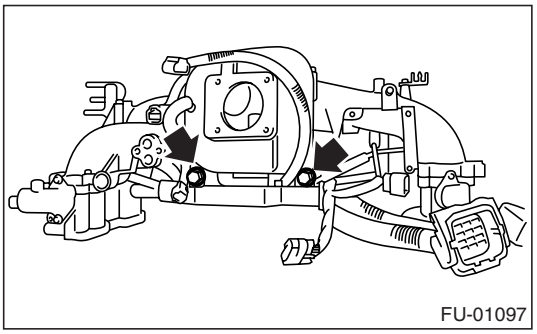
FU-01336

11) Remove the tumble generator valve actuator. (EC, EK, K4, EH and ER model) <Ref. to FU(H4SO 2.5)-29, REMOVAL, Tumble Generator Valve Actuator.>

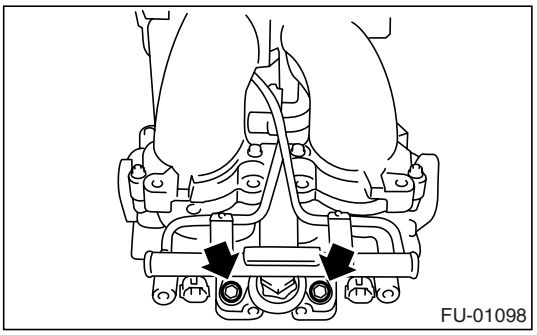
12) Remove the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, REMOVAL, Purge Control Solenoid Valve.>
13) Remove the harness band clips which install the engine harness.


FU-01096

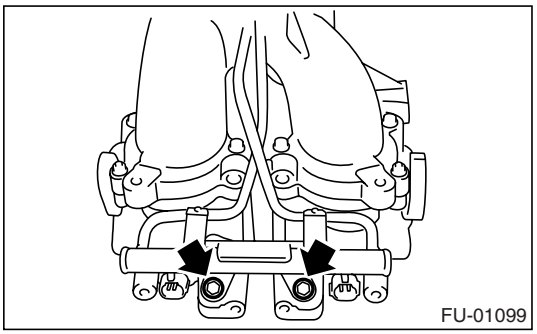
14) Remove the bolts which hold engine harness to intake manifold.

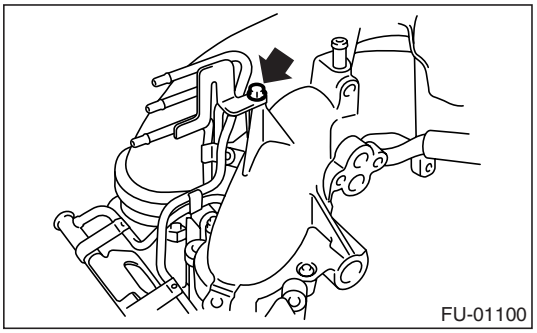

FU-01097

15) Remove the engine harness from intake manifold.
16) Remove the bolts which install injector pipe on the intake manifold as shown in the figure.
• RH side

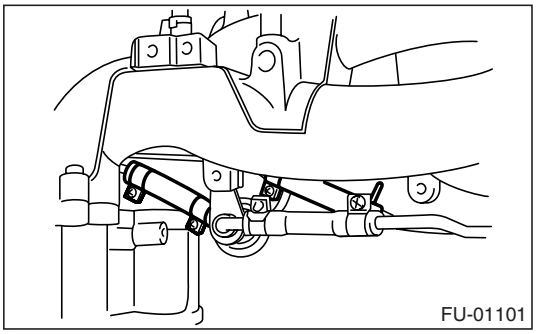

FU-01098

• LH side

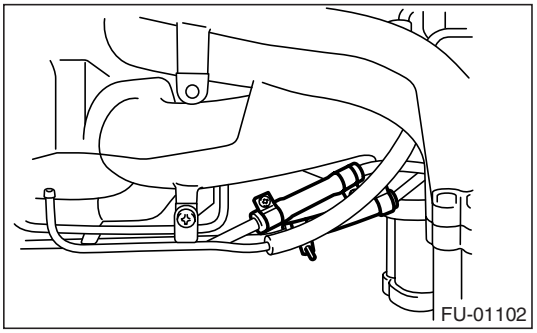

FU-01099


FU-01100

17) Remove the fuel injectors from injector pipe.
18) Loosen the clamp which holds fuel injector pipe RH to fuel hose, and then disconnect the pipe from fuel hose.

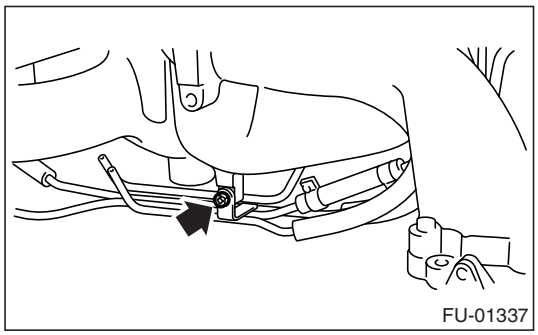

FU-01101

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

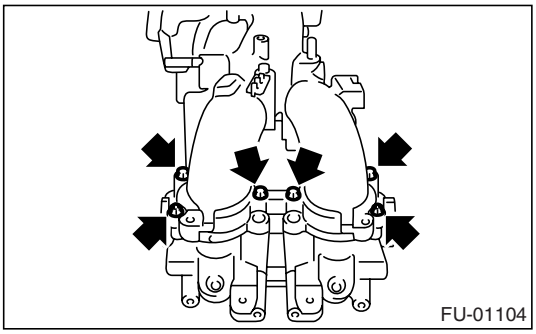

FU-01102

20) Remove the fuel injector pipe.
21) Remove the bolt which installs pressure regulator on intake manifold.

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



23) Remove the fuel pipe assembly and pressure regulator from intake manifold.
24) Remove the PCV pipe. (EC, EK, K4, EH and ER model)



D: ASSEMBLY

NOTE:
When assembling the nipple, apply liquid gasket.

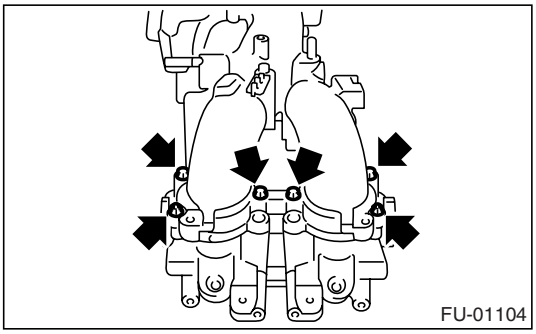
Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
17 N·m (1.7 kgf-m, 12.5 ft-lb)

1) Install the intake manifold. (EC, EK, K4, EH and ER model)

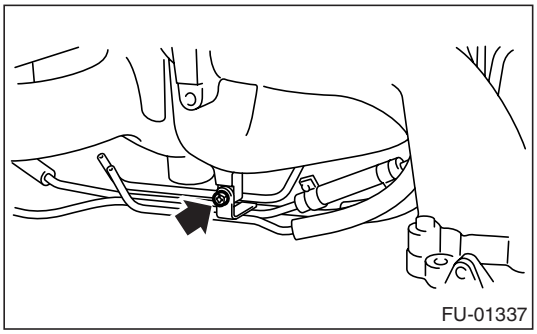
NOTE:
Use a new gasket.

Tightening torque:
8.75 N·m (0.89 kgf-m, 6.5 ft-lb)



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

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

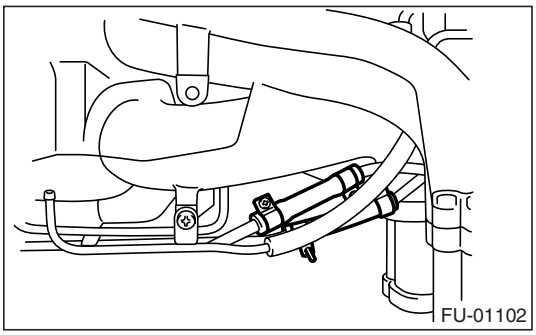


3) Tighten the bolt which installs pressure regulator on intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

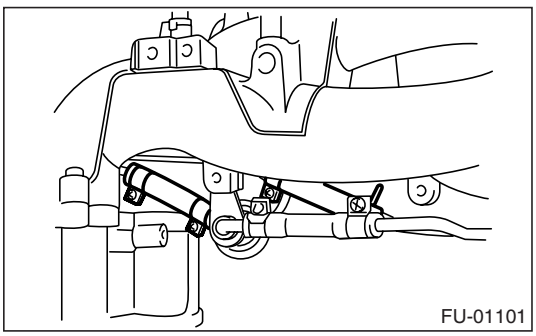
4) Connect the fuel injector pipe.
5) Connect the fuel injector pipe LH to fuel hose, and tighten the clamp.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



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

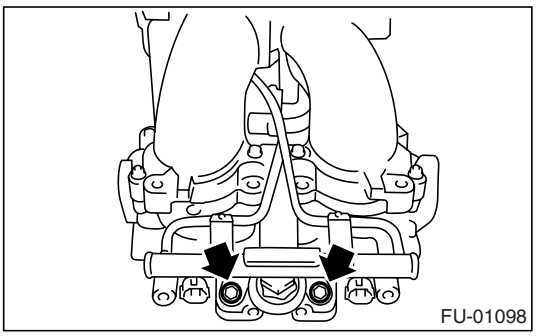
Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



7) Install the fuel injectors.

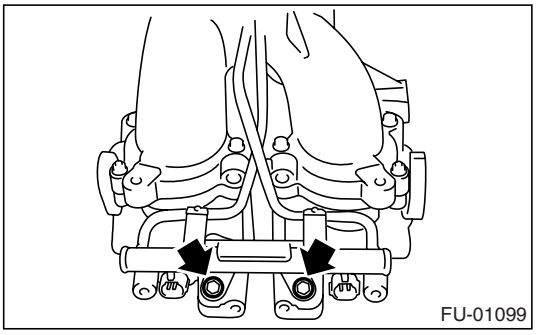
8) Tighten the bolts which install injector pipe on intake manifold.
• RH side

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



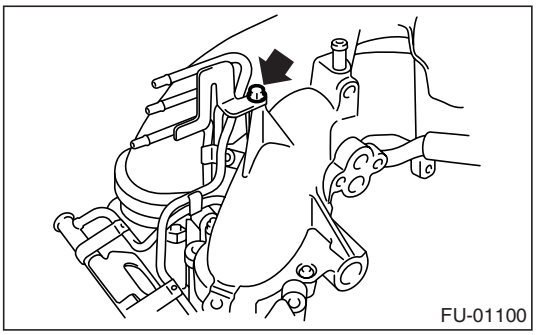
• LH side

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



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

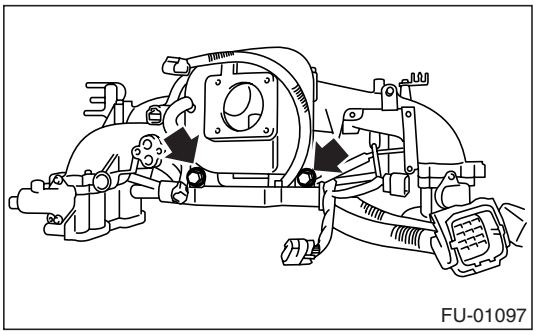
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



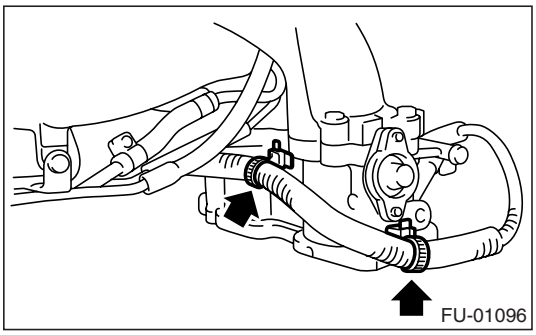
10) Install the engine harness to intake manifold.

11) Tighten the bolts which install engine harness on intake manifold.

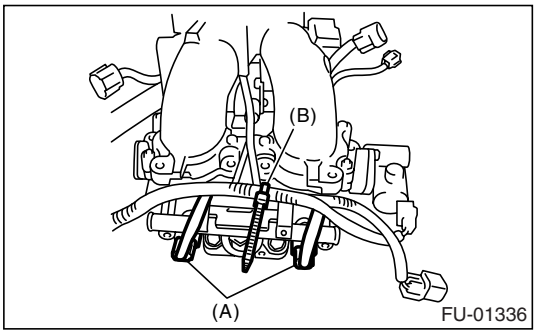
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



12) Hold the engine harness by harness band clips.

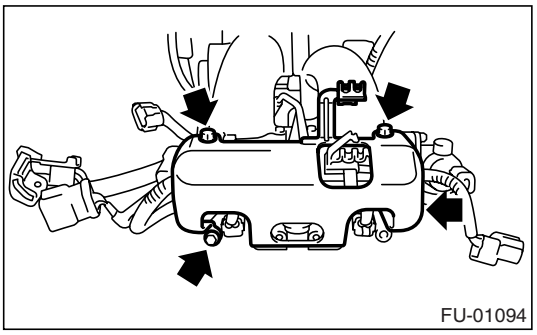


13) Install the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, INSTALLATION, Purge Control Solenoid Valve.>
14) Remove the tumble generator valve actuator. (EC, EK, K4, EH and ER model) <Ref. to FU(H4SO 2.5)-29, INSTALLATION, Tumble Generator Valve Actuator.>
15) Connect the connectors (A) to fuel injector.
16) Hold the engine harness to injector pipe by harness band (B).



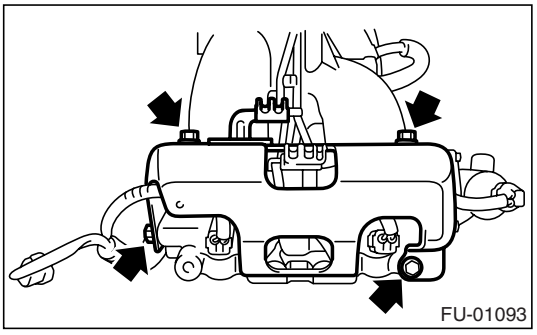
17) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

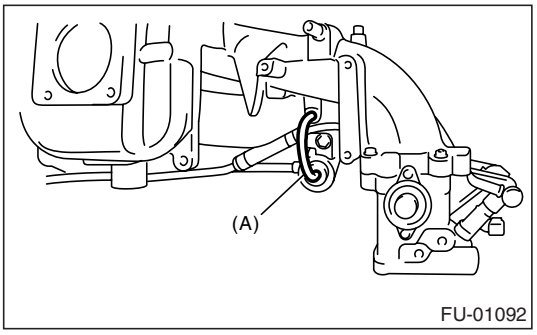


18) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

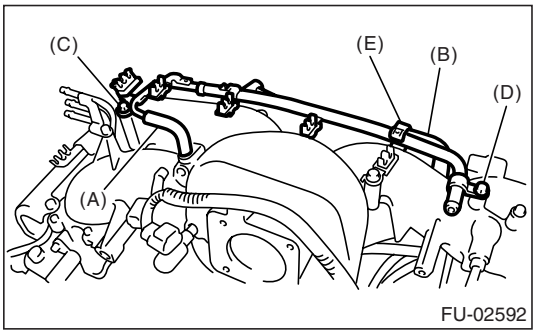


19) Connect the pressure regulator vacuum hose (A) to intake manifold.



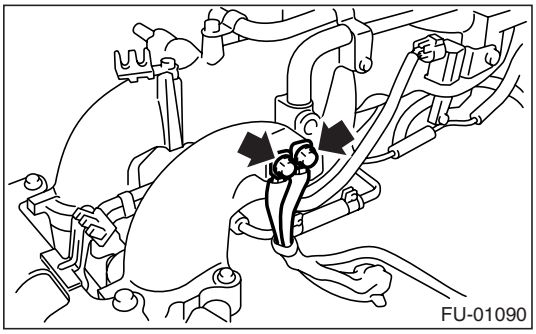
20) Install the PCV pipe. (EC, EK, K4, EH and ER model)
(1) Connect the hose (A) and (B) to intake manifold.
(2) Tighten the bolts (C) through (E) in alphabetical sequence.

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



21) Install the EGR valve. (EC, EK, K4, EH and ER model) <Ref. to FU(H4SO 2.5)-31, INSTALLATION, EGR Valve.>
22) Install the throttle body to intake manifold. <Ref. to FU(H4SO 2.5)-11, INSTALLATION, Throttle Body.>
23) Install the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, INSTALLATION, Ignition Coil and Ignitor Assembly.>
24) Install the engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



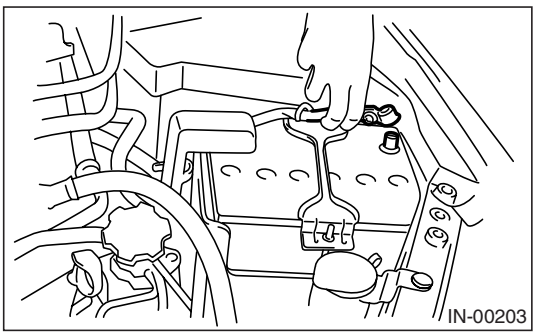
E: INSPECTION

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

4. Engine Coolant Temperature Sensor

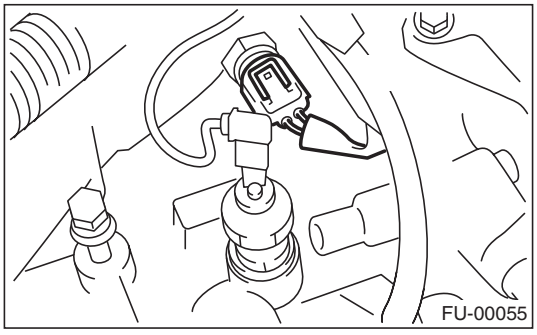
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>

3) Disconnect the connectors from engine coolant temperature sensor.



4) Remove the engine coolant temperature sensor.

B: INSTALLATION

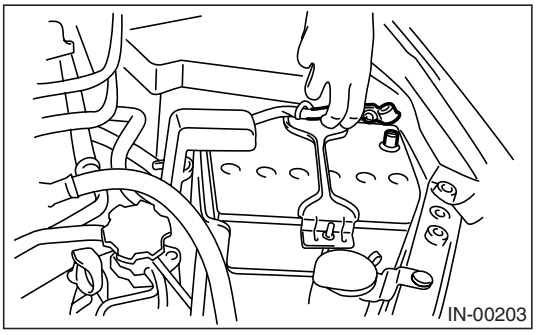
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)

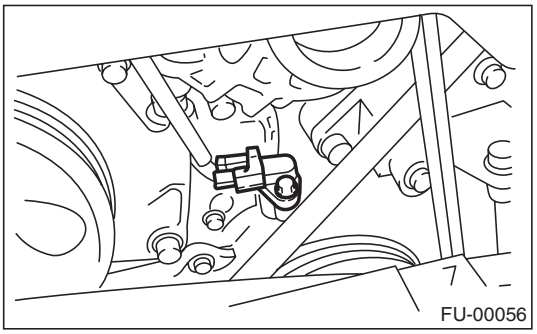
5. Crankshaft Position Sensor

A: REMOVAL

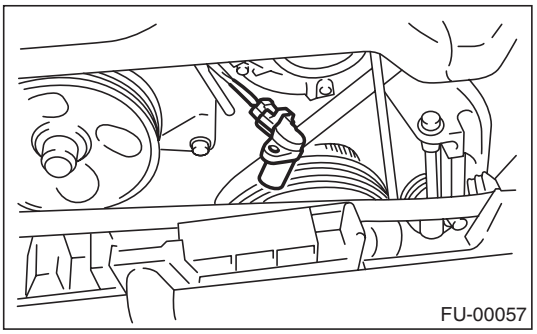
1) Disconnect the ground cable from battery.



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



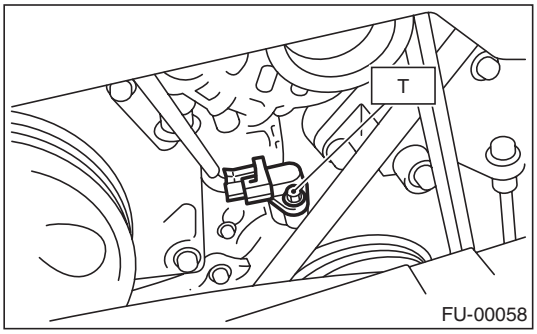
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

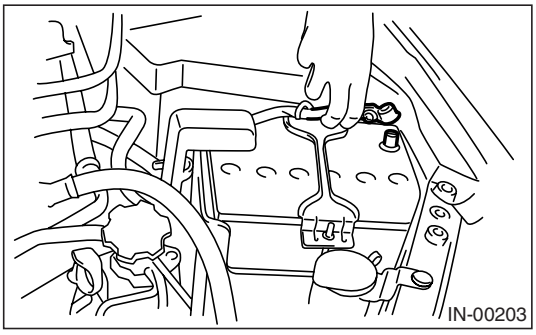
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



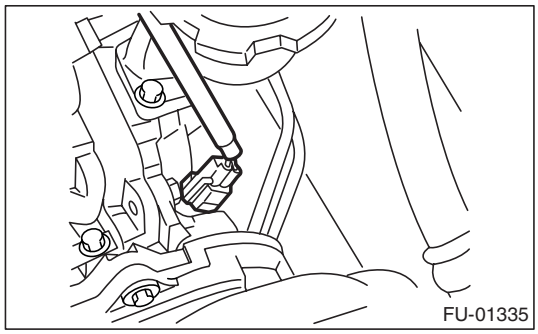
6. Camshaft Position Sensor

A: REMOVAL

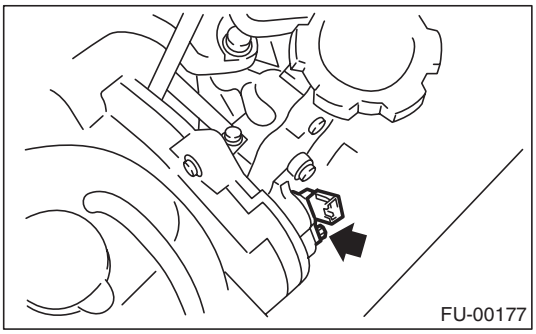
1) Disconnect the ground cable from battery.



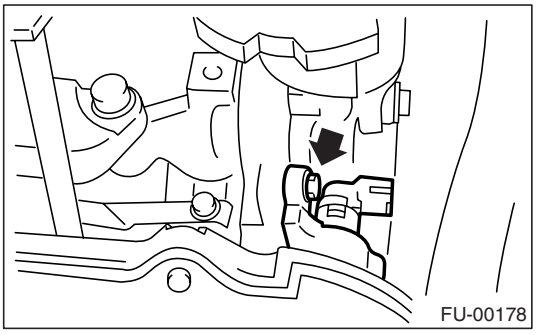
2) Disconnect the connector from camshaft position sensor.



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

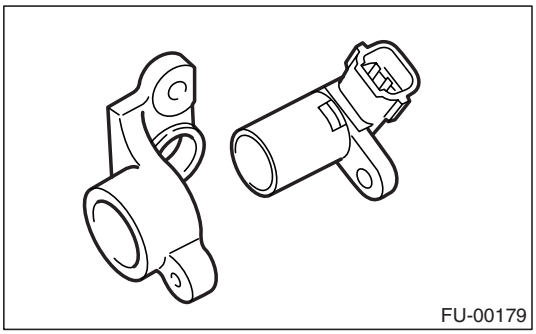


4) Remove the bolt which installs camshaft position sensor support to camshaft cap LH.



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

6) Remove the camshaft position sensor itself.



B: INSTALLATION

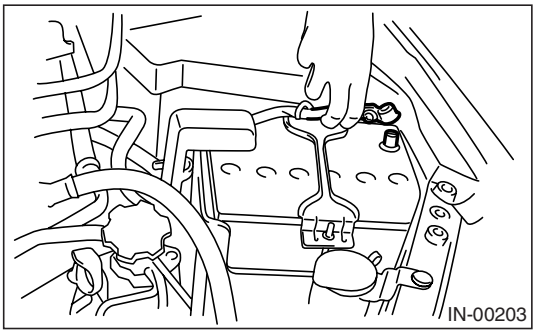
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

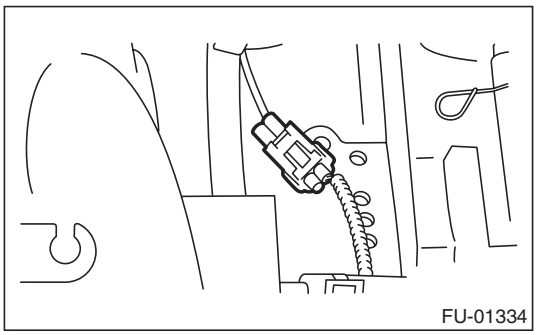
7. Knock Sensor

A: REMOVAL

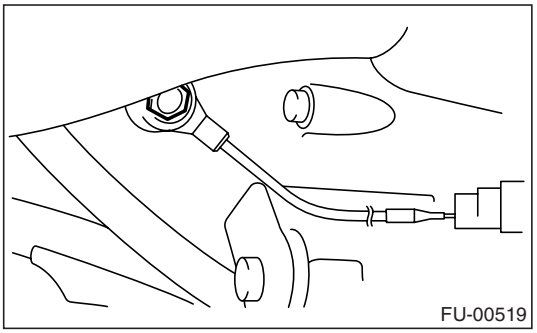
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>
3) Disconnect the knock sensor connector.



4) Remove the knock sensor from cylinder block.

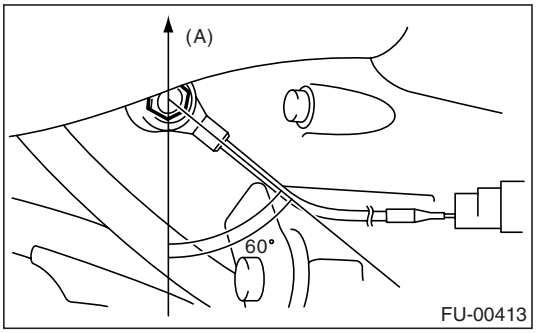


B: INSTALLATION

1) Install the knock sensor to cylinder block.

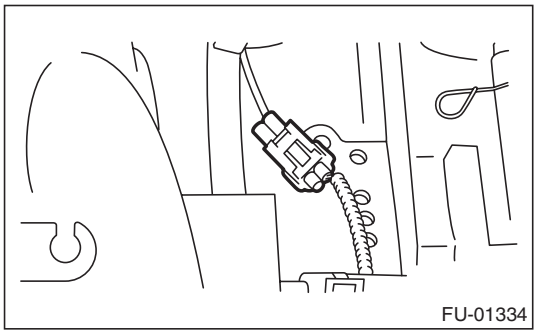
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to the engine rear.

Tightening torque:
24 N·m (2.4 kgf-m, 17.7 ft-lb)

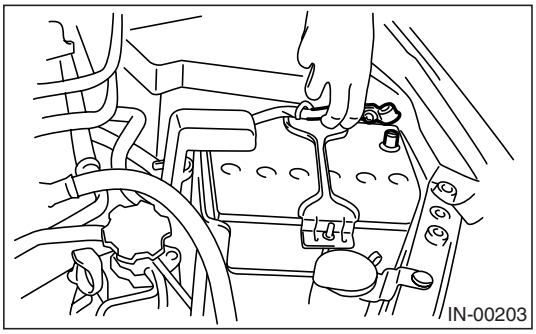


(A) Front side

2) Connect the knock sensor connector.



3) Install the air cleaner case.
<Ref. to IN(H4SO 2.0)-5, INSTALLATION, Air Cleaner Case.>
4) Connect the ground cable to battery.



8. Throttle Position Sensor

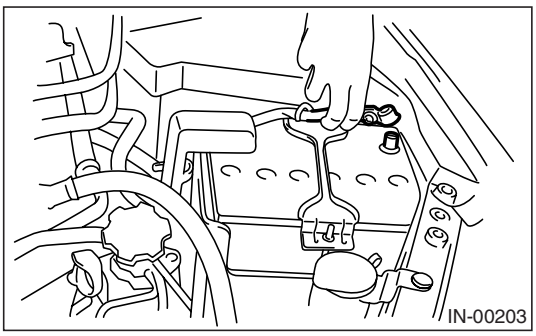
A: SPECIFICATION

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(H4SO 2.5)-11, REMOVAL, Throttle Body.> <Ref. to FU(H4SO 2.5)-11, INSTALLATION, Throttle Body.>

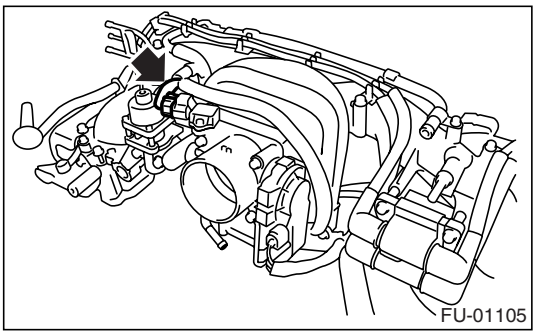
9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from manifold absolute pressure sensor.



3) Remove the manifold absolute pressure sensor from throttle body.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new O-ring.

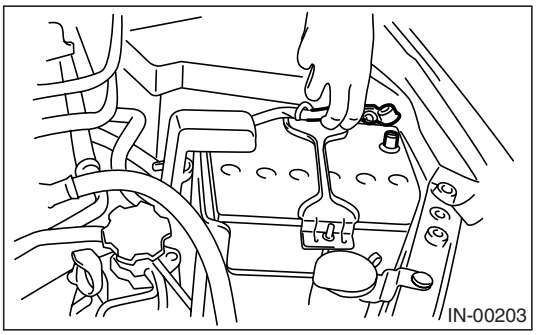
Tightening torque:
2 N·m (0.2 kgf-m, 1.5 ft-lb)

10. Mass Air Flow and Intake Air Temperature Sensor

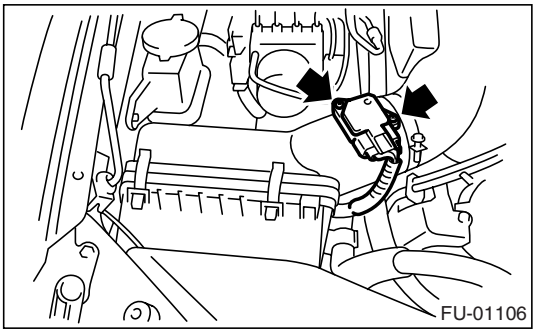
A: REMOVAL

NOTE:
Mass air flow and intake air temperature sensor is installed to EC, EK, K4, EH and ER model.

1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.
3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

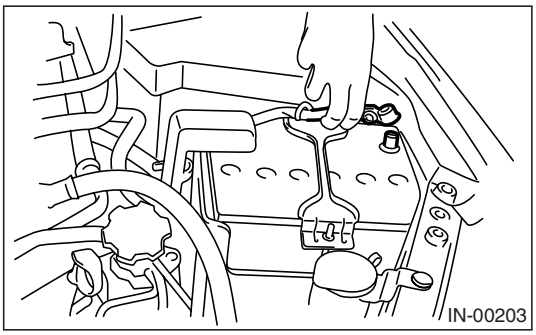
Tightening torque:
1 N·m (0.1 kgf-m, 0.7 ft-lb)

11. Intake Air Temperature Sensor

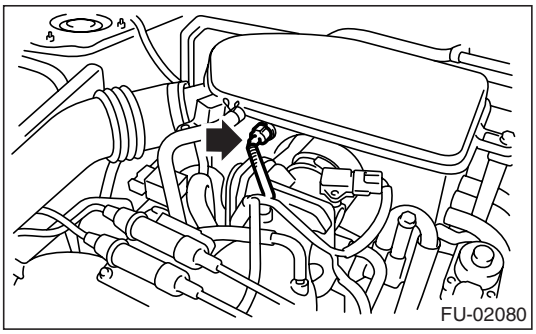
A: REMOVAL

NOTE:
Intake air temperature sensor is installed to KA and KS model.

1) Disconnect the ground cable from battery.



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



B: INSTALLATION

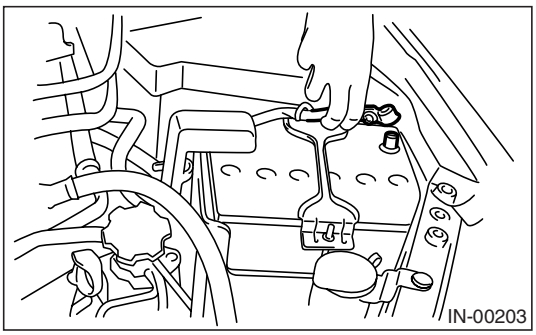
Install in the reverse order of removal.

12. Tumble Generator Valve Assembly

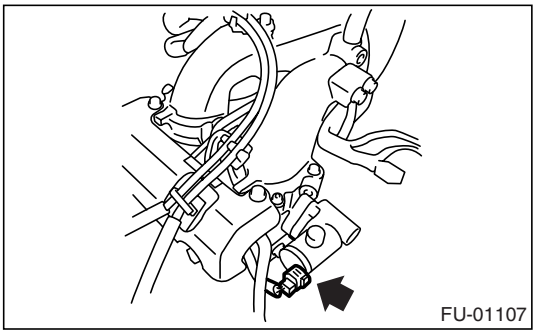
A: REMOVAL

NOTE:
Tumble generator valve is installed to EC, EK, K4, EH and ER model.

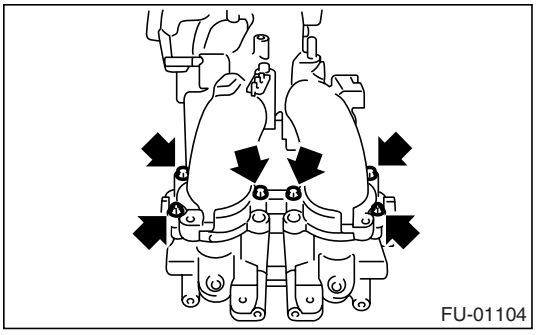
1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Remove the intake manifold.
<Ref. to FU(H4SO 2.5)-12, REMOVAL, Intake Manifold.>
5) Disconnect the connector from tumble generator valve actuator.



6) Remove the fuel injectors.
<Ref. to FU(H4SO 2.5)-32, REMOVAL, Fuel Injector.>
7) Remove the tumble generator valve body from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
8.75 N·m (0.89 kgf-m, 6.5 ft-lb)

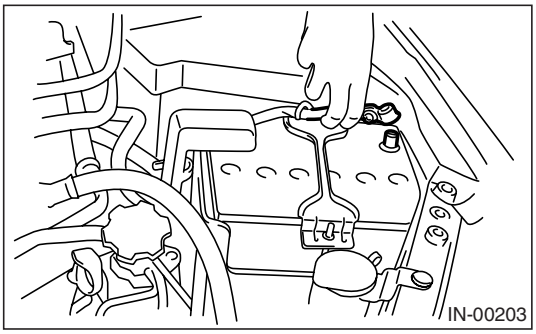
13. Tumble Generator Valve Actuator

A: REMOVAL

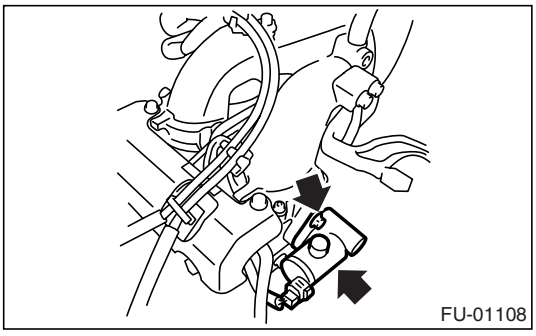
NOTE:
Tumble generator valve actuator is installed to EC, EK, K4, EH and ER model.

1. RH SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

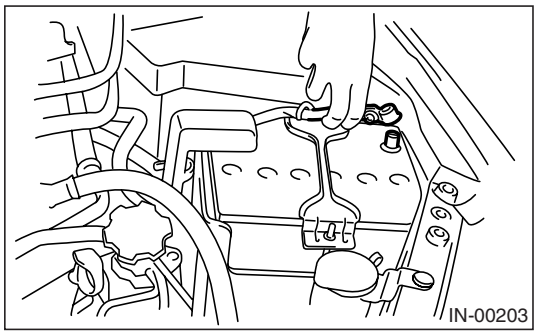


4) Remove the intake manifold.
<Ref. to FU(H4SO 2.5)-12, REMOVAL, Intake Manifold.>
5) Disconnect the connector from tumble generator valve RH.
6) Remove the tumble generator valve RH.

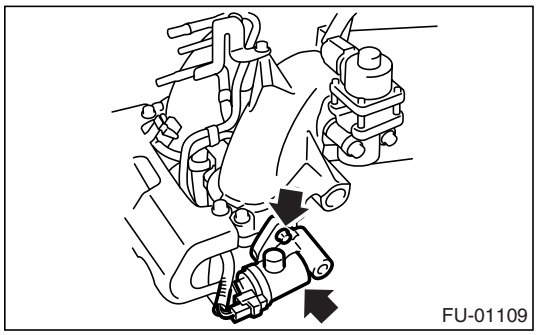


2. LH SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Disconnect the connector from tumble generator valve LH.
5) Remove the tumble generator valve LH.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

2. LH SIDE

Install in the reverse order of removal.

Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

14. Tumble Generator Valve Position Sensor

A: SPECIFICATION

NOTE:
Tumble generator valve position sensor is installed to EC, EK, K4, EH and ER model.

Do not remove the tumble generator valve position sensor from tumble generator valve assembly, since it cannot be adjusted during installation.

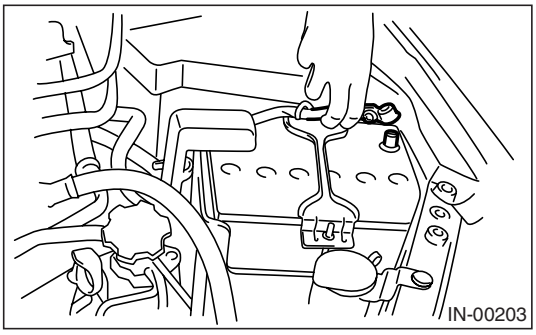
Refer to “Tumble Generator Valve ASSY” for removal and installation procedures. <Ref. to FU(H4SO 2.5)-28, REMOVAL, Tumble Generator Valve Assembly.>
<Ref. to FU(H4SO 2.5)-28, INSTALLATION, Tumble Generator Valve Assembly.>

15.EGR Valve

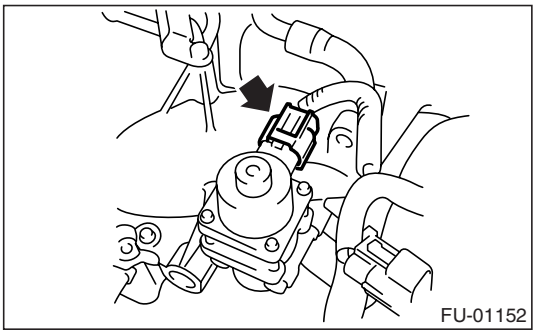
A: REMOVAL

NOTE:
EGR valve is installed to EC, EK, K4 EH and ER model.

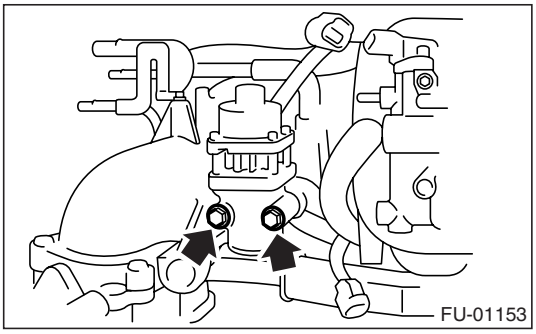
1) Disconnect the ground cable from battery.



2) Disconnect the connector from EGR valve.



3) Remove the EGR valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

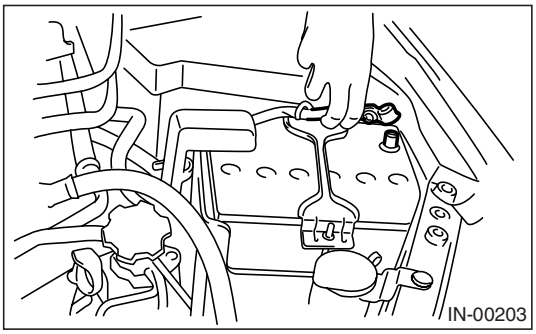
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)

16.Fuel Injector

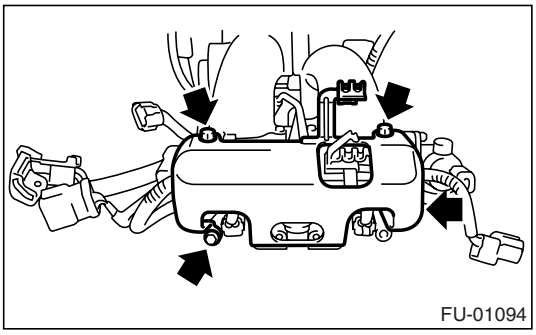
A: REMOVAL

1. RH SIDE

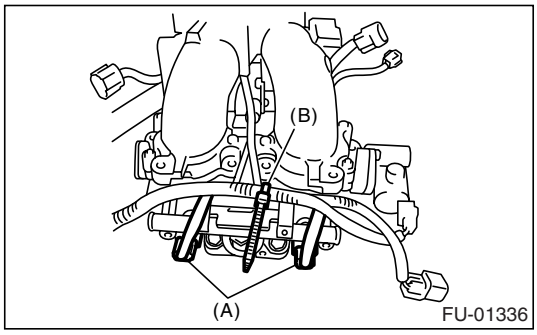
1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



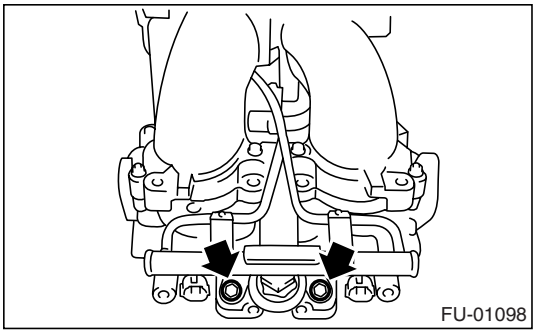
4) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-5, REMOVAL, Air Cleaner Case.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).
6) Remove the fuel pipe protector RH.



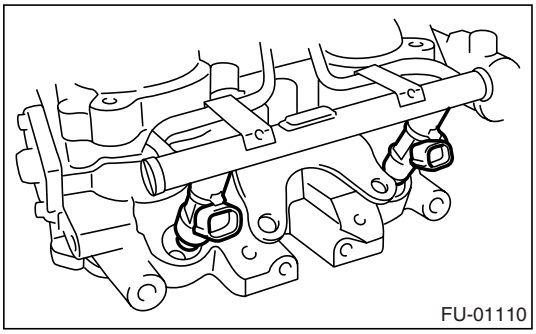
7) Disconnect the connectors (A) from fuel injector.
8) Remove the harness band (B) which holds the engine harness to injector pipe.



9) Remove the bolts which hold fuel injector pipe to intake manifold.

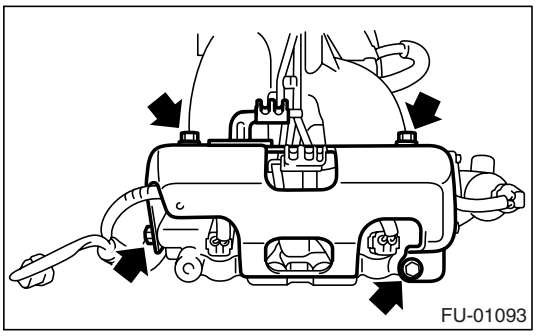


10) Remove the fuel injector while lifting up the fuel injector pipe.



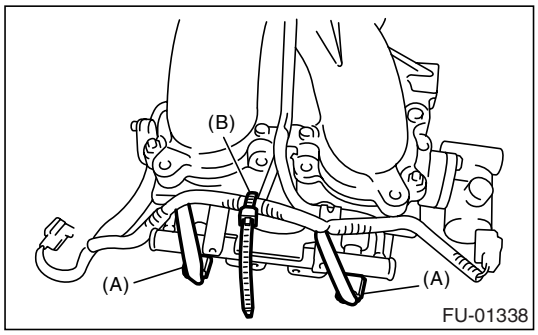
2. LH SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the battery.
4) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).
5) Remove the fuel pipe protector LH.

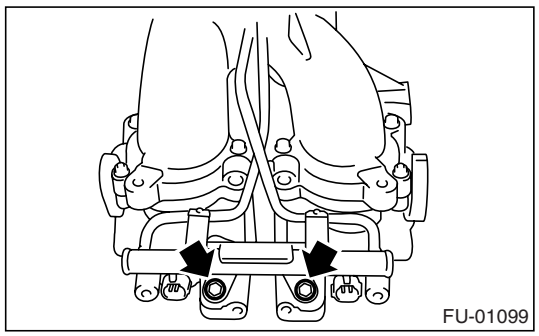


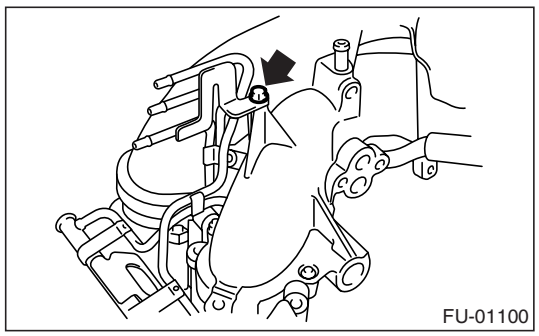
6) Disconnect the connectors (A) from fuel injector.

7) Remove the harness band (B) which holds the engine harness to injector pipe.

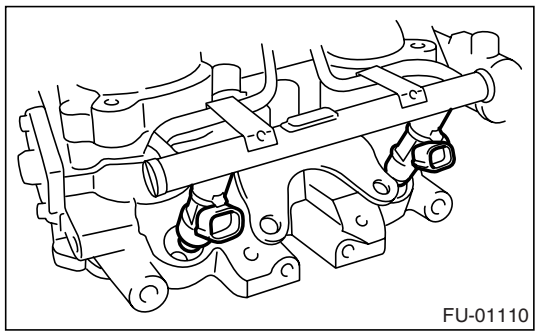


8) Remove the bolts which hold fuel injector pipe to intake manifold.





9) Remove the fuel injector while lifting up the fuel injector pipe.

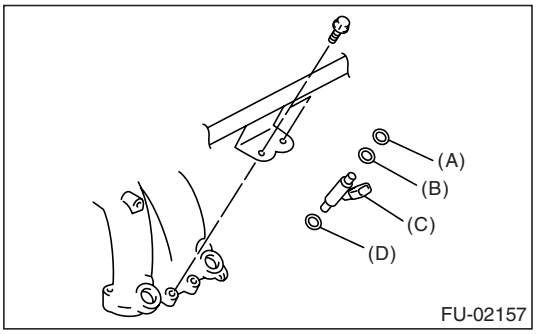


B: INSTALLATION

1. RH SIDE

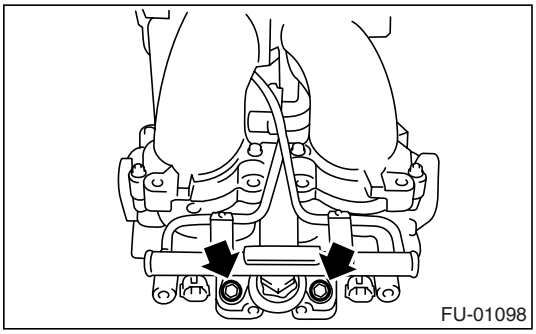
Install in the reverse order of removal.

NOTE:
- Use a new O-ring.
- O-ring (B) is used for EC, EK, K4, EH and ER model.

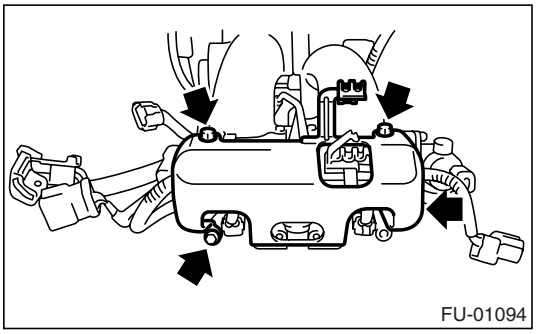


(A) O-ring
(B) O-ring
(C) Fuel injector
(D) O-ring

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



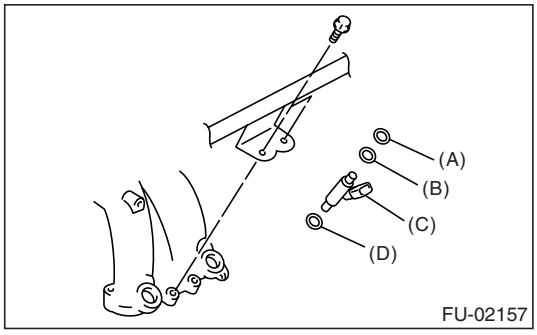
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



2. LH SIDE

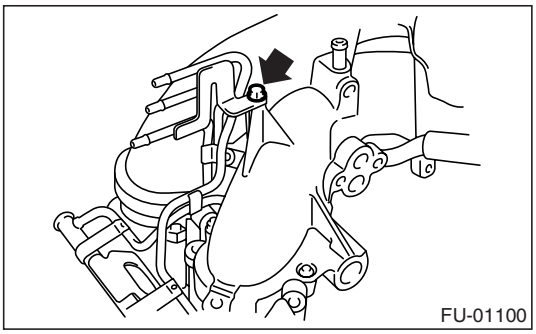
Install in the reverse order of removal.

NOTE:
• Use a new O-ring.
• O-ring (B) is used for EC, EK, K4, EH and ER model.

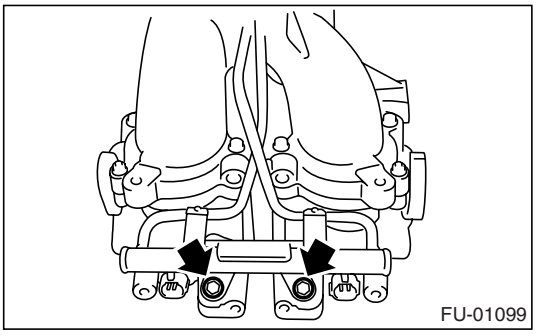


(A) O-ring
(B) O-ring
(C) Fuel injector
(D) O-ring

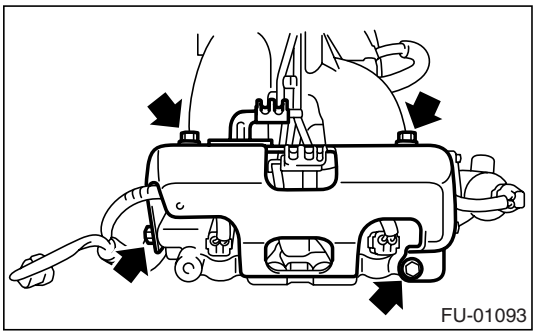
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



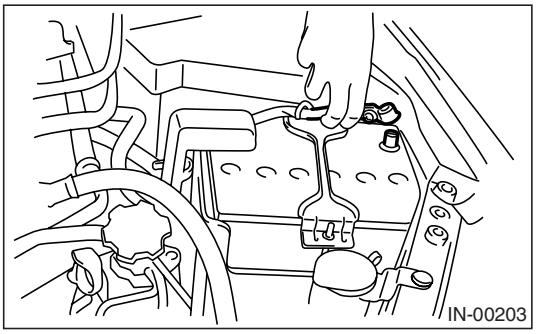
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



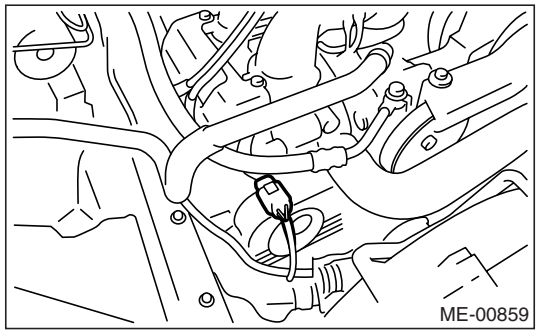
17.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

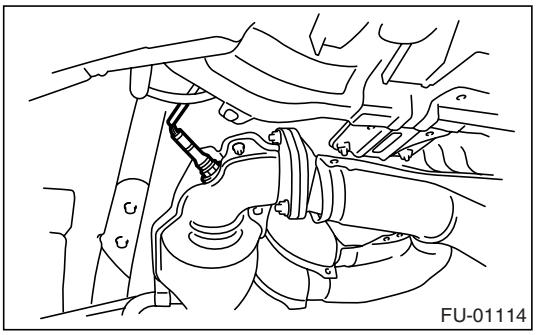


2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Duct.>
3) Remove the connector of front oxygen (A/F) sensor.



4) Remove the clip which holds harness.
5) Lift-up the vehicle.
6) Remove the under cover.
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

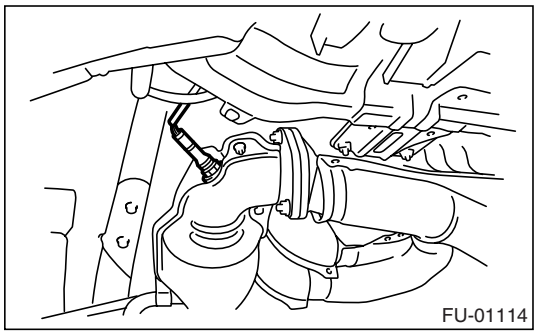
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

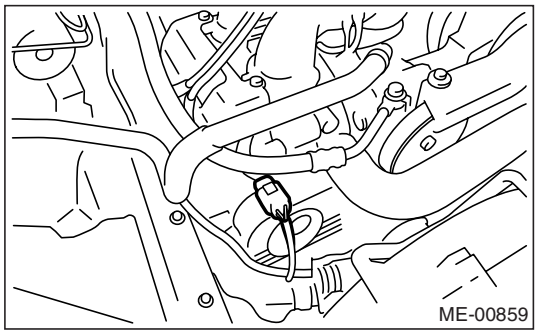
CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

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

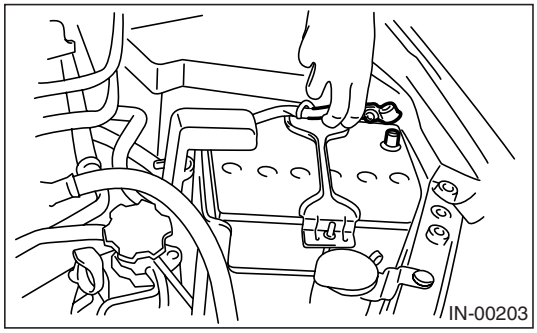
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Install the under cover.
4) Lower the vehicle.
5) Hold the harness with clip.
6) Connect the connector of front oxygen (A/F) sensor.



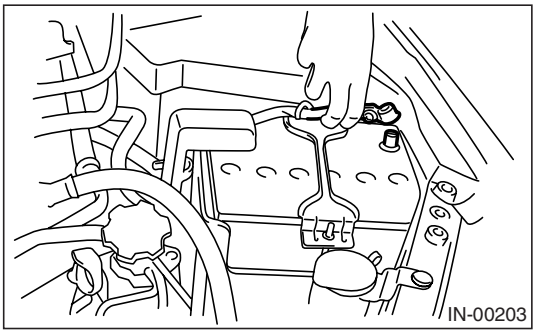
7) Install the air intake duct. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Duct.>
8) Connect the ground cable to battery.



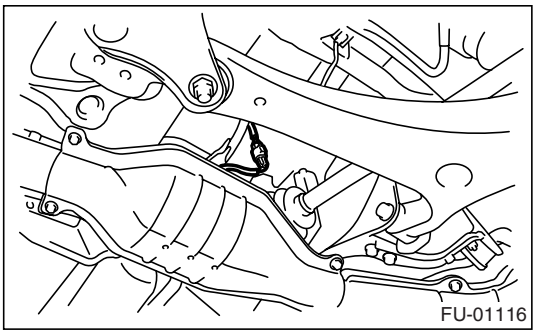
18. Rear Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

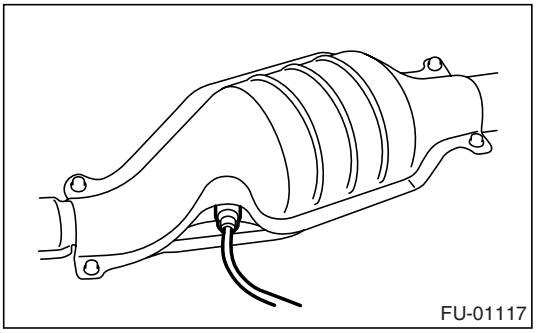


2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.



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

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



B: INSTALLATION

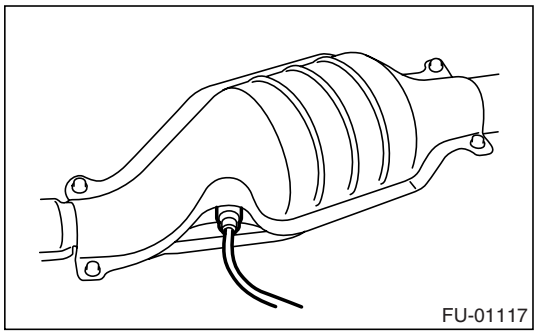
1) Before installing the rear oxygen sensor, apply anti-seize compound only to the threaded portion of the rear oxygen sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

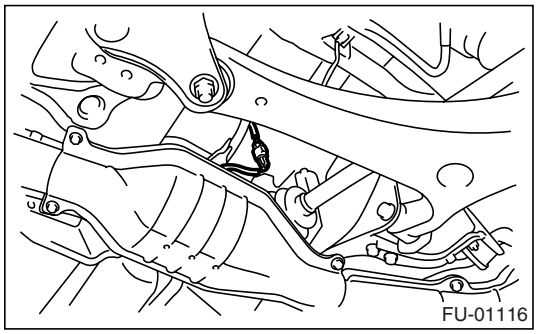
CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

2) Install the rear oxygen sensor.

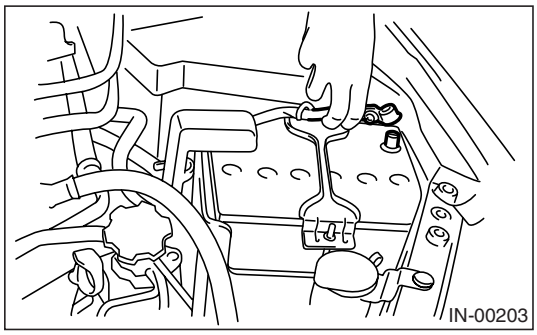
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Hold the harness with clip.
4) Connect the connector to rear oxygen sensor.



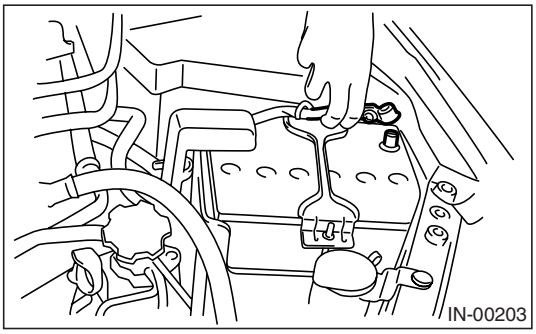
5) Lower the vehicle.
6) Connect the ground cable to battery.



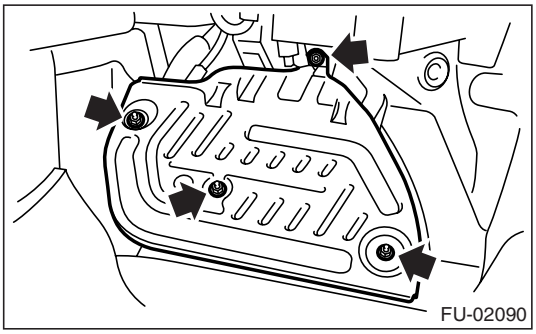
19. Engine Control Module (ECM)

A: REMOVAL

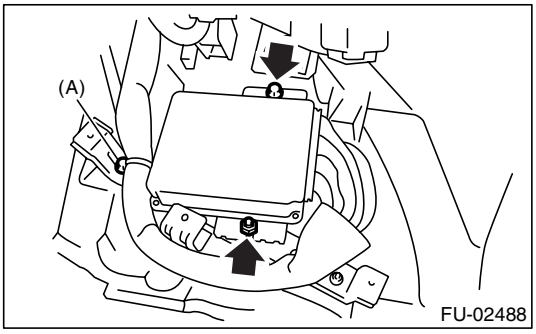
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger's side.
<Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of passenger's seat.
4) Remove the protect cover.



5) Remove the bolt and nut which hold the ECM to bracket.
6) Remove the clip (A) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

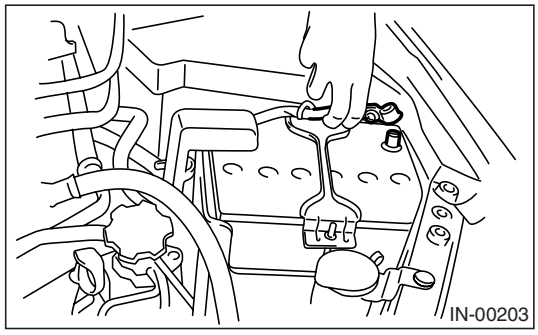
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

20.Main Relay

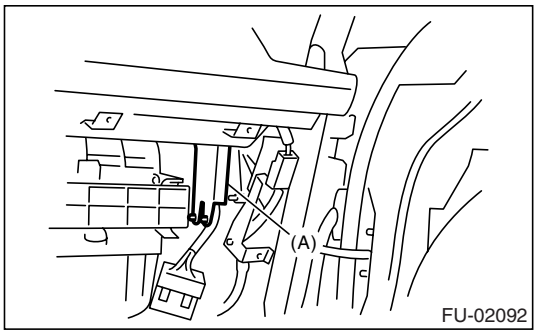
A: REMOVAL

1) Disconnect the ground cable from battery.

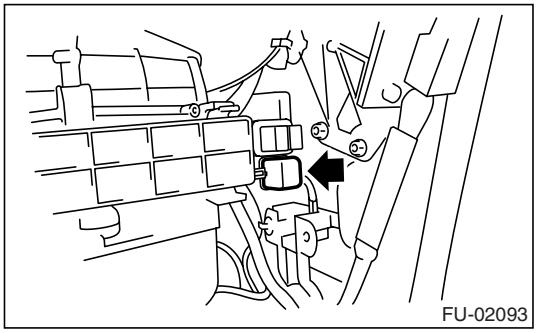


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



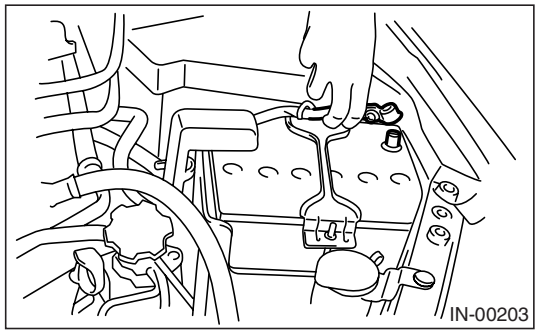
B: INSTALLATION

Install in the reverse order of removal.

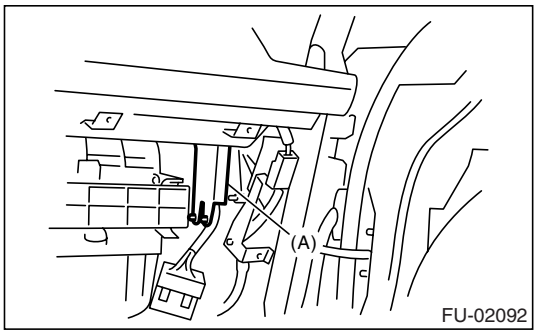
21.Fuel Pump Relay

A: REMOVAL

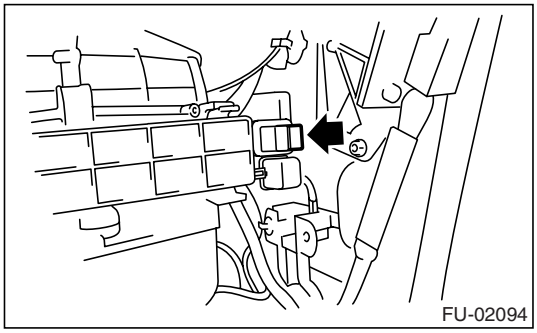
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



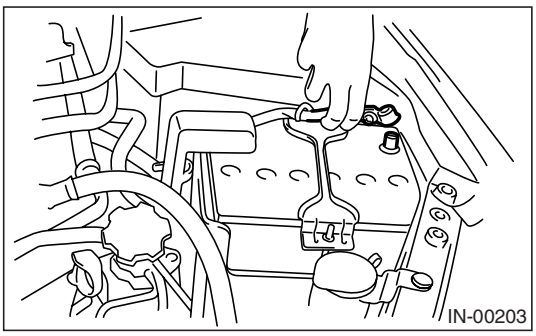
B: INSTALLATION

Install in the reverse order of removal.

22. Electronic Throttle Control Relay

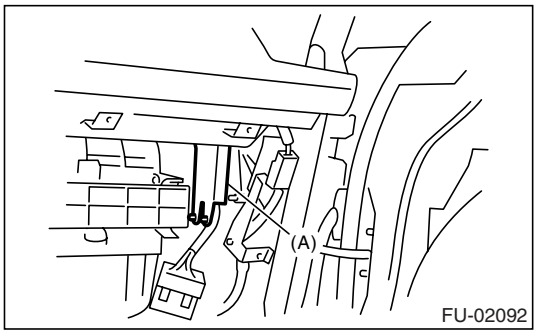
A: REMOVAL

1) Disconnect the ground cable from battery.

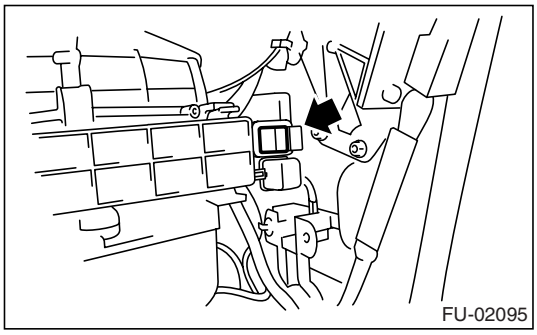


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from electronic throttle control relay.



B: INSTALLATION

Install in the reverse order of removal.

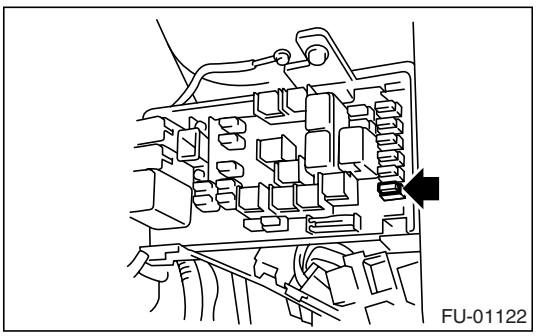
23. Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

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

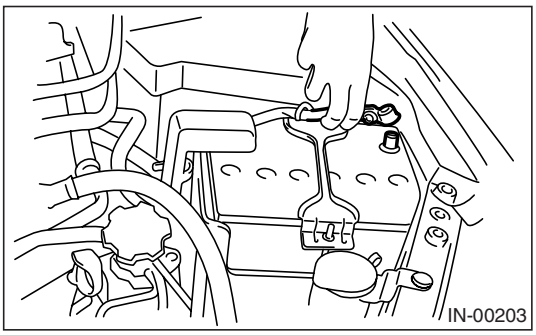


2) Start the engine and run until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

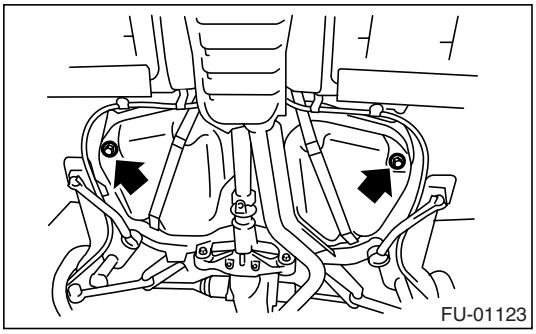
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

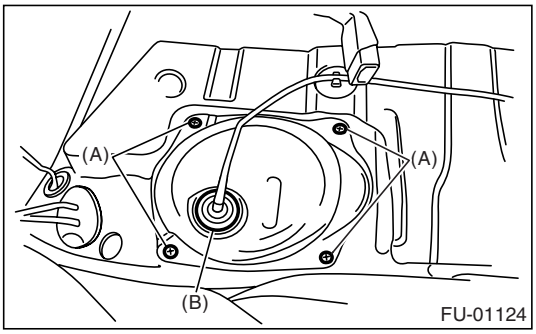
Tightening torque:
Nut
9 N·m (0.9 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

24.Fuel Tank

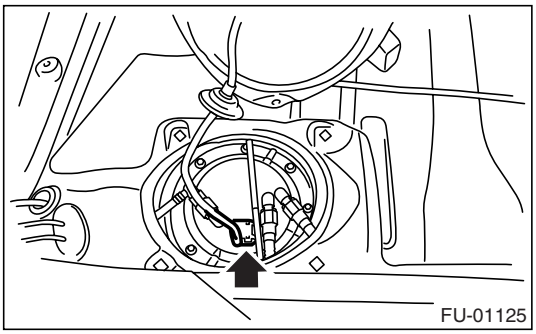
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

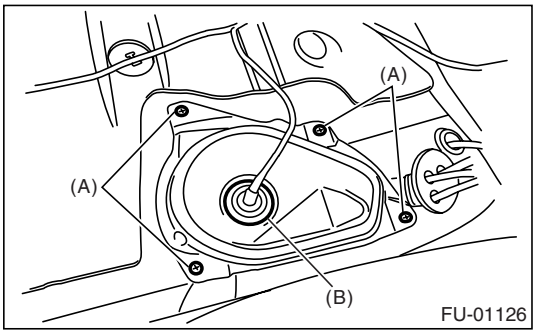
1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from fuel tank.
<Ref. to FU(H4SO 2.5)-41, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Remove the service hole cover of fuel pump.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



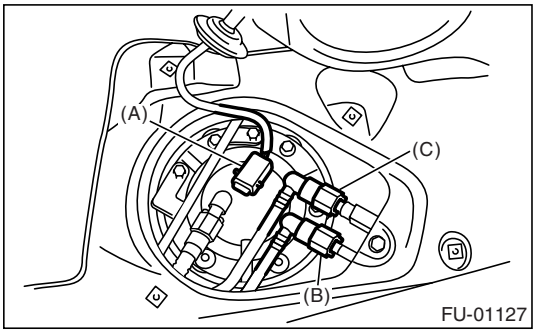
6) Disconnect the connector from fuel pump.



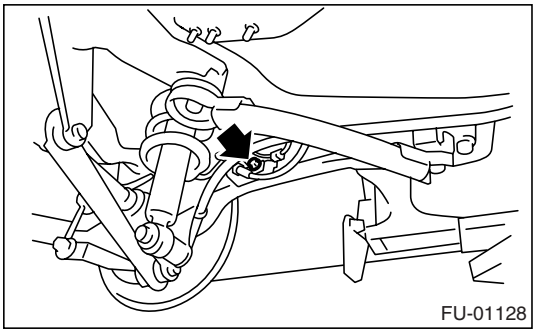
7) Remove the service hole cover of fuel sub level sensor.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



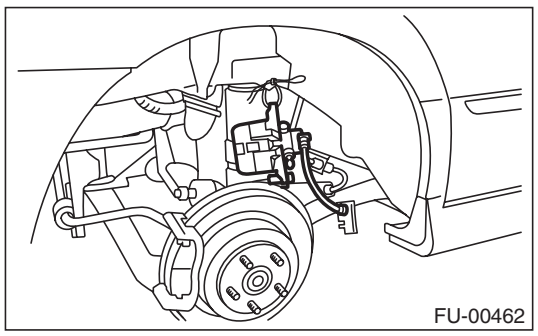
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector of the fuel delivery (B) and return hose (C). <Ref. to FU(H4SO 2.5)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



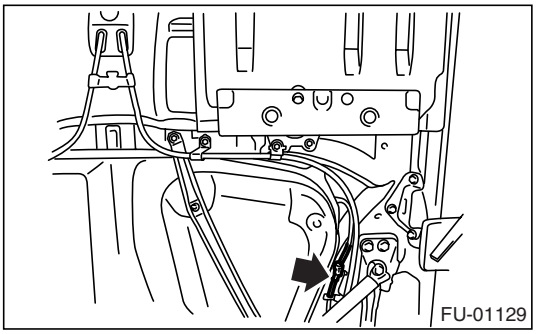
10) Lift-up the vehicle.
11) Remove the rear wheels.
12) Remove the bolts which secure the rear brake hose installation bracket.



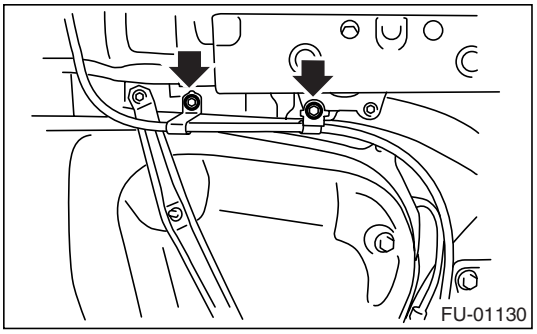
13) Remove the rear brake caliper and tie it to the vehicle body side.

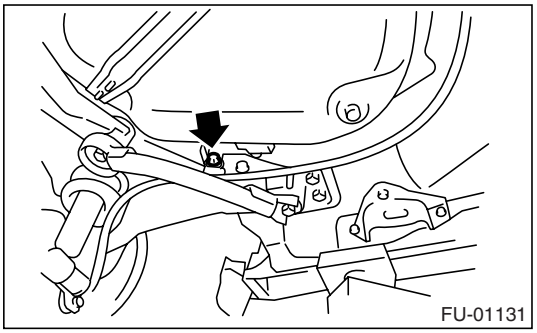


14) Remove the parking brake cable from parking brake assembly. <Ref. to PB-6, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
15) Remove the rear exhaust pipe.
<Ref. to EX(H4SO 2.0)-10, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install the parking brake cable clamp.

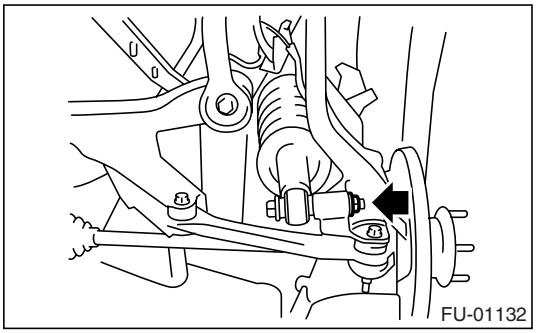




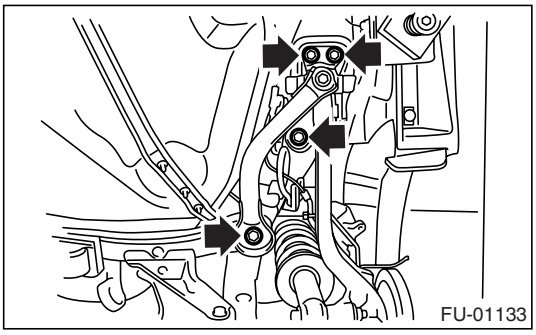
20) Remove the rear suspension assembly.

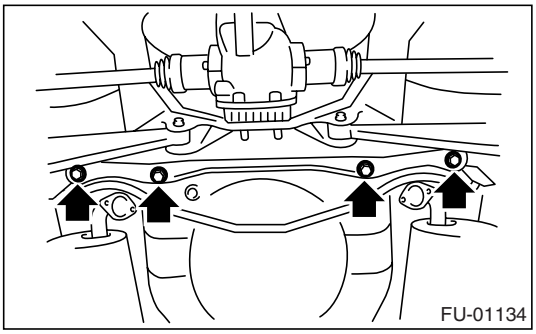
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs the rear shock absorber to rear suspension arm.



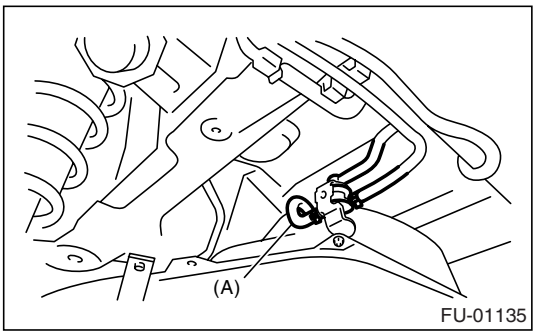
(3) Remove the bolts which secure the rear suspension assembly to body.



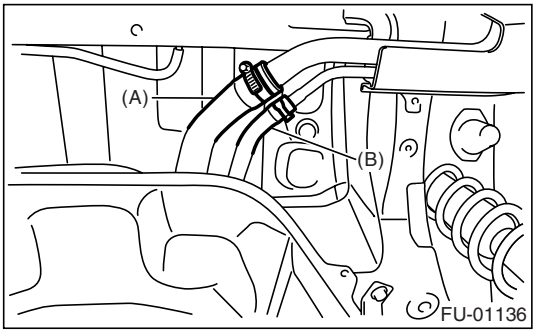


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

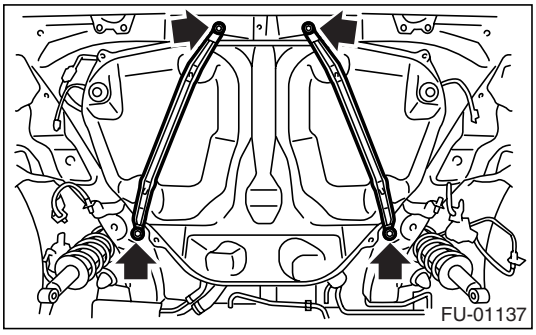


22) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands, and dismount the fuel tank from vehicle.

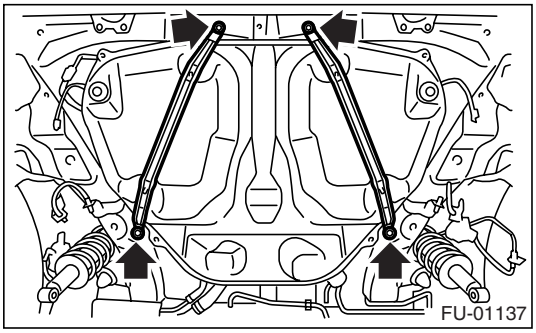
CAUTION:
A helper is required to perform this work.



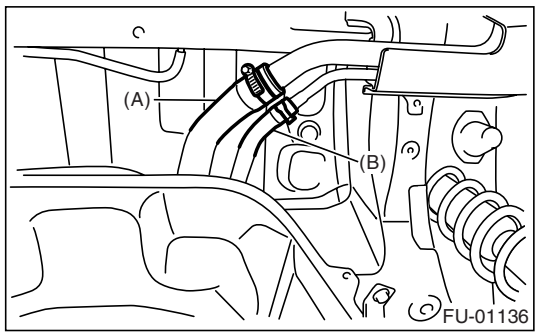
B: INSTALLATION

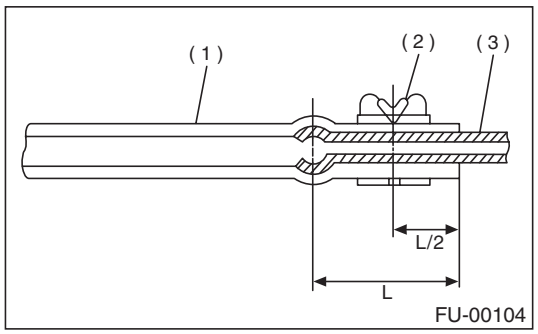
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

CAUTION:
A helper is required to perform this work.



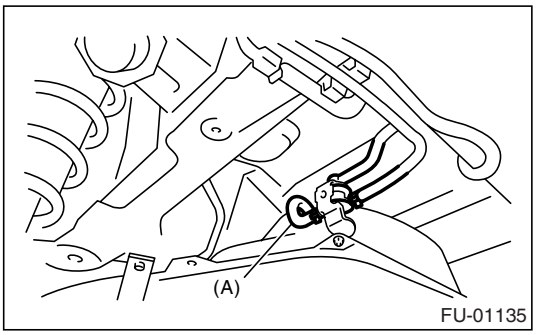
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipe

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolts of fuel tank band.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

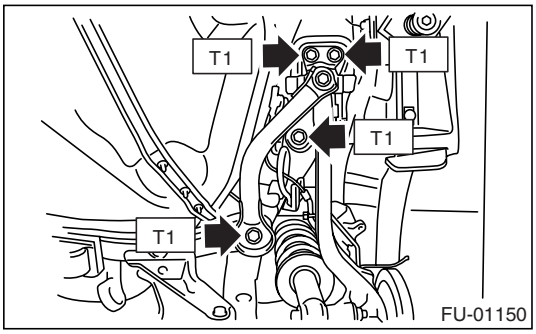
5) Install the rear suspension assembly.

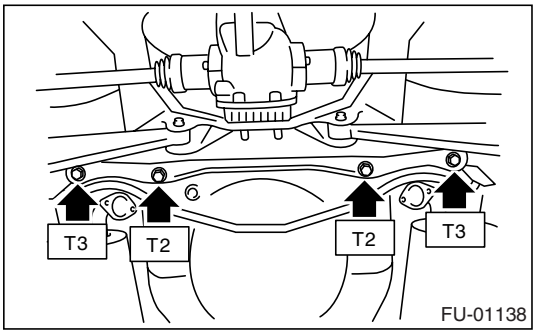
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.

(2) Support the rear suspension assembly, and then tighten the bolts which secure the rear suspension assembly to body.

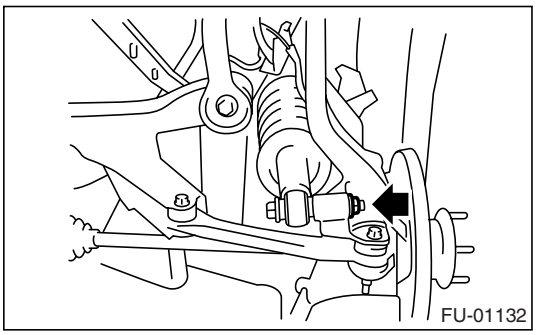
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.2 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





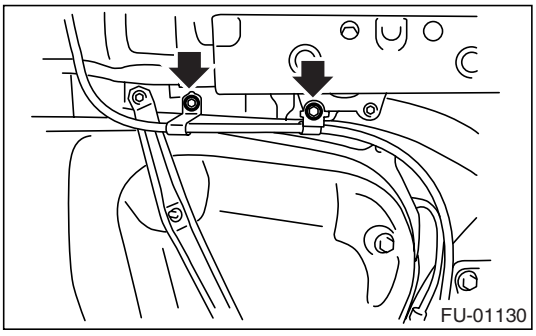
(3) Tighten the bolts which install the rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

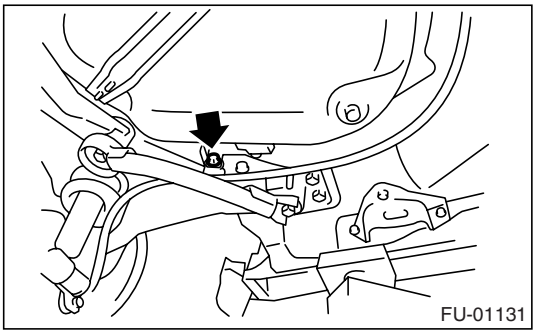


6) Tighten the bolts which install the parking brake cable clamp.

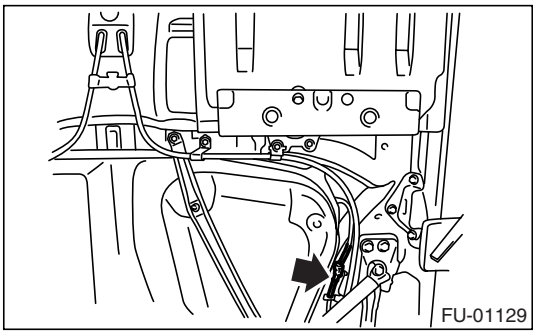
Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)



Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

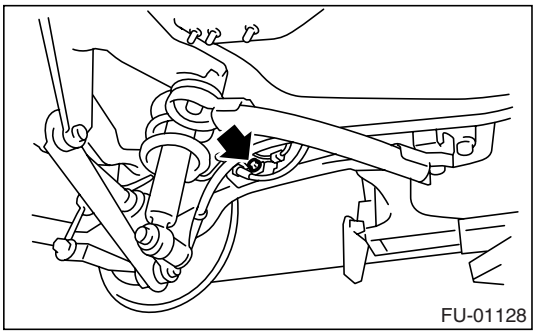


7) Connect the connector to rear ABS wheel speed sensor.



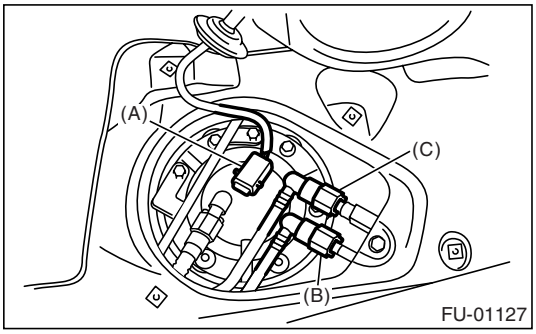
8) Install the heat shield cover.
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe. <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-7, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolt which secures rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

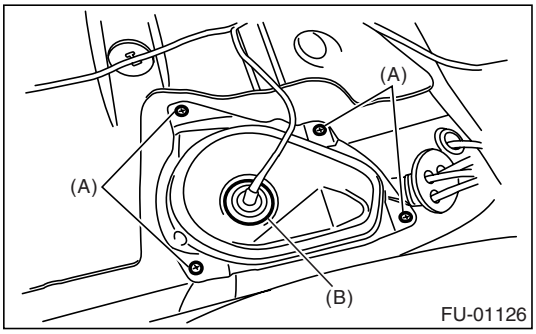


15) Install the rear wheels.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector to the fuel delivery (B) and return hose (C). <Ref. to FU(H4SO 2.5)-57, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

NOTE:
Be careful not to misconnect the delivery side and return side.

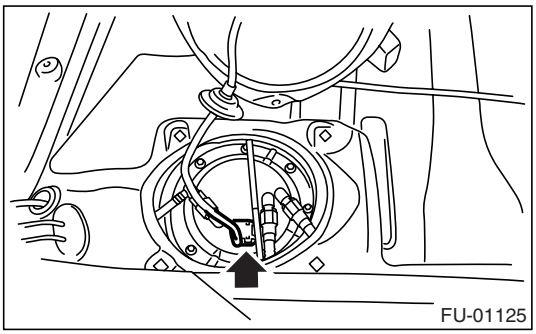


19) Install the service hole cover of fuel sub level sensor.

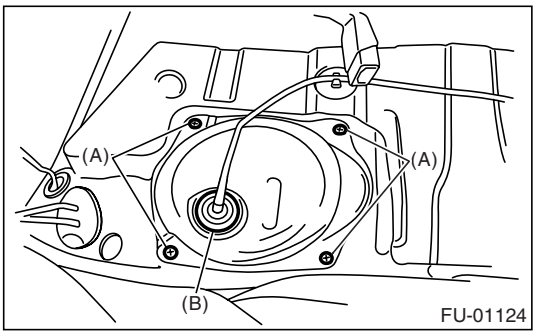


(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

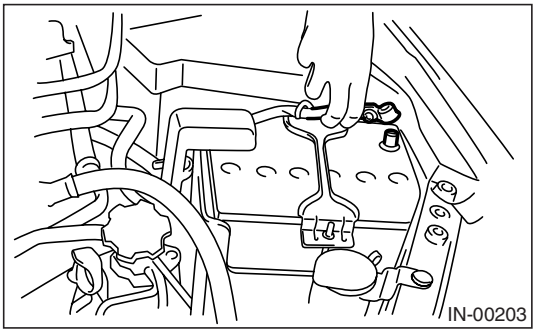
1) Check that the fuel tank is not holed, cracked or otherwise damaged.
2) Make sure that the fuel pipe and fuel hose are not cracked and those connections are tight.

25.Fuel Filler Pipe

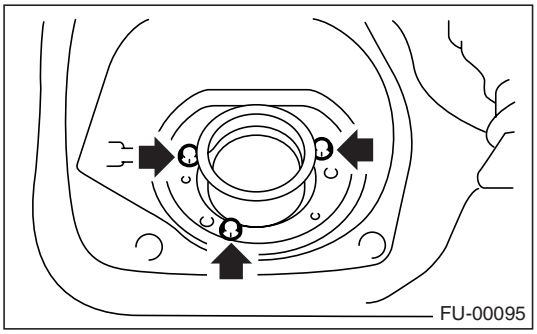
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

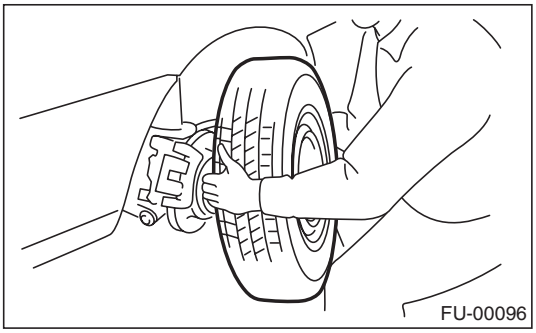
1) Disconnect the ground cable from battery.



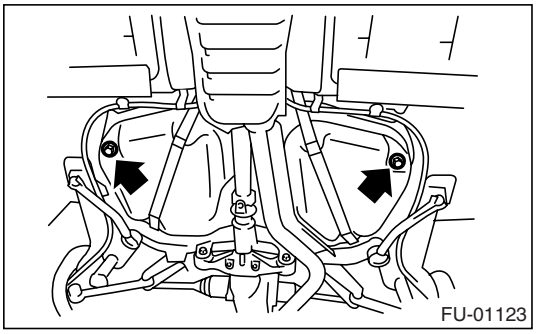
2) Open the fuel filler flap lid, and remove the filler cap.
3) Remove the screws which secure the packing.



4) Lift-up the vehicle.
5) Remove the rear wheel RH.



6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.

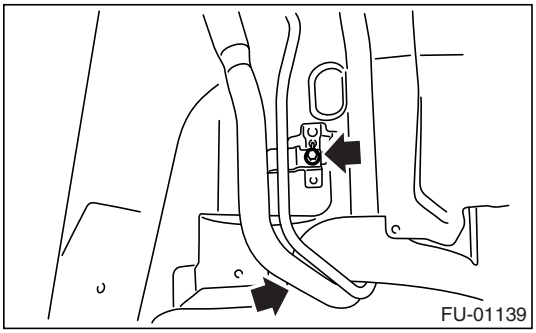


7) Tighten the fuel drain plug.

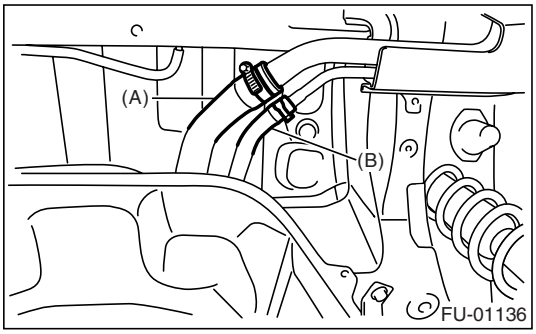
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
9) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
10) Remove the bolts which hold the fuel filler pipe bracket on the body.



11) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

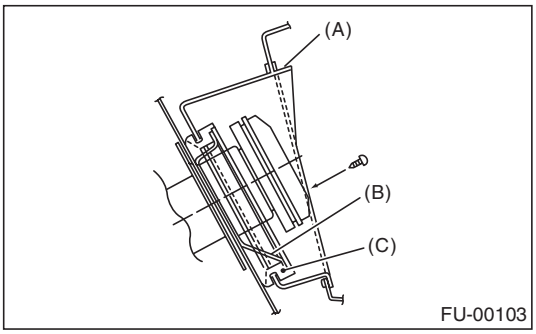


12) Remove the fuel filler pipe to under side of the vehicle.

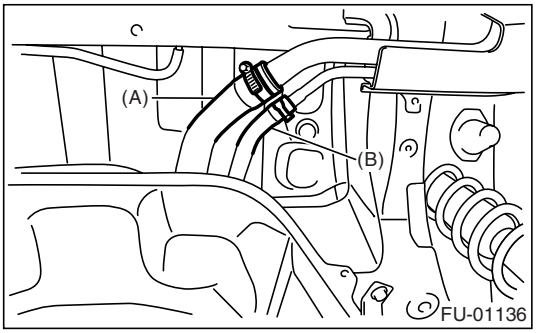
B: INSTALLATION

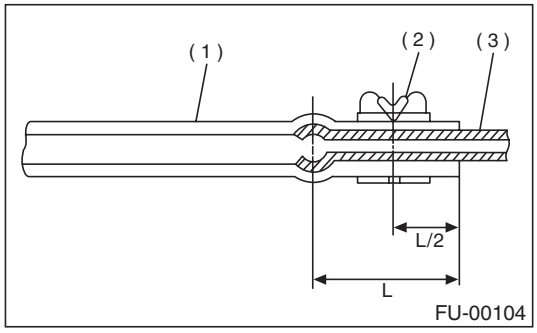
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.

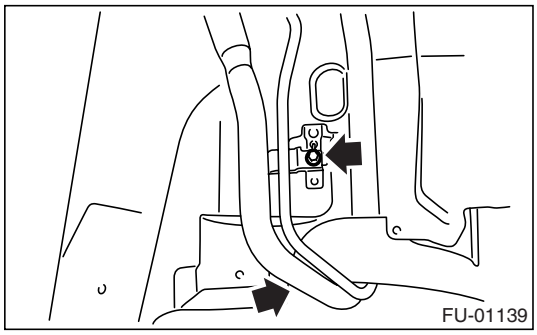




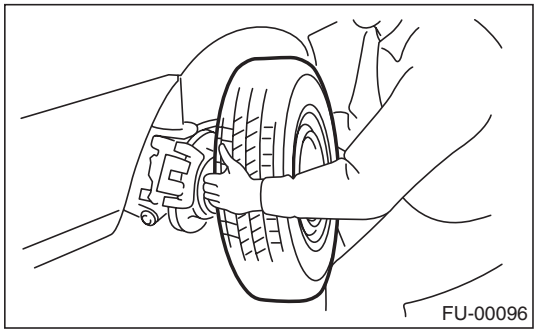
(1) Hose
(2) Clip or clamp
(3) Pipe

5) Tighten the bolts which hold the fuel filler pipe bracket on the body.

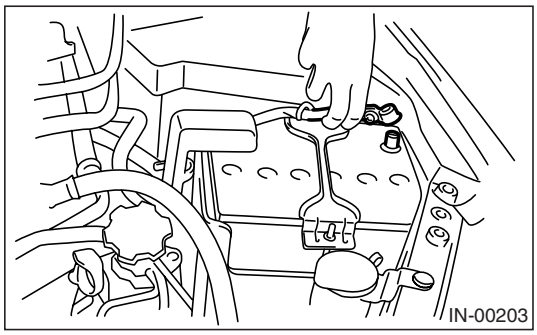
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Connect the ground cable to battery.



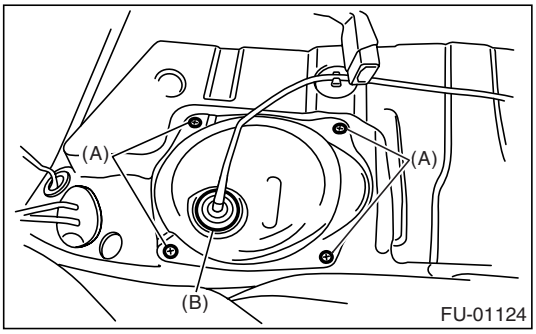
26.Fuel Pump

A: REMOVAL

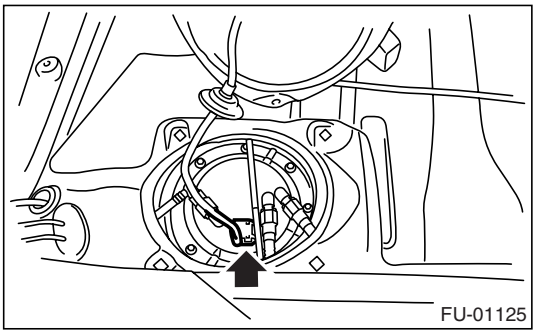
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

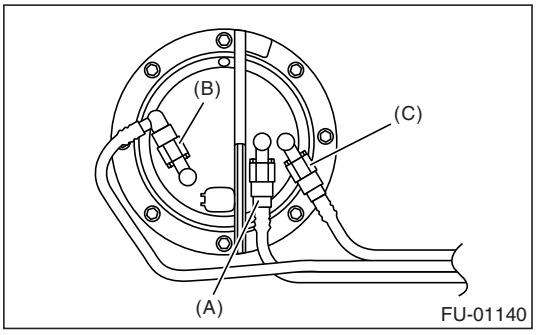
1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4SO 2.5)-41, DRAINING FUEL, PROCEDURE, Fuel.>
3) Remove the rear seat.
4) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove service hole cover.



5) Disconnect the connector from fuel pump.



6) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.5)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
7) Remove the nuts which install the fuel pump assembly to fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

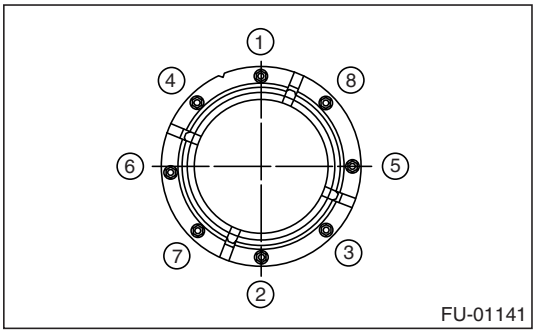
8) Remove the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in the order as shown in the figure.

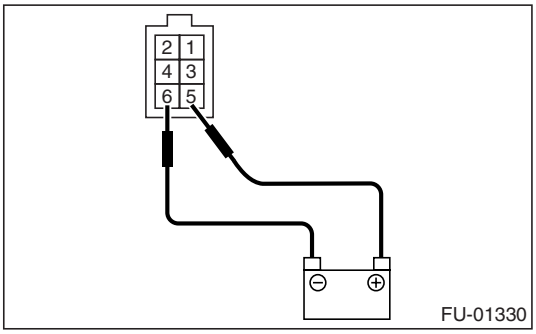
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.2 ft-lb)



C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump and apply the battery power supply to check whether the pump operates.

WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply ON and OFF on battery side.**
- **Do not run fuel pump for a long time under non-load condition.**



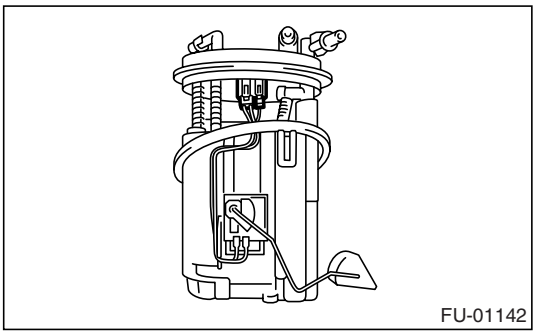
27.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4SO 2.5)-50, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

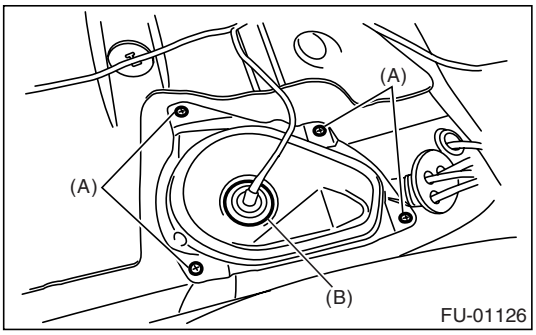
Install in the reverse order of removal.

28.Fuel Sub Level Sensor

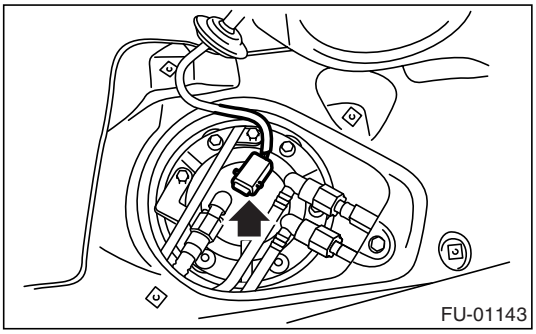
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

1) Drain fuel. <Ref. to FU(H4SO 2.5)-41, DRAINING FUEL, PROCEDURE, Fuel.>
2) Remove the rear seat.
3) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down and remove the service hole cover.

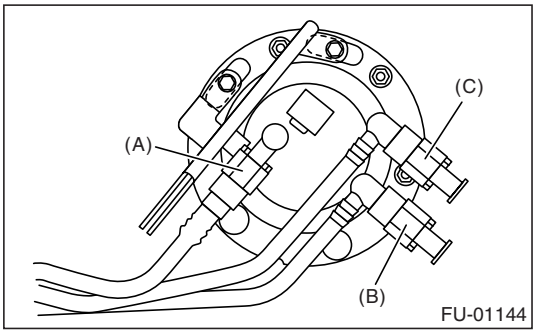


4) Disconnect the connector from fuel sub level sensor.



5) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.5)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

6) Remove the nuts and bolts which install the fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

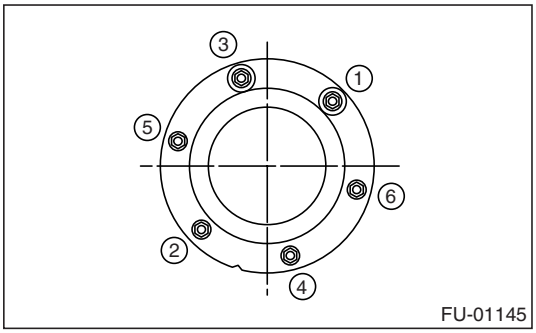
7) Remove the fuel sub level sensor.

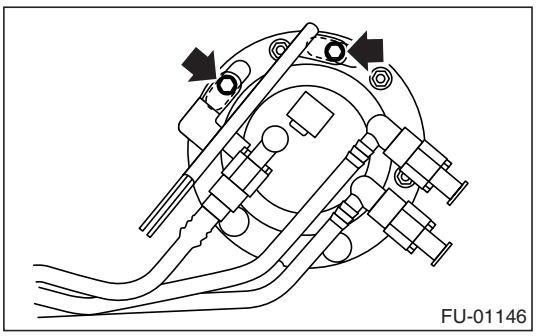
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (3.1 kgf-m, 3.2 ft-lb)





29.Fuel Filter

A: SPECIFICATION

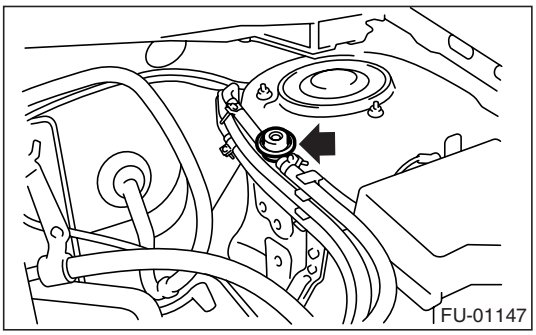
Fuel filter forms a single unit with fuel pump.
Refer to “Fuel Pump” for removal and installation procedures. <Ref. to FU(H4SO 2.5)-50, REMOVAL, Fuel Pump.> <Ref. to FU(H4SO 2.5)-50, INSTALLATION, Fuel Pump.>

30. Fuel Damper Valve

A: REMOVAL

1. DELIVERY SIDE

1) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel delivery line.



2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for removal. <Ref. to FU(H4SO 2.5)-15, DISASSEMBLY, Intake Manifold.>

B: INSTALLATION

1. DELIVERY SIDE

Install in the reverse order of removal.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

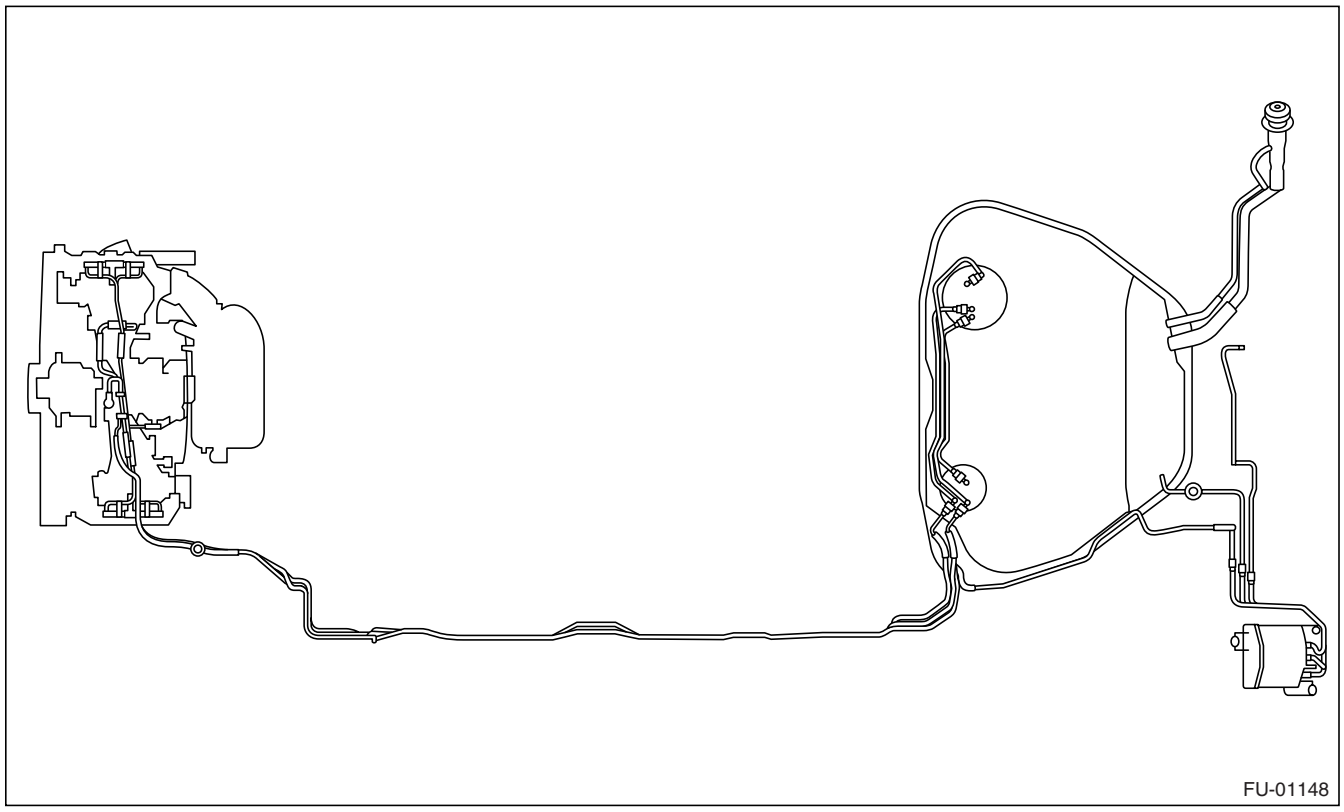
2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for installation. <Ref. to FU(H4SO 2.5)-17, ASSEMBLY, Intake Manifold.>

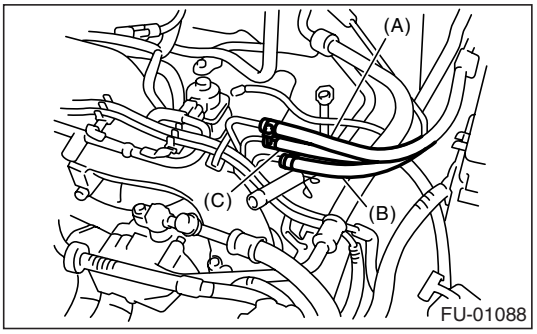
31.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SO 2.5)-41, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.

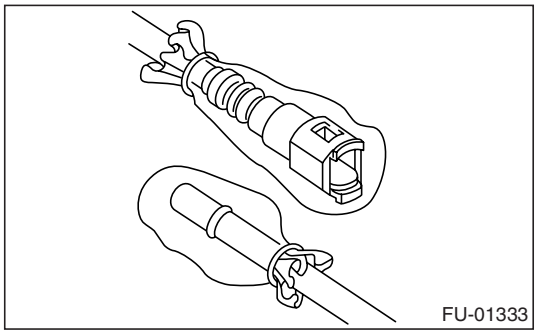


6) In the engine compartment, disconnect the fuel delivery hoses, return hoses, and evaporation hose.



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

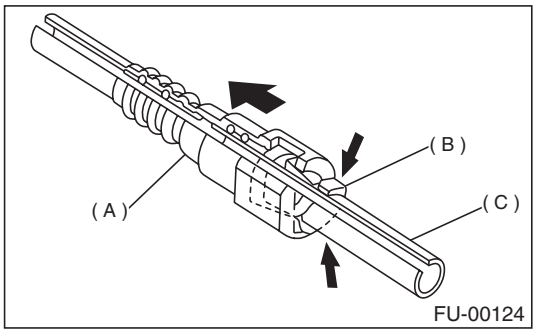
7) Lift-up the vehicle.
8) Remove the fuel tank. <Ref. to FU(H4SO 2.5)-42, REMOVAL, Fuel Tank.>
9) Separate the quick connector on fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A) and push retainer (B) down.

(4) Pull out the connector (A) from retainer (B).

CAUTION:
Replace new retainer.

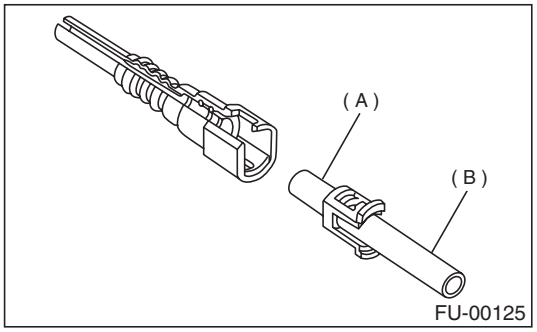


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

1) Connect the quick connector of fuel line.

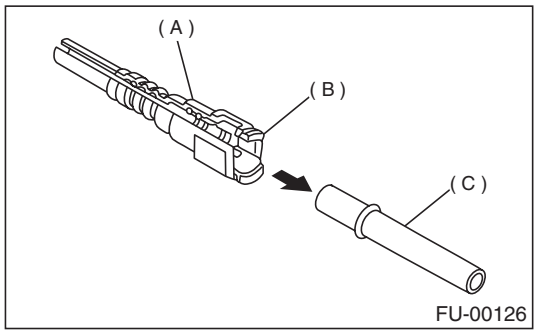
CAUTION:
- **Replace new retainer.**
- **Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.**



(A) Seal surface
(B) Pipe

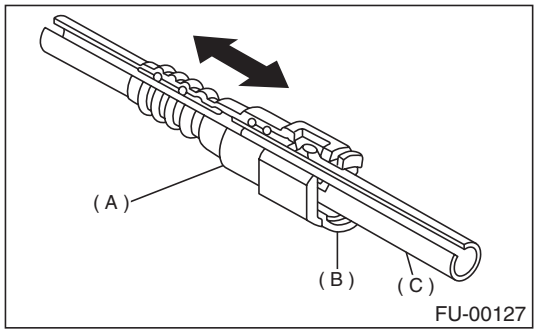
(1) Set the new retainer (B) to connector (A).

(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.



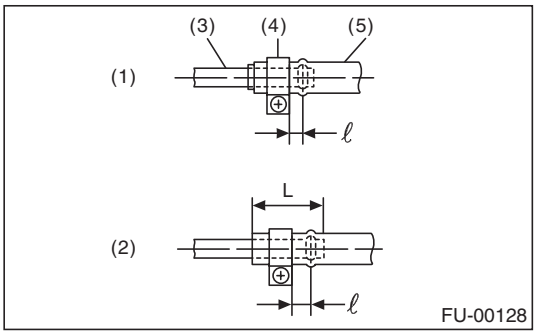
(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose and fuel return hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount to be inserted is specified.
Type B: When the amount to be inserted is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

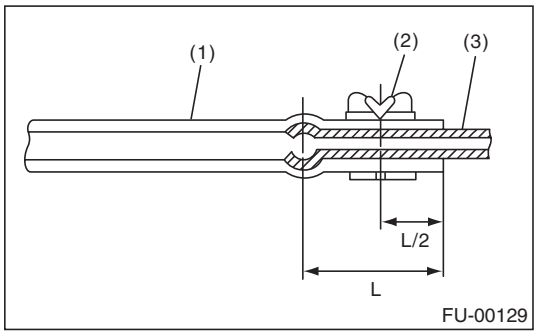
L: 22.5±2.5 mm (0.886±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) Connect the evaporation hose to the pipe with an overlap of 15 mm (0.59 in).
L = 17.5±2.5 mm (0.689±0.098 in)



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

32.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	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.
2)	Decline of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air mixed in the fuel system	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator	Replace.
2. Leakage or blow out of fuel		
1)	Loosened joints of the fuel pipe	Retighten.
2)	Cracked fuel pipe, hose, and fuel tank	Replace.
3)	Defective welding part on the fuel tank	Replace.
4)	Defective drain packing of the fuel tank	Replace.
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube, and fuel filler pipe	Retighten.
2)	Defective packing air tightness on the fuel saucer	Correct or replace the packing.
3)	Defective fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unused for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent each time the fuel is reduced to half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use 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(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in EC(H4SO 2.0) section. <Ref. to EC(H4SO 2.0)-2, General Description.>

INTAKE (INDUCTION)

IN(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in IN(H4SO 2.0) section. <Ref. to IN(H4SO 2.0)-2, General Description.>

MECHANICAL

ME(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in ME(H4SO 2.0) section. <Ref. to ME(H4SO 2.0)-2, General Description.>

EXHAUST

EX(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in EX(H4SO 2.0) section. <Ref. to EX(H4SO 2.0)-2, General Description.>

COOLING

CO(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in CO(H4SO 2.0) section. <Ref. to CO(H4SO 2.0)-2, General Description.>

LUBRICATION

LU(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are the same as 2.0 L SOHC model. <Ref. to LU(H4SO 2.0)-2, General Description.>

SPEED CONTROL SYSTEMS

SP(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are the same as 2.0 L SOHC model. <Ref. to SP(H4SO 2.0)-2, General Description.>

IGNITION

IG(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in IG(H4SO 2.0) section. <Ref. to IG(H4SO 2.0)-2, General Description.>

STARTING/CHARGING SYSTEMS

SC(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L SOHC model are included in SC (H4SO 2.0) section. <Ref. to SC(H4SO 2.0)-2, General Description.>

ENGINE (DIAGNOSTICS)

EN(H4SO 2.5)(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	3
3.	General Description	5
4.	Electrical Component Location	8
5.	Engine Control Module (ECM) I/O Signal	17
6.	Engine Condition Data	21
7.	Data Link Connector	22
8.	General Scan Tool	23
9.	Subaru Select Monitor	25
10.	Read Diagnostic Trouble Code (DTC)	32
11.	Inspection Mode	33
12.	Drive Cycle	38
13.	Clear Memory Mode	40
14.	Compulsory Valve Operation Check Mode	41
15.	Malfunction Indicator Light	43
16.	Diagnostics for Engine Starting Failure	53
17.	List of Diagnostic Trouble Code (DTC)	69
18.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	78
19.	General Diagnostic Table	257

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(H4SO 2.5)(diag)-3, 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(H4SO 2.5)(diag)-53, 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(H4SO 2.5)(diag)-257, INSPECTION, General Diagnostic Table.>
3	**CHECK DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON. 4) Read DTC using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "Read Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-32, Read Diagnostic Trouble Code (DTC).> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the engine warning light illuminates, perform the diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4SO 2.5)(diag)-43, Malfunction Indicator Light.>
4	**PERFORM DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-78, 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 items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
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 ❑ 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	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

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

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on.❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge warning light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure warning light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experience of 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 of other parts except 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:
• All airbag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these 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.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will be damaged.

3) Do not disconnect the battery terminals 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.

4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the clear memory mode after connecting the connectors.

5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of each sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

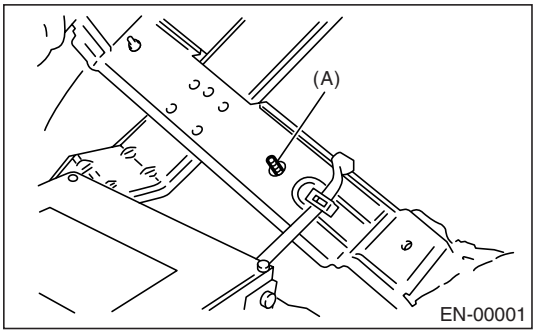
6) Before removing the ECM from the located position, disconnect two cables on battery.
Otherwise, the ECM may be damaged.

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

NOTE:
Immobilizer system must be registered when installing the ECM of the model with immobilizer. For doing so, all ignition keys and ID cards should be prepared. Refer to "IMMOBILIZER TEACHING OPERATION MANUAL"

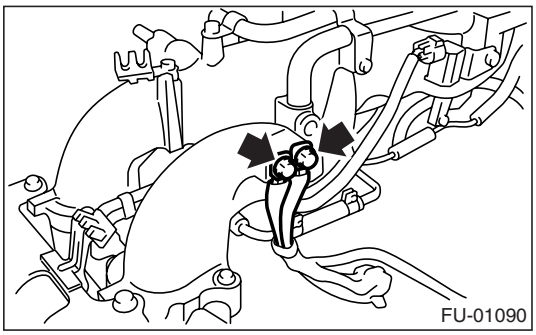
7) Connectors of each sensor in the engine compartment and the harness connectors on the engine / body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

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



(A) Stud bolt

9) Use engine grounding terminal or engine as the grounding point to chassis when measuring voltage and resistance in the engine compartment.



10) Every MFI-related part is a precision part. Do not drop them.

11) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control module.
• The antenna feeder must be placed as far apart as possible from the ECM and MFI 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.

12) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run until it stops.

13) Diagnostics should be conducted by starting with simple, easy operations then proceeding to complicate, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish the cause among engine, electrical system and transmission.
14) For the model with ABS, the ABS warning light may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. This is due to speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

B: INSPECTION

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

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

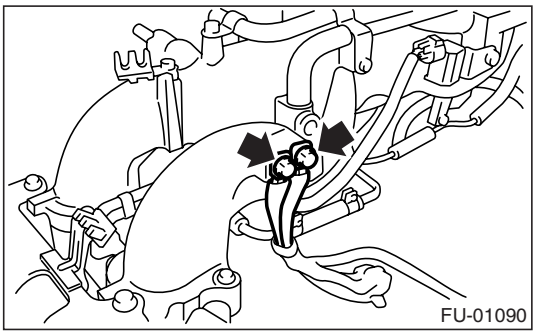
Standard voltage: 12 V

Specific gravity: 1.260 or more

2) Check the condition of main fuse, other fuses, harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

Make sure the engine grounding terminal is properly connected to engine.



C: NOTE

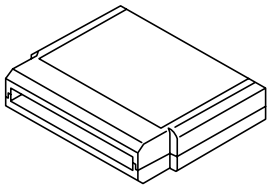
1. GENERAL DESCRIPTION

• The on-board diagnostics (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 such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with E-OBD 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 first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or 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.
• When troubleshooting the vehicle which complies with E-OBD Regulations, connect the Subaru Select Monitor or general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:
  • Reduced emission of harmful exhaust gases.
  • Reduced in fuel consumption.
  • Increased engine output.
  • Superior acceleration and deceleration.
  • Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

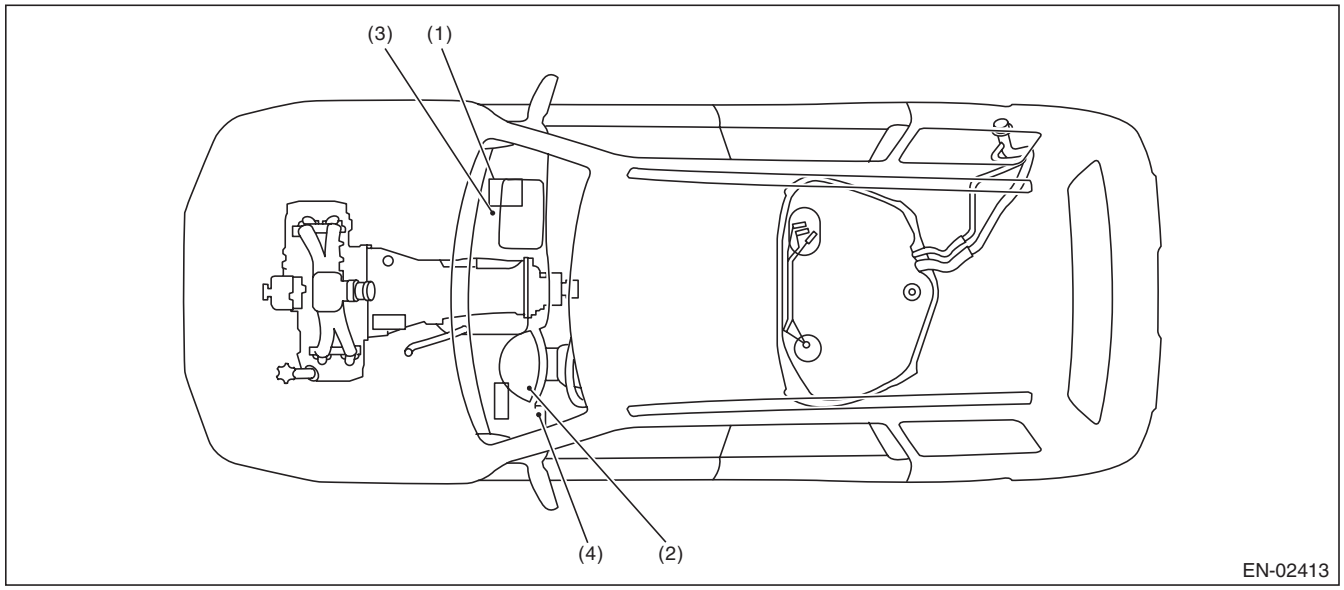
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

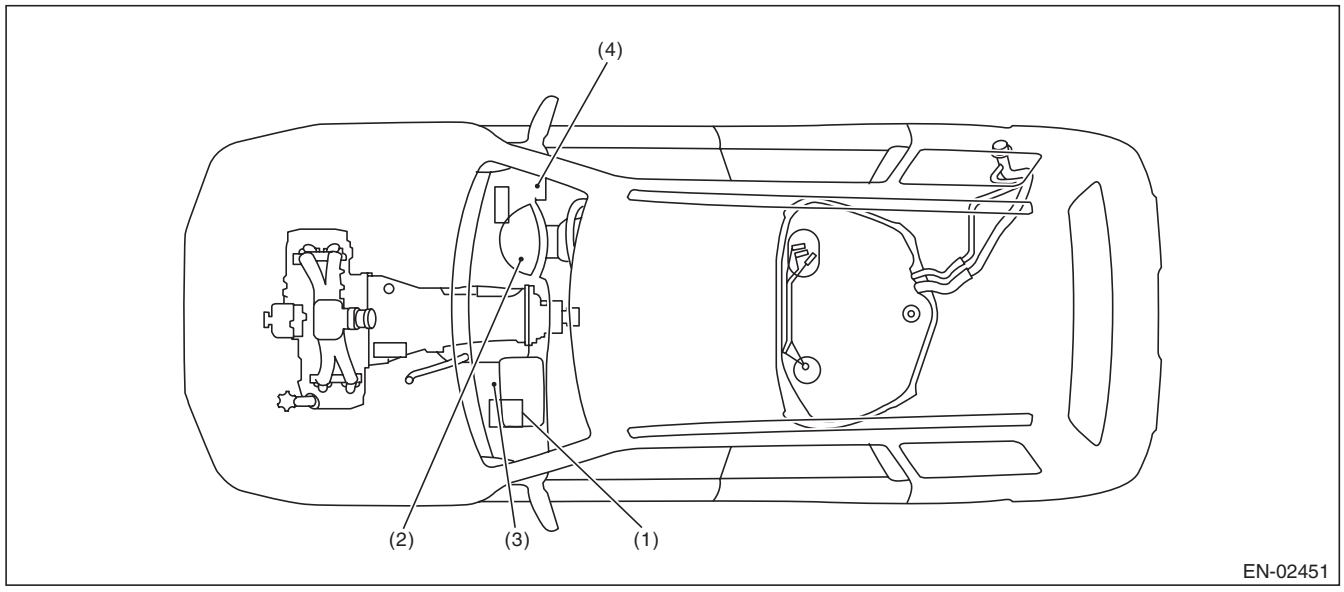
A: LOCATION

1. CONTROL MODULE

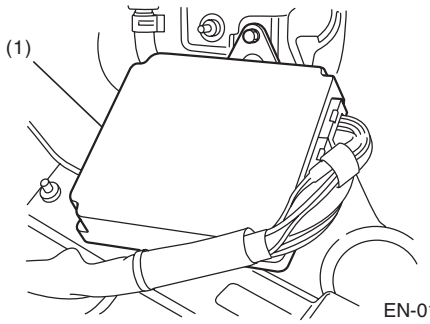
- LHD model



- RHD model



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



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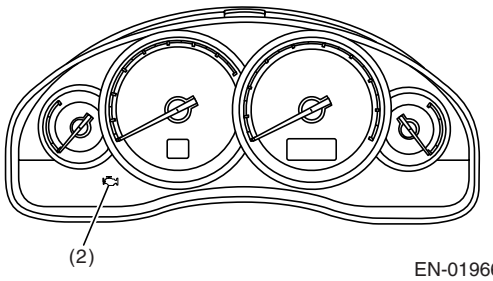
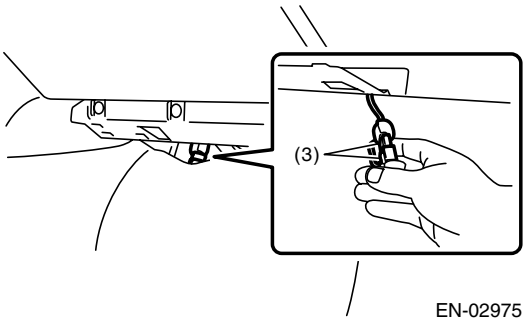
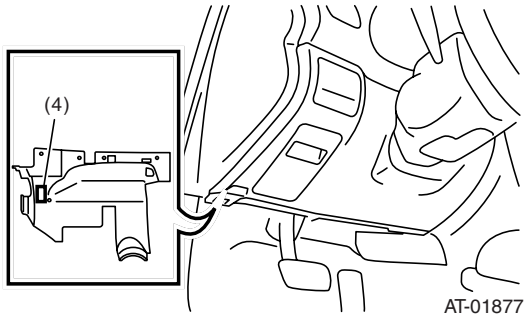


EN-01966

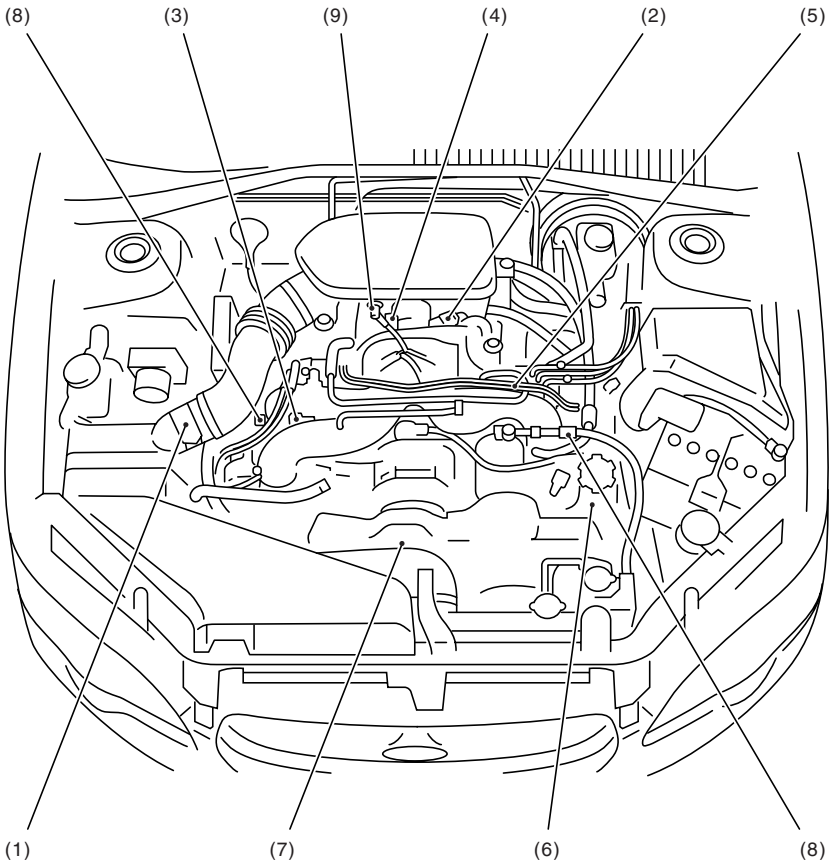


EN-02975



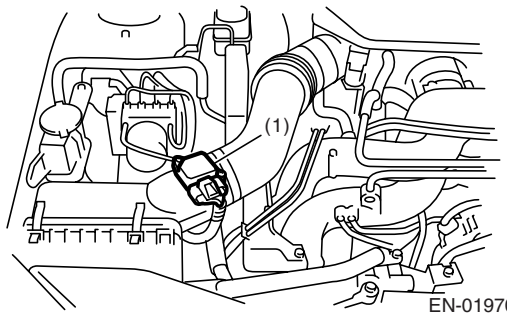
AT-01877

2. SENSOR



EN-02530

(1) Mass air flow and intake air temperature sensor (EC, EK, EH, ER and K4 model)
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor
(8) Tumble generator valve position sensor (EC, EK, EH, ER and K4 model)
(9) Intake air temperature sensor (KA and KS model)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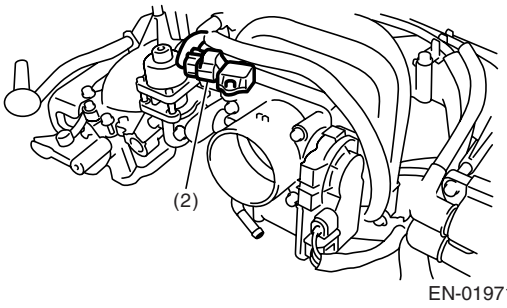
EN-01970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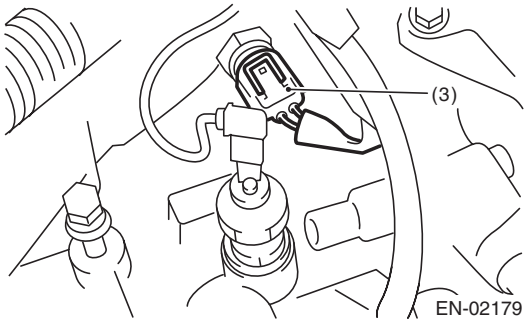
EN-01971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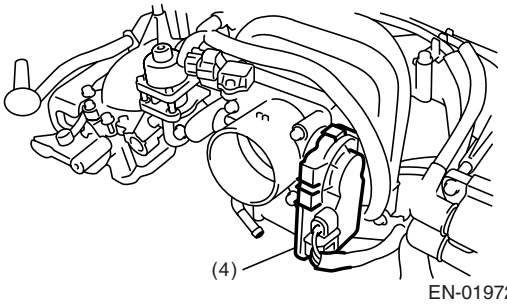
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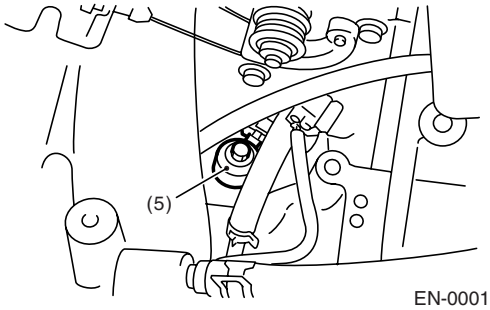
EN-01972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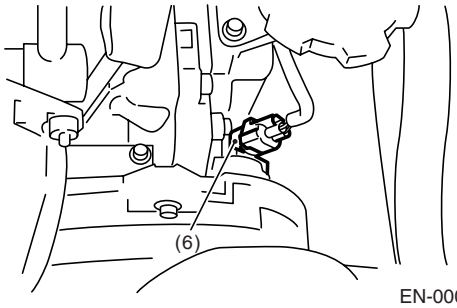
EN-00010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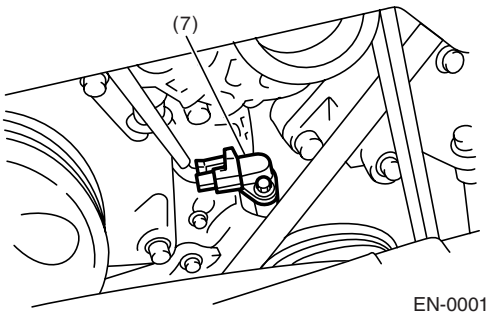
EN-00011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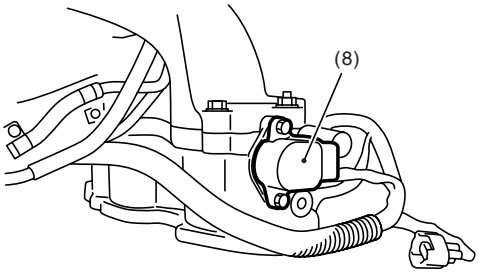
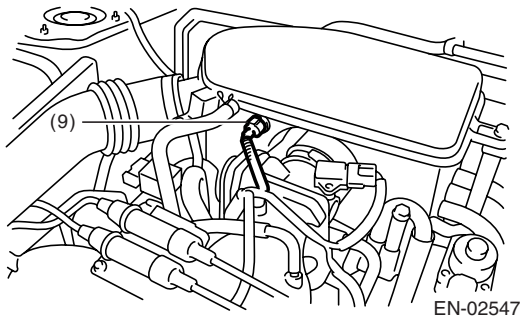
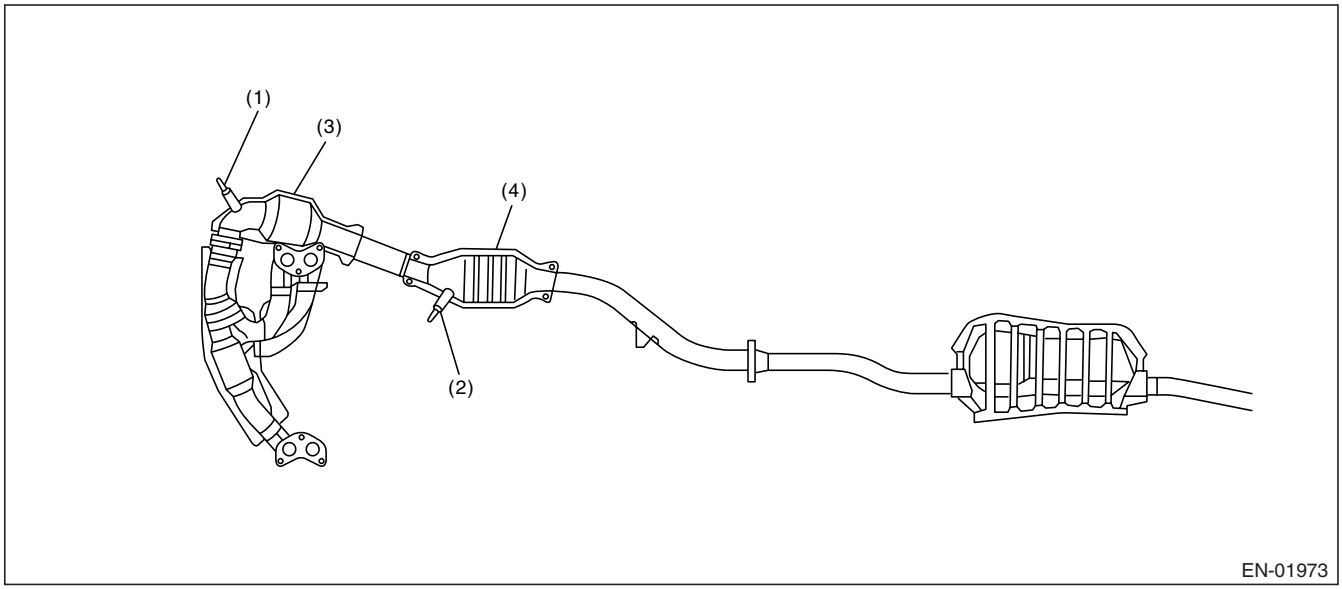
EN-00012


(8)
EN-02531

Electrical Component Location

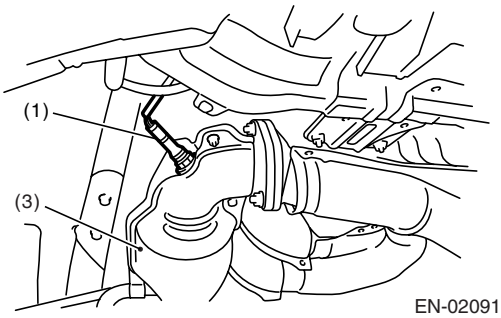


EN-02547

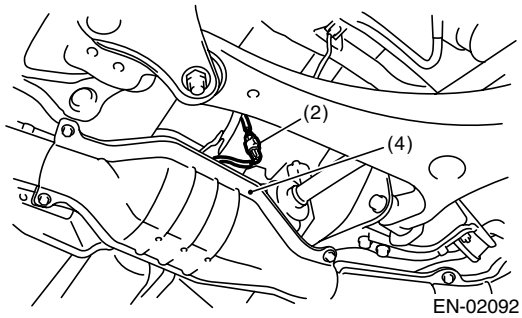


EN-01973

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

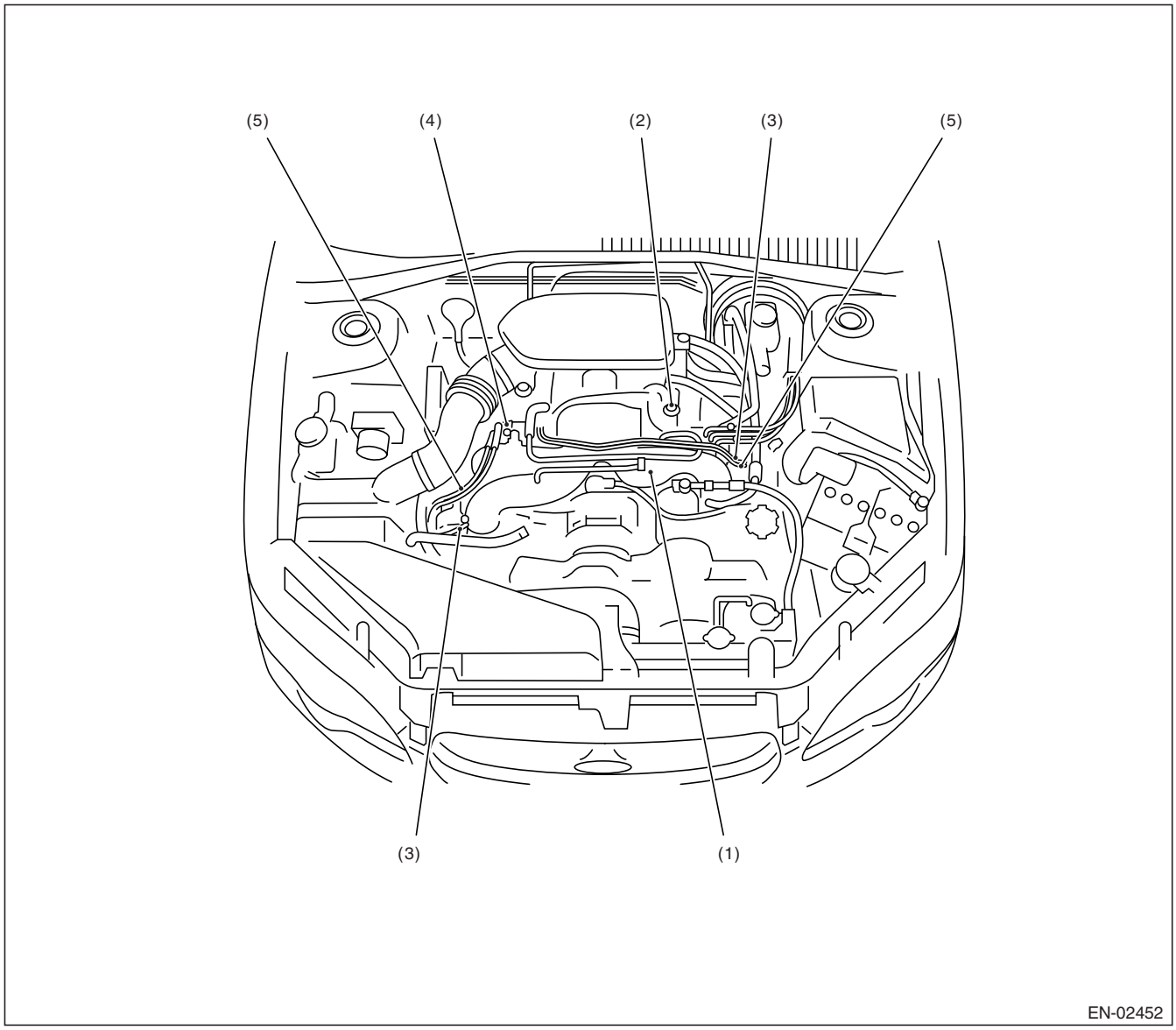


EN-02091



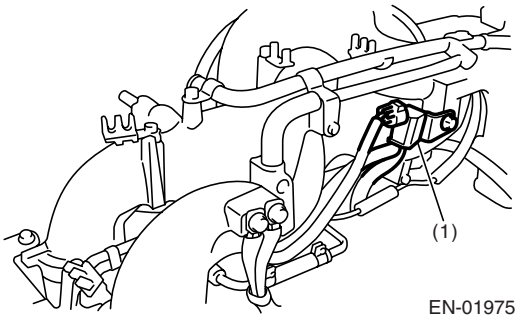
EN-02092

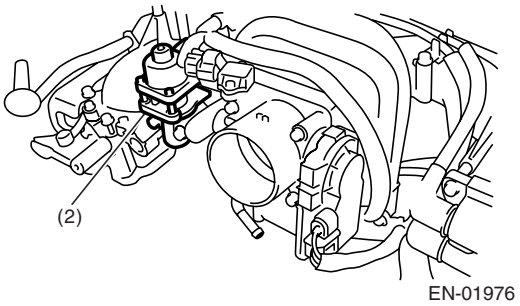
3. SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

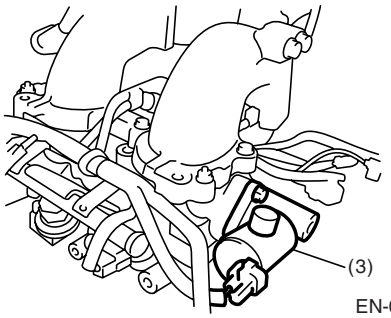


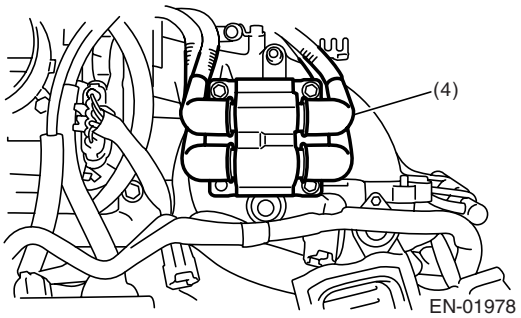
(1) Purge control solenoid valve
(2) EGR valve (EC, EK, EH, ER and K4 model)
(3) Tumble generator valve actuator (EC, EK, EH, ER and K4 model)
(4) Ignition coil and ignitor ASSY
(5) Fuel injector

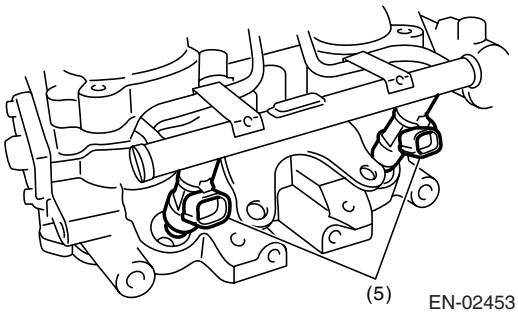
Electrical Component Location



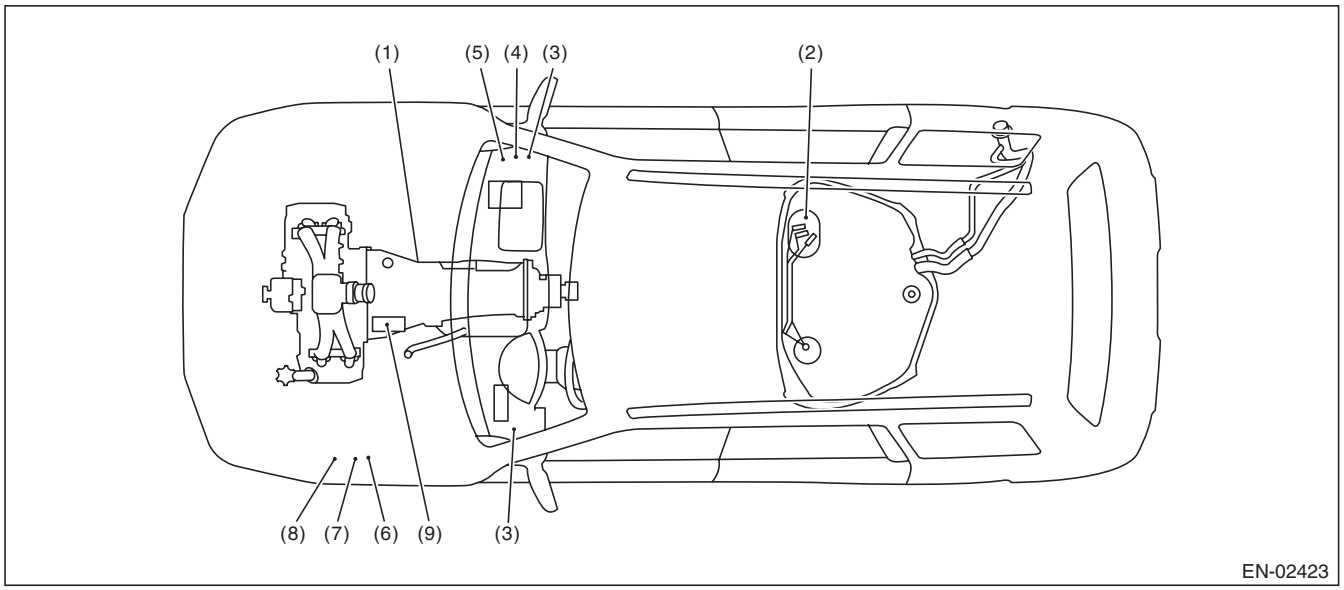




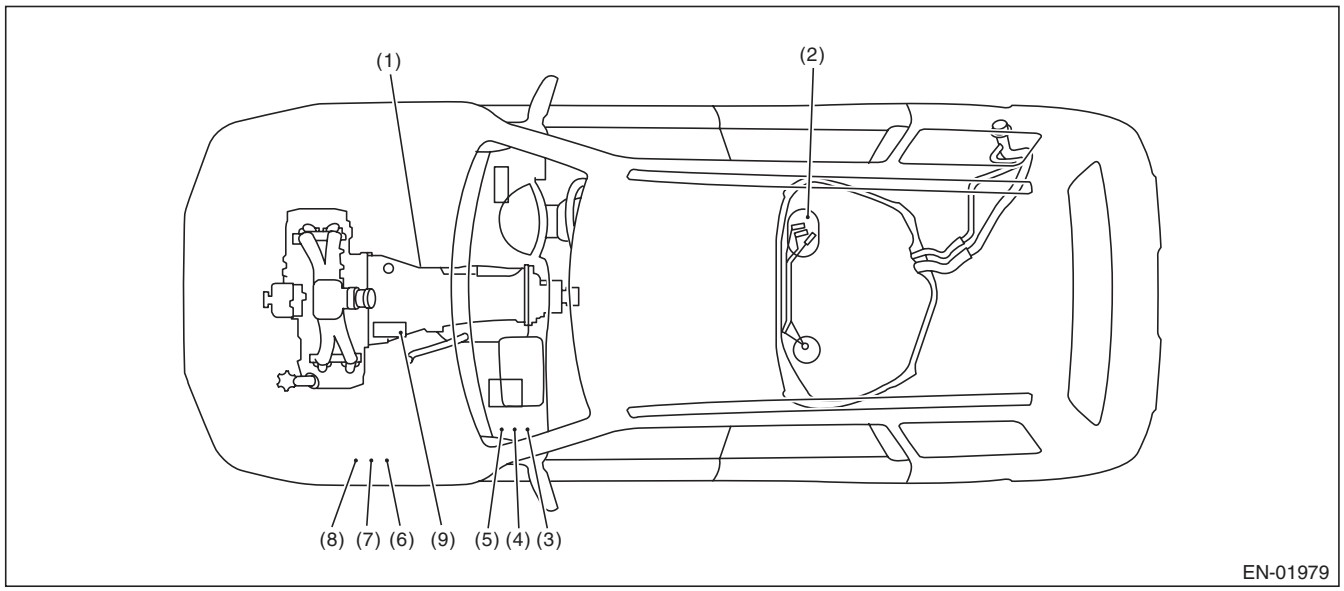




- LHD model

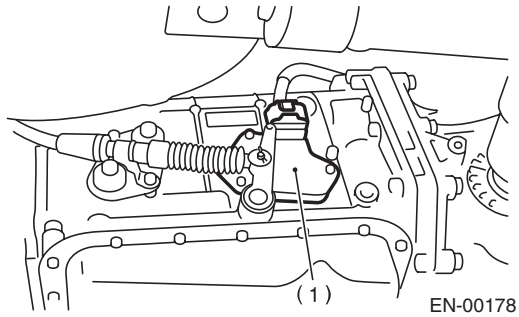


- RHD model

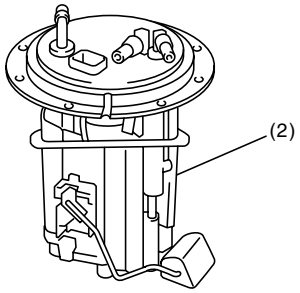


(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator main fan relay 1
(7) Radiator sub fan relay
(8) Radiator main fan relay 2
(9) Starter

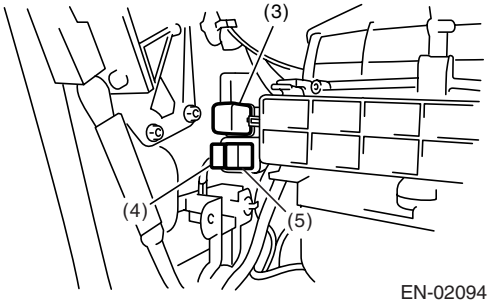
Electrical Component Location



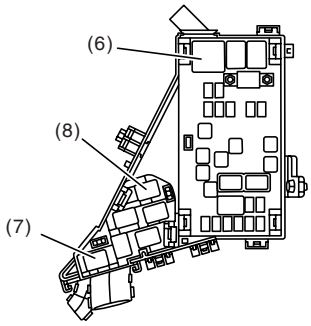
EN-00178



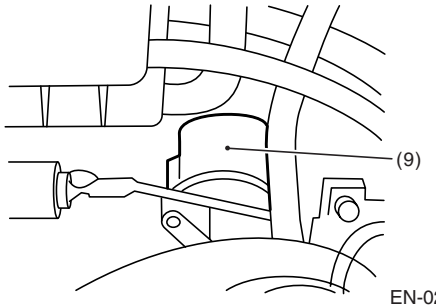
EN-02093



EN-02094



EN-02095

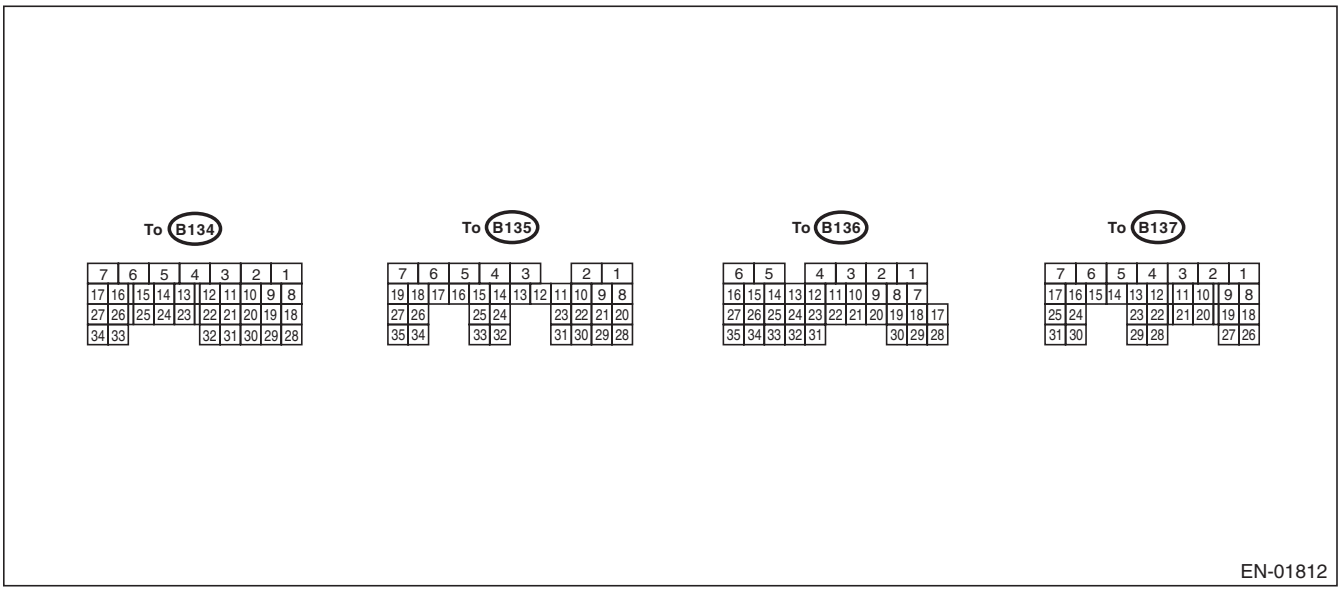


EN-02096

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION

NOTE:
KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.



Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B135	10	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	22	0	0	—
	Shield	B135	31	0	0	—
Camshaft position sensor	Signal (+)	B135	11	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	23	0	0	—
	Shield	B135	31	0	0	—
Electronic throttle control	Main	B136	18	0.64 — 0.72 Fully opened: 3.96	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully opened: 3.96
	Sub	B136	29	1.51 — 1.58 Fully opened: 4.17	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully opened: 4.17
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor relay		B135	35	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator pedal position sensor	Main	B136	17	Fully closed: 1 Fully opened: 3.3	Fully closed: 1 Fully opened: 3.3	—
	Power supply	B136	15	5	5	—
	Ground	B136	34	0	0	—
	Sub	B136	28	Fully closed: 1 Fully opened: 3.3	Fully closed: 1 Fully opened: 3.3	—

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Rear oxygen sensor	Signal	B137	24	0	0 — 0.9	—
	Shield	B137	31	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B134	3	0 — 1.0	0 — 1.0	—
	Signal 2	B134	2	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B135	2	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor		B136	14	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
Tumble generator valve RH (open)		B134	19	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve RH (close)		B134	18	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (open)		B134	29	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (close)		B134	28	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve position sensor RH		B136	27	Fully opened: 0.2 — 1.0 Fully closed: 4.2 — 4.7		—
Tumble generator valve position sensor LH		B136	26	Fully opened: 0.2 — 1.0 Fully closed: 4.2 — 4.7		—
Starter switch		B137	8	0	0	Cranking: 8 — 14
Starter relay		B135	32	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C switch (Model with immobilizer)		B137	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
A/C switch (Model without immobilizer)		B137	16	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch (Model with immobilizer)		B137	14	10 — 13	13 — 14	—
Ignition switch (Model without immobilizer)		B137	15	10 — 13	13 — 14	—
Neutral position switch		B137	9	ON: 0 OFF: 12±0.5		• Switch is ON when shifted into “P” or “N” range. (AT model) • Switch is ON when shifted into “N” range. (MT model)
Test mode connector (Model with immobilizer)		B137	15	10 — 13		When connected: 0
Test mode connector (Model without immobilizer)		B137	14	10 — 13		When connected: 0
Knock sensor	Signal	B136	25	2.8	2.8	—
	Shield	B136	33	0	0	—
Backup power supply		B135	19	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B135	6	10 — 13	13 — 14	—
		B135	5	10 — 13	13 — 14	—
Sensor power supply	1	B136	16	5	5	—
	2	B136	15	5	5	—
Ignition control	1	B135	18	0	1 — 3.4	Waveform
	2	B135	17	0	1 — 3.4	Waveform

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel injector	#1	B136	6	10 — 13	1 — 14	Waveform
	#2	B136	5	10 — 13	1 — 14	Waveform
	#3	B136	4	10 — 13	1 — 14	Waveform
	#4	B136	3	10 — 13	1 — 14	Waveform
Fuel pump relay control (Model with immobilizer)		B135	27	ON: 0.5 or less OFF: 10 — 13	0.5 or less	—
Fuel pump relay control (Model without immobilizer)		B135	26	ON: 0.5 or less OFF: 10 — 13	0.5 or less	—
A/C relay control		B135	33	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	31	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B135	34	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Self-shutoff control (Model with immobilizer)		B137	16	10 — 13	13 — 14	—
Self-shutoff control (Model without immobilizer)		B137	17	10 — 13	13 — 14	—
Malfunction indicator light		B134	17	—	—	Light ON: 1 or less Light OFF: 10 — 14
Engine speed output		B134	23	—	0 — 13 or more	Waveform
Purge control solenoid valve		B134	14	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
EGR solenoid valve	Signal A+	B134	11	0 or 10 — 13	0 or 10 — 13	—
	Signal A–	B134	10	0 or 10 — 13	0 or 10 — 13	—
	Signal B+	B134	9	0 or 10 — 13	0 or 10 — 13	—
	Signal B–	B134	8	0 or 10 — 13	0 or 10 — 13	—
Power steering switch		B137	10	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Blower fan switch		B137	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C middle pressure switch		B136	30	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal 1		B134	33	—	2.05 — 2.25	—
Front oxygen (A/F) sensor signal 2		B134	26	—	1.75 — 1.95	—
Front oxygen (A/F) sensor shield		B134	25	0	0	—
Manifold absolute pressure sensor		B136	22	4.0 — 4.8	1.1 — 1.9	—
Air flow sensor	Signal	B136	23	—	0.3 — 4.5	—
	Shield	B136	32	0	0	—
	Ground	B136	31	0	0	—
Intake air temperature sensor		B136	13	3.15 — 3.33	3.15 — 3.33	Intake air temperature: 25°C (75°F)
Generator control		B134	22	0 — 6.5	0 — 6.5	—
SSM communication line		B137	20	Less than 1←→ More than 4	Less than 1←→ More than 4	—
GND (sensor)	1	B136	35	0	0	—
	2	B136	34	0	0	—
GND (injector)		B137	7	0	0	—

Engine Control Module (ECM) I/O Signal

Description	Connector No.	Terminal No.	Signal (V)		Reference
			Ignition SW ON (engine OFF)	Engine ON (idling)	
GND (ignition system)	B135	12	0	0	—
GND (power supply)	B135	4	0	0	—
	B135	1	0	0	—
GND (control system)	B137	2	0	0	—
	B137	1	0	0	—
GND (oxygen sensor heater 1)	B134	7	0	0	—
GND (oxygen sensor heater 2)	B134	6	0	0	—
GND (electronic throttle control)	B137	3	0	0	—
Cruise control main switch	B136	7	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Cruise control clutch switch	B136	10	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
Brake switch 1	B136	9	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2	B136	8	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch	B136	11	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	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	Specifications
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm racing

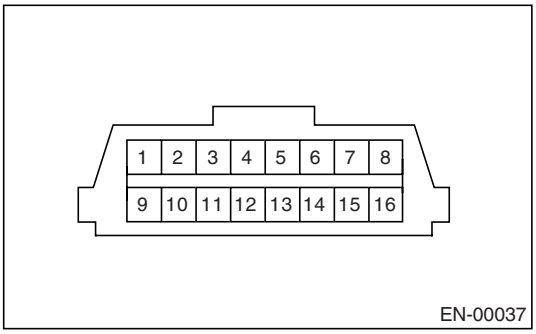
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for connecting the Subaru Select Monitor.

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool because the circuit for Subaru Select Monitor may be damaged.



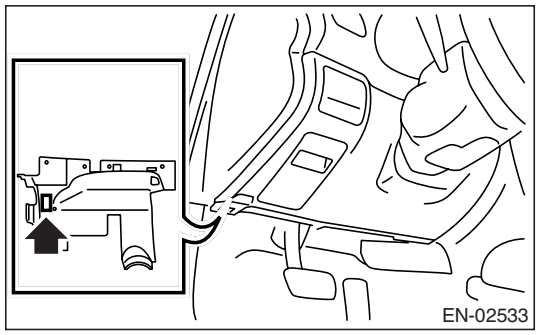
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1) Prepare a general 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 DTC and freeze frame 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
Read out the data according to repair procedures. (For detailed operation procedure, refer to the general scan tool operation manual.)

NOTE:
For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.5)(diag)-69, 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 or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa, inHg or psig
0C	Engine revolution	rpm
0D	Vehicle speed	km/h or MPH
0E	Ignition timing advance	°
0F	Intake air temperature	°C or °F
10	Air flow rate from mass air flow sensor	g/s or lb/m
11	Throttle valve absolute opening angle	%
13	Check whether oxygen sensor is installed	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor	V and %
1C	Supporting OBD system	—
21	Driving distance after MIL illuminates	km or miles
24	A/F value and A/F sensor output voltage	— and V
34	A/F sensor lambda valve and current	— and mA

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 for freeze frame data	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa, inHg or psig
0C	Engine speed	rpm
0D	Vehicle speed	km/h or MPH
0E	Ignition timing advance	°
0F	Intake air temperature	°C or °F
10	Air flow rate from mass air flow sensor	g/s or lb/m
11	Throttle valve absolute opening angle	%

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

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

Refer to "Read Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4SO 2.5)(diag)-69, 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.

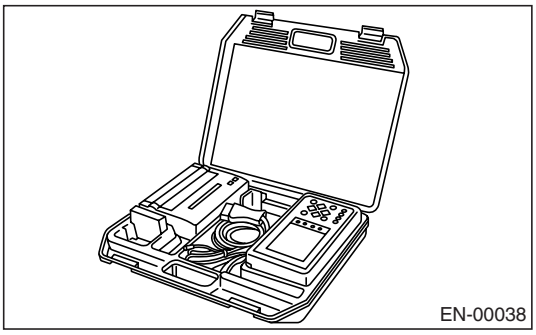
NOTE:
Refer to general scan tool manufacturer's operation manual to clear or reset emission-related diagnostic information (MODE $04).

9. Subaru Select Monitor

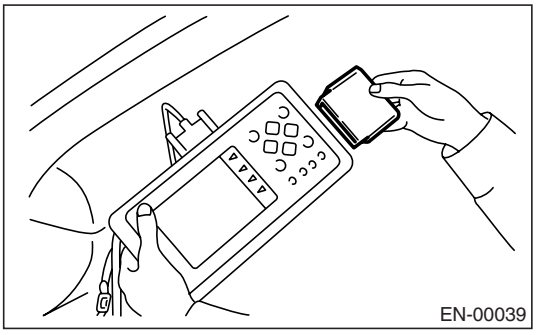
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>

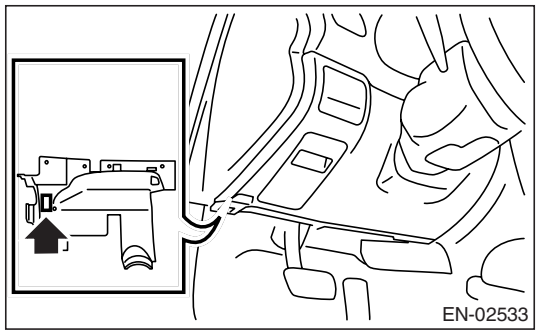

EN-00038

2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>


EN-00039

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

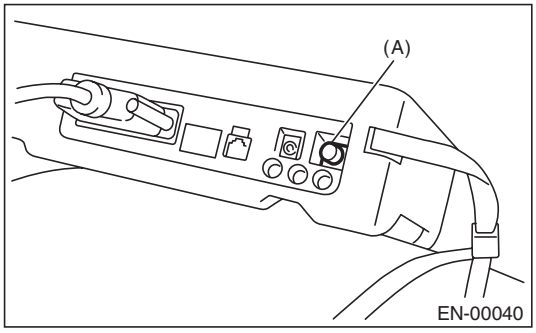
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).


EN-02533

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

5) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



EN-00040

(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.5)(diag)-32, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.5)(diag)-32, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Content	Display	Unit of measure	Note (at idling)
Engine load	Engine Load	%	3.5%
Engine coolant temperature signal	Coolant Temp.	°C or °F	≥ 75 °C or 167°F
A/F correction 1	A/F Correction #1	%	−10 — +10%
A/F learning 1	A/F Learning #1	%	−15 — +15%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	200 — 300 mmHg, 26.7 — 40 kPa, 7.8 — 11.8 inHg or 3.8 — 5.8 psig
Engine speed signal	Engine Speed	rpm	600 — 800 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h or MPH	0 km/h or 0 MPH (at parking)
Ignition timing signal	Ignition Timing	deg	12.5 — 13.5 deg
Intake air temperature signal	Intake Air Temp.	°C or °F	(Ambient air temperature)
Amount of intake air	Mass Air Flow	g/s or lb/m	2.8 — 3.2 g/s or 0.37 — 0.42 lb/m
Throttle opening angle signal	Throttle Opening Angle	%	1.2 — 1.6%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0.6 — 0.85 V
Battery voltage	Battery Voltage	V	12 — 14 V
Mass air flow voltage	Air Flow Sensor Voltage	V	1.1 — 1.2 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2.56 — 3.3 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Atmospheric pressure signal	Atmosphere Pressure	mmHg, kPa, inHg or psig	(Atmosphere pressure)
Intake manifold relative pressure	Mani. Relative Pressure	mmHg, kPa, inHg or psig	(Intake manifold absolute pressure − Atmospheric pressure)
Acceleration opening angle signal	Accel. Opening Angle	%	0.0%
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 3%
Tumble generator valve position sensor signal RH	TGV Position Sensor R	V	0 — 12
Tumble generator valve position sensor signal LH	TGV Position Sensor L	V	0 — 12
EGR step number	No. of EGR steps	STEP	0
Generator duty ratio	ALT Duty	%	0%
A/F sensor current value 1	A/F Sensor #1 Current	mA	−0.2 — 0.2 mA
A/F sensor resistance value 1	A/F Sensor #1 Resistance	Ω	28 — 31 mA
A/F sensor output lambda 1	A/F Sensor #1	—	0.85 — 1.05
A/F correction 3	A/F Correction #3	%	5.08%
A/F learning 3	A/F Learning #3	%	0%
Throttle motor duty	Throttle Motor Duty	%	−12 — −20%
Throttle power supply voltage	Throttle Motor Voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub-Throttle Sensor	V	1.48 — 1.50 V
Main throttle sensor voltage	Main-throttle Sensor	V	0.62 V

Content	Display	Unit of measure	Note (at idling)
Sub acceleration sensor voltage	Sub-Accelerator Sensor	V	1.12 V
Main acceleration sensor voltage	Main-Accelerator Sensor	V	0.98 — 1.0 V
Memory vehicle speed	Memorized Cruise Speed	km/h or MPH	0 km/h or 0 MPH
Fuel level sensor resistance	Fuel level resistance	Ω	4 — 100 Ω
#1 cylinder roughness monitor	Roughness Monitor #1	—	0
#2 cylinder roughness monitor	Roughness Monitor #2	—	0
#3 cylinder roughness monitor	Roughness Monitor #3	—	0
#4 cylinder roughness monitor	Roughness Monitor #4	—	0
AT/MT identification terminal	AT Vehicle ID Signal	—	ON/OFF
Test mode terminal	Test mode terminal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch signal	P/S Switch	—	OFF (At OFF)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Steering wheel switch signal	Handle Switch	—	Hi/Low
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	Rich/Lean
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Signal	—	OFF
Camshaft position sensor signal	Camshaft Position Signal	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Wiper switch signal	Wiper Switch	—	OFF (At OFF)
A/C middle pressure switch signal	A/C Mid Pressure Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF (At OFF)
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF (At OFF)
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF (At OFF)
Fuel pump relay signal	Fuel Pump Relay	—	ON
Tumble generator valve output signal	TGV Output	—	OFF
Tumble generator valve drive signal	TGV Drive	—	Open
AT coordinate retard angle demand signal	Retard Signal from AT	—	OFF
AT coordinate fuel cut demand signal	Fuel Cut Signal from AT	—	OFF
Ban of torque down signal	Ban of Torque Down	—	ON/OFF
Request torque down signal	Request Torque Down VDC	—	ON or OFF
AT coordinate permission signal	Torque Permission Signal	—	ON
ETC motor relay signal	ETC Motor Relay	—	ON
Clutch switch signal	Clutch Switch	—	OFF (At OFF)
Stop light switch signal	Stop Light Switch	—	OFF (At OFF)
SET/COAST switch signal	SET/CST Switch	—	OFF (At OFF)
RESUME/ACCEL switch signal	RES/ACC Switch	—	OFF (At OFF)
Brake switch signal	Brake Switch	—	OFF (At OFF)
Main switch signal	Main Switch	—	OFF (At OFF)
Integrated module data reception	Body Int. Unit Data	—	ON
Integrated module data update	Body Int. Unit Count	—	ON
Cancel switch signal	CC Cancel SW	—	OFF (At OFF)

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
6) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Description	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	0
Condition of malfunction indicator light	MI (MIL)	OFF
Monitoring test of misfire	Misfire monitoring	complete
Monitoring test of fuel system	Fuel system monitoring	complete
Monitoring test of comprehensive component	Component monitoring	complete
Test of catalyst	Catalyst Diagnosis	complete
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete
Test of EGR system	EGR system	complete

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.

• A list of the support data is shown in the following table.

Description	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing signal	Ignition Timing	°
Amount of intake air	Mass Air Flow	g/s or lb/m
Intake air temperature signal	Intake Air Temp	°C
Throttle position signal	Throttle Opening Angle	%

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save}, and then press the [YES] key.
5) On the «Data Display» screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Message	LED "ON" requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Clear memory signal	Clear Memory Terminal	ON or OFF	Clear memory connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Steering wheel switch signal	Handle Switch	RHD or LHD	When handle switch signal is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan SW	ON or OFF	When blower fan switch is turned ON.
Light switch signal	Light Switch	ON or OFF	When light switch is turned ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned ON.
Windshield wiper switch signal	Wiper Switch	ON or OFF	When windshield wiper switch is turned ON.
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When A/C middle pressure switch is turned ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON
Tumble generator valve output signal	TGV Output	ON or OFF	ON

Remarks	Display	Message	LED “ON” requirements
Tumble generator valve drive signal	TGV Drive	Open or Close	Opening direction
AT retard angle demand signal	Retard Signal	ON or OFF	When AT retard angle demand signal is input.
AT fuel cut signal	Fuel Cut	ON or OFF	When AT fuel cut signal is input.
Ban of torque down signal	Ban of Torque Down	ON or OFF	When ban of torque down signal is input.
Request torque down signal	Request Torque Down	ON or OFF	When request torque down signal is input.
AT coordinate permission signal	Torque Permission Signal	ON or OFF	When AT coordinate permission signal is input.
Electronic throttle control motor relay signal	ETC Motor Relay	ON or OFF	When electronic throttle control motor relay is in function.
Clutch switch signal	Clutch Switch	ON or OFF	When clutch switch is turned to ON.
Stop light switch signal	Stop Light Switch	ON or OFF	When stop switch is turned to ON.
SET/COAST switch signal	SET/CST Switch	ON or OFF	When SET/CST switch is turned to ON.
RESUME/ACCEL switch signal	RES/ACC Switch	ON or OFF	When RES/ACC switch is turned to ON.
Brake switch signal	Brake Switch	ON or OFF	When brake switch is turned to ON.
Main switch signal	Main Switch	ON or OFF	When main switch is turned to ON.
Data reception signal	Body Int. Unit Data	ON or OFF	When data reception signal is entered.
Counter update signal	Body Int. Unit Count	ON or OFF	When counter update signal is entered.
Cancel switch signal	Cancel Switch	ON or OFF	When cancel switch is turned to ON.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

10. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {Diagnostic Code(s) Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>

3. GENERAL SCAN TOOL

Refer to the data denoting emission-related powertrain DTC.
For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to the general scan tool manufacturer’s operation 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 the item on the drive cycle. <Ref. to EN(H4SO 2.5)(diag)-38, Drive Cycle.>

NOTE:
KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

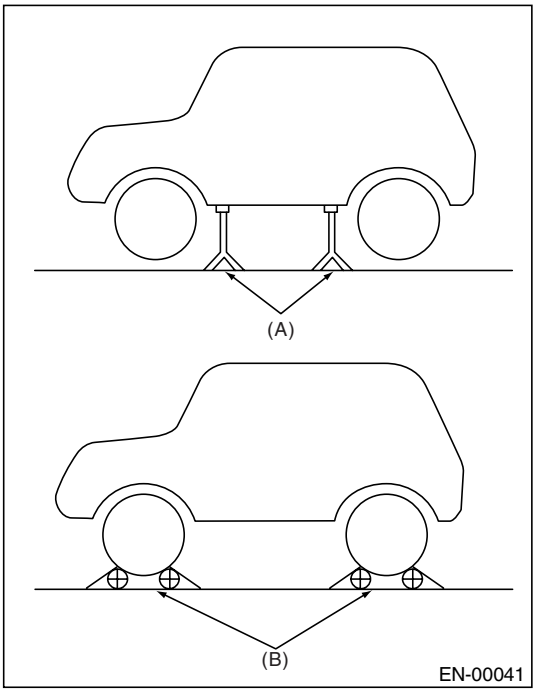
DTC	Item	Condition
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
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)	—
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
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)	—
P0172	System Too Rich (Bank 1)	—
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	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—
P0400	Exhaust gas recirculation flow	—
P0458	Evaporative Emission System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor “A” Circuit Low	—
P0463	Fuel Level Sensor “A” Circuit High	—
P0500	Vehicle Speed Sensor “A”	—
P0512	Starter Request Circuit	—
P0513	Incorrect Immobilizer Key	—
P0519	Idle Air Control System performance	—
P0600	Serial Communication Link	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0607	Control Module Performance	—
P0638	Throttle Actuator Control Range/Performance (Bank 1)	—
P0691	Fan 1 Control Circuit Low	—
P0692	Fan 1 Control Circuit High	—
P0851	Park/Neutral Position Switch Input Circuit Low	—

DTC	Item	Condition
P0852	Park/Neutral Position Switch Input Circuit High	—
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	—
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	—
P1160	Return Spring Failure	—
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)	—
P1518	Starter Switch Circuit Low Input	—
P1560	Back-up Voltage Circuit Malfunction	—
P1570	Antenna	—
P1571	Reference Code Incompatibility	—
P1572	IMM Circuit Failure	—
P1574	Key Communication Failure	—
P1576	EGI Control Module EEPROM	—
P1577	IMM Control Module EEPROM	—
P1578	Meter Failure	—
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	Engine coolant temperature at engine start is –5 — 5°C (–41 — 41°F)
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	Engine coolant temperature at engine start is –5 — 5°C (–41 — 41°F)
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	—
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	—
P2008	Intake Manifold Runner Control Circuit / Open (Bank 1)	—
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	—
P2011	Intake Manifold Runner Control Circuit / Open (Bank 2)	—
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	—
P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)	—
P2017	Intake Manifold Runner Position Sensor / Switch Circuit High (Bank 1)	—
P2021	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 2)	—
P2022	Intake Manifold Runner Position Sensor / Switch Circuit High (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	—
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	—
P2503	Charging System Voltage Low	—

1. PREPARATION FOR THE INSPECTION MODE

1) Check that the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

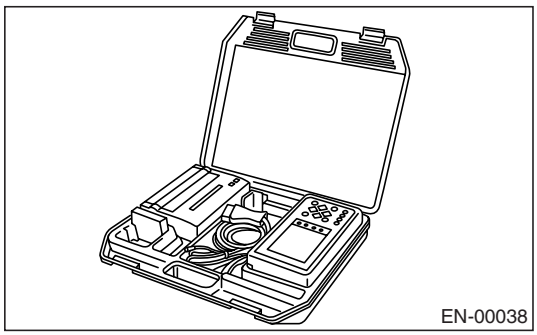
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



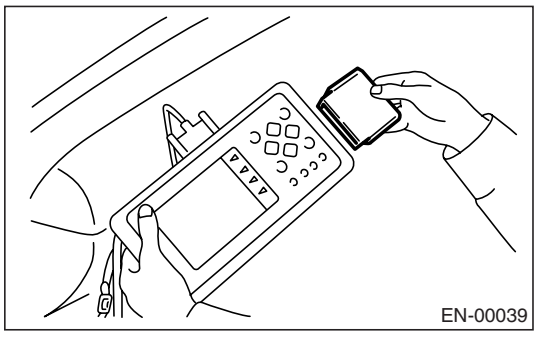
(A) Rigid racks
(B) Free rollers

2. SUBARU SELECT MONITOR

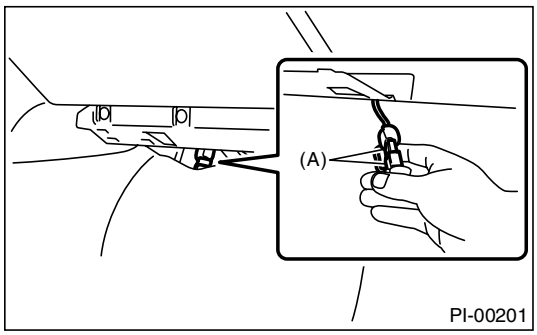
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



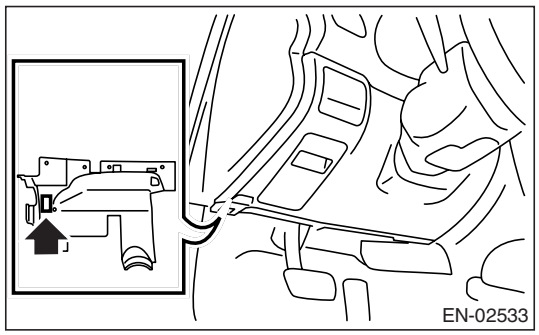
4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located at the lower portion of glove box.

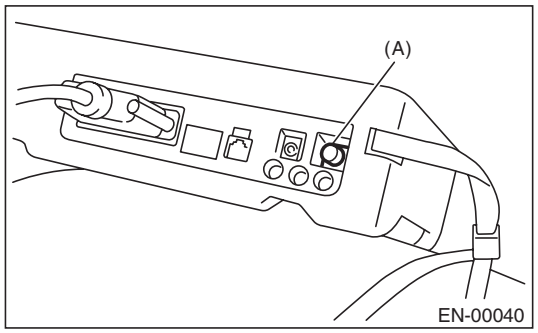


7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

8) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



(A) Power switch

9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type has been displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the "Perform D Check?" is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.

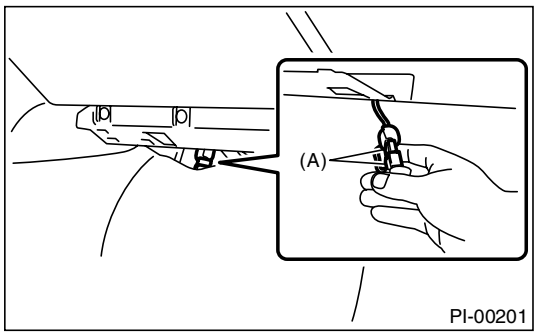
• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>

• Release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis function.

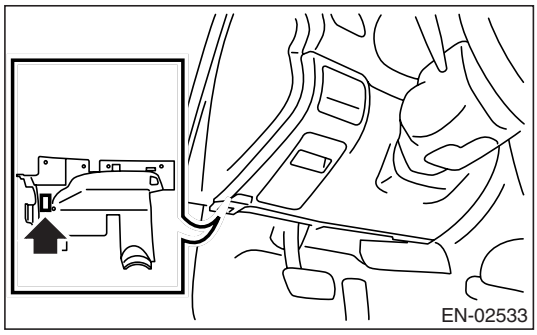
3. GENERAL SCAN TOOL

1) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.>
2) Idle the engine.
3) Connect the test mode connector (A) located at the lower portion of glove box.



4) Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in "P" position before starting. (AT model)
• Depress the clutch pedal when starting the engine. (MT model)

6) Using the select lever or shift lever, turn the "P" position switch and the "N" position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT model)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.

9) Shift the select lever or shift lever in the “D” range (AT model) or “1st” gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• For AWD model, release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the general scan tool, check DTC and record the result(s).

NOTE:
• For detailed operation procedure, refer to the general scan tool operation manual.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”.
<Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>

12. Drive Cycle

A: PROCEDURE

There are three drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the repair of the following trouble items, be sure to drive the vehicle with the specified drive patterns to check whether the function is resumed correctly.

NOTE:
KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

1. PREPARATION FOR DRIVE CYCLE

1) Check that the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Perform the diagnosis after warming up the engine except when the engine coolant temperature at starting is specified.
• Perform the diagnosis twice if the DTC marked with *. After completing the first diagnosis, stop the engine and perform second diagnosis in same condition.

2. DRIVE THE VEHICLE WITH 80 KM/H (50 MPH) FOR 20 MINUTES, AND THEN IDLE THE ENGINE FOR A MINUTE.

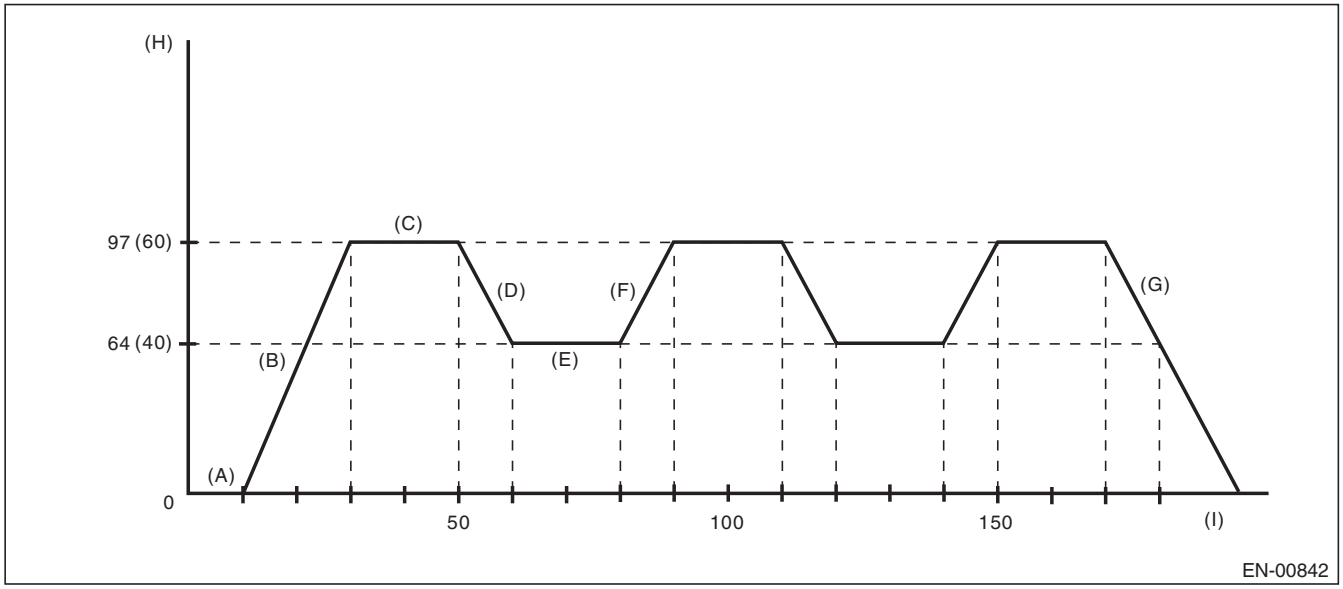
DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Engine coolant temperature at engine start is 20°C (68°F) or less.
*P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
P0459	Evaporative Emission System Purge Valve Circuit High	—

3. 10 MINUTES IDLING

NOTE:
Drive the vehicle in more than 10 km/h (6 MPH) before diagnosis.

DTC	Item	Condition
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle the engine for more than 10 seconds.
(B) Accelerate the vehicle to 97 km/h (60 MPH) within 20 seconds.
(C) Drive the vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate the vehicle to 64 km/h (40 MPH) with throttle fully closed.
(E) Drive the vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate the vehicle to 97 km/h (60 MPH) within 10 seconds.
(G) Stop the vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Sec.

DTC	Item	Condition
*P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
*P0301	Cylinder 1 Misfire Detected	Diagnosis may complete at once
*P0302	Cylinder 2 Misfire Detected	Diagnosis may complete at once
*P0303	Cylinder 3 Misfire Detected	Diagnosis may complete at once
*P0304	Cylinder 4 Misfire Detected	Diagnosis may complete at once
P0700	Transmission Control System (MIL Request)	—
P2504	Charging System Voltage High	—

13. Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor power switch to OFF.

NOTE:
• Initial diagnosis of electronic throttle control is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF, and the Subaru Select Monitor power switch to OFF.
• Initial diagnosis of electronic throttle control is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

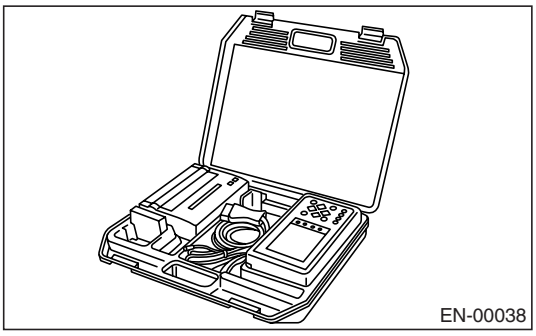
3. GENERAL SCAN TOOL

For clear memory procedures using the general scan tool, refer to the general scan tool operation manual.

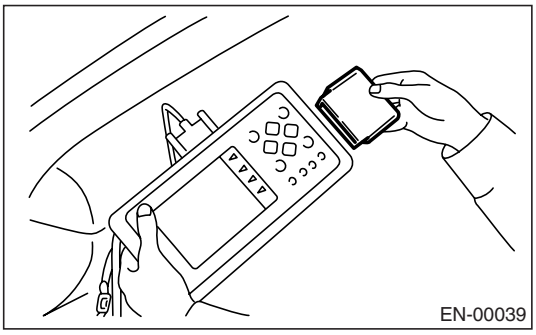
14. Compulsory Valve Operation Check Mode

A: OPERATION

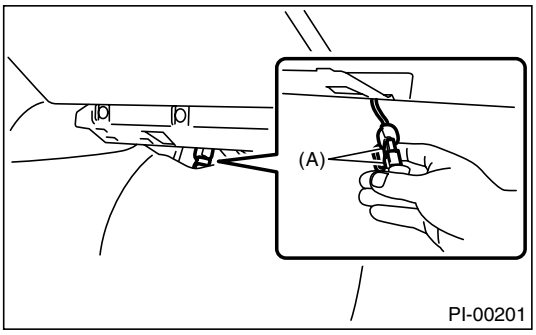
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>


EN-00038

2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>

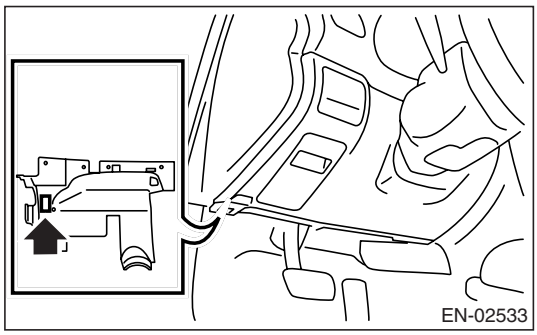

EN-00039

4) Connect the test mode connector (A) located at the lower portion of glove box.



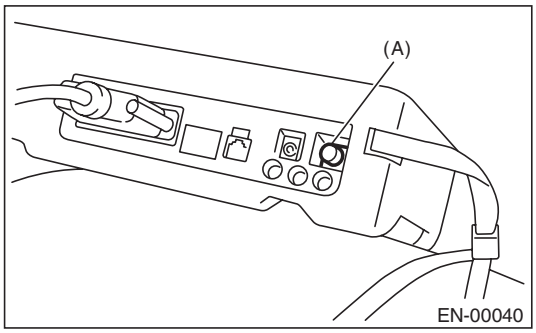
PI-00201

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


EN-02533

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

6) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor power switch to ON.



EN-00040

(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type has been displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

Description	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve

NOTE:

• The following parts will be displayed but not functional.

Display
EGR Solenoid Valve
ASV Solenoid Valve
FICD Solenoid
Pressure Switching Sol.1
Pressure Switching Sol.2
Turbocharger Wastegate Solenoid
PCV Solenoid Valve
Vent. Solenoid Valve
AAI Solenoid Valve
Tank Sensor Cntl Valve
Exhaust Bypass Valve Control Permit Flag

• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

15.Malfunction Indicator Light

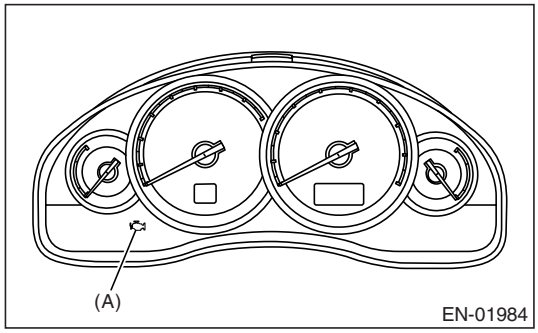
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SO 2.5)(diag)-44, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4SO 2.5)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4SO 2.5)(diag)-47, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink. <Ref. to EN(H4SO 2.5)(diag)-49, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking. <Ref. to EN(H4SO 2.5)(diag)-51, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

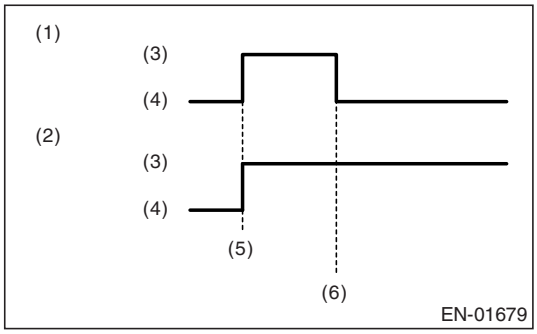
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

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 the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4SO 2.5)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>

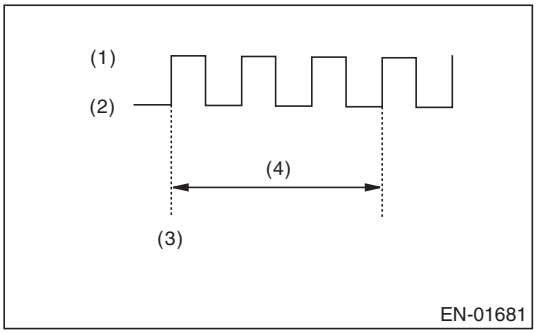


2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or emission control system is malfunctioning.



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

3) Turn the ignition switch to OFF and connect the test mode connector.
(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
(2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz. (During diagnosis)
(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.

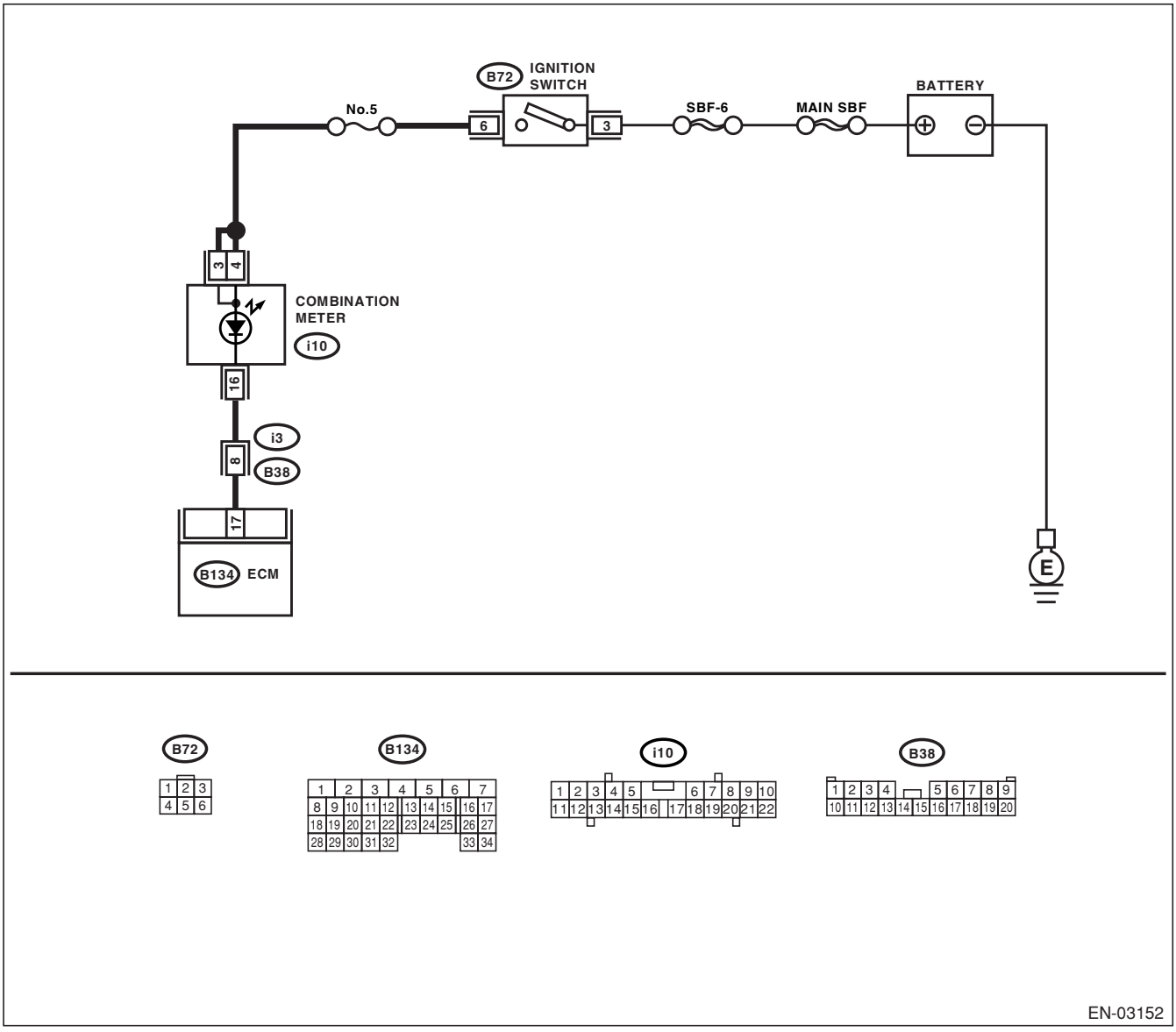


(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 sec.

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

DIAGNOSIS:
The malfunction indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.
WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

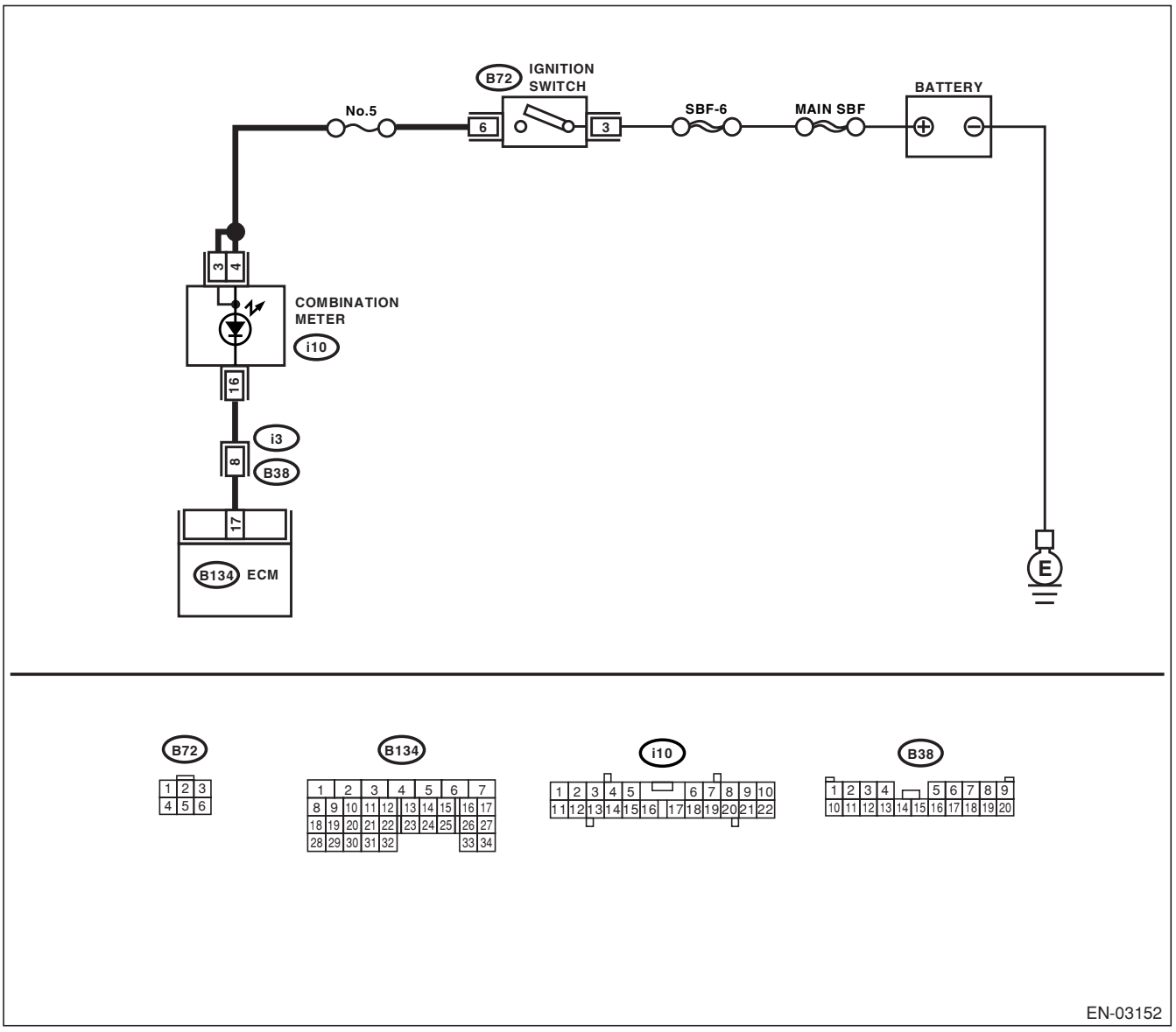
NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM 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 less than 1 V?	Go to step **5.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check for poor connection by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **4.**
4	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the connection of ECM connector.
5	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-15, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 17 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and combination meter connector • Poor contact in coupling connector
6	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the meter case assembly of combination meter. <Ref. to IDI-15, Combination Meter.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 5) • Open or short circuit of harness between fuse (No. 5) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

DIAGNOSIS:
The malfunction indicator light circuit is shorted.
TROUBLE SYMPTOM:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.
WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

DIAGNOSIS:

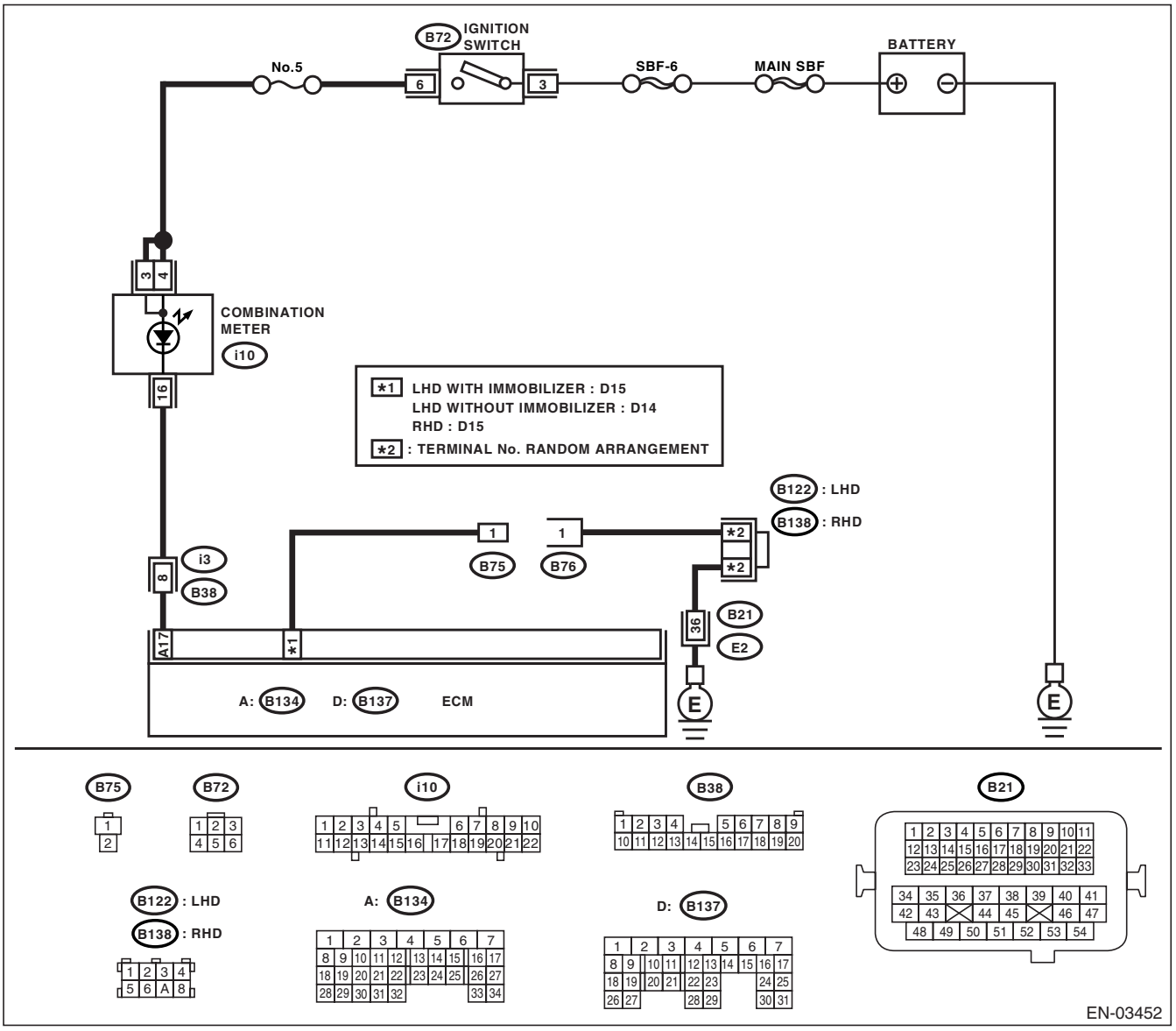
- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step **3.**	Repair the malfunction indictor light circuit. <Ref. to EN(H4SO 2.5)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
3	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between test mode connector and chassis ground
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B137) No. 15 — Chassis ground:*** ***LHD model with immobilizer*** ***(B137) No. 15 — Chassis ground:*** ***LHD model without immobilizer*** ***(B137) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and test mode connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

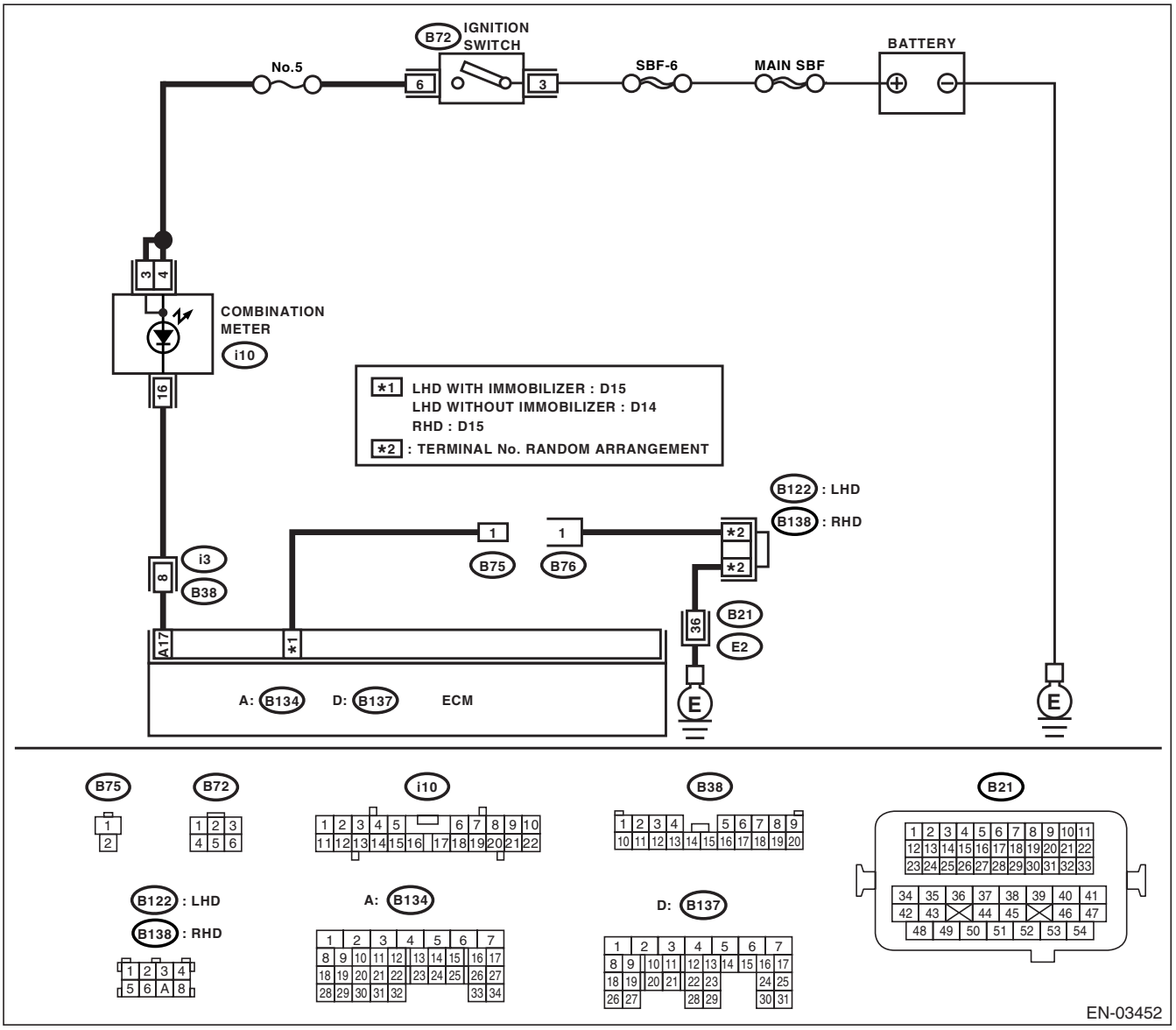
F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.

TROUBLE SYMPTOM:
Malfunction indicator light blinks when test mode connector is not connected.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **3.**	System is in good order. NOTE: Malfunction indicator light blinks when test mode connector is connected.
3	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUND TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B137) No. 15 — Chassis ground:*** ***LHD model with immobilizer*** ***(B137) No. 15 — Chassis ground:*** ***LHD model without immobilizer*** ***(B137) No. 14 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit of harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

A: PROCEDURE

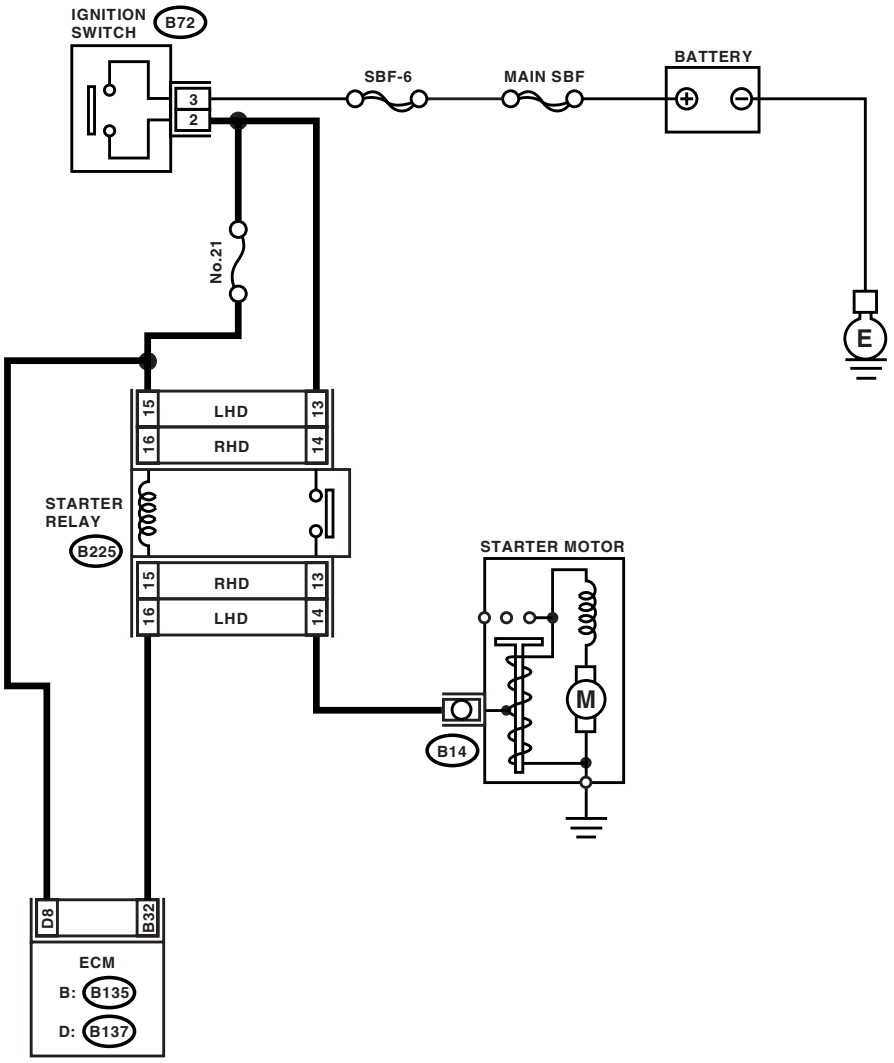
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO 2.5)(diag)-54, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO 2.5)(diag)-57, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO 2.5)(diag)-60, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO 2.5)(diag)-63, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-66, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

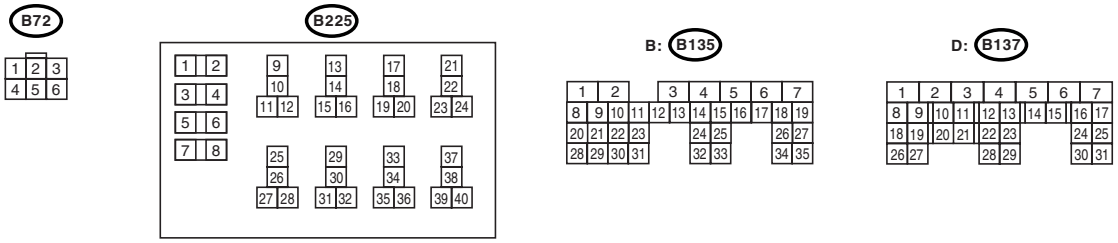
B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model





EN-03453

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **4.**	Go to step **5.**
4	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4SO 2.5)(diag)-32, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
5	**CHECK INPUT SIGNAL OF 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 power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: • For AT model, place the select lever in “P” or “N” range. • For MT model, depress the clutch pedal.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H4SO 2.0)-6, Starter.>	Go to step **6.**
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit of harness between ignition switch and battery, and check fuse SBF No. 6 and MAIN SBF.
7	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **8.**	Replace the ignition switch.

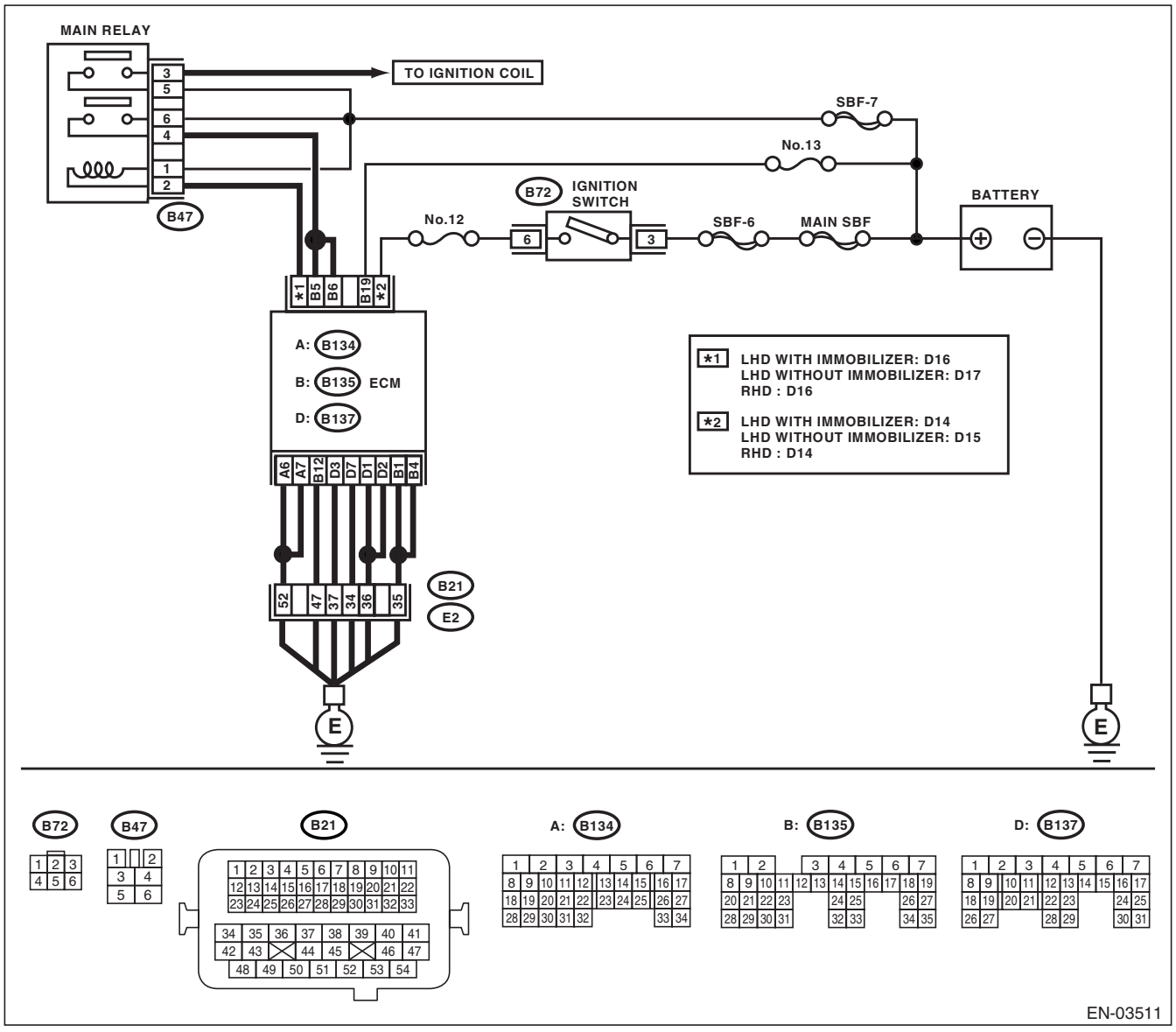
	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***LHD model*** ***(B225) No. 13 (+) — Chassis ground (−):*** ***(B225) No. 15 (+) — Chassis ground (−):*** ***RHD model*** ***(B225) No. 14 (+) — Chassis ground (−):*** ***(B225) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open circuit of harness between starter relay and ignition switch.
9	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the starter relay.
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connector from ECM. 4) Turn the ignition switch to START. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (−):*** ***(B137) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the open or ground short circuit of harness between ECM and starter relay.

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

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the main relay.
3	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B135) No. 12 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the open circuit of harness between ECM connector and engine grounding terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B137) No. 14 (+) — Chassis ground (−):*** ***LHD model with immobilizer*** ***(B137) No. 14 (+) — Chassis ground (−):*** ***LHD model without immobilizer*** ***(B137) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open or ground short circuit of power supply circuit.
6	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit of harness between ECM connector and main relay connector.

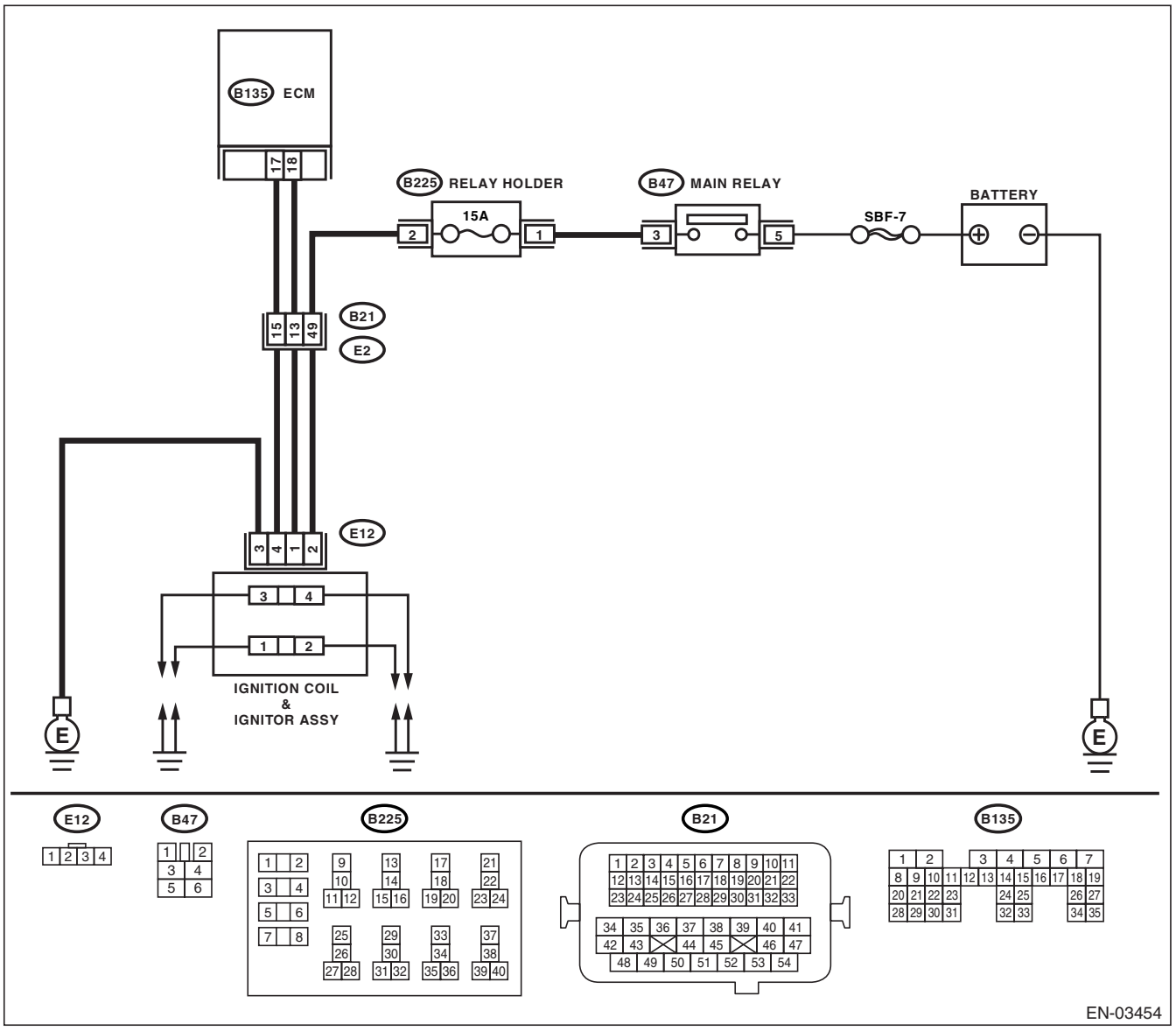
	Step	Check	Yes	No
7	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B137) No. 16 (+) — Chassis ground (−):*** ***LHD model with immobilizer*** ***(B137) No. 16 (+) — Chassis ground (−):*** ***LHD model without immobilizer*** ***(B137) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit of harness between ECM connector and main relay connector.
8	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open or ground short circuit of harness of power supply circuit.
9	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO 2.5)(diag)-60, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit of harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug thread portion on 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 the fuel pump system. <Ref. to EN(H4SO 2.5)(diag)-63, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL AND IGNITOR ASSEMBY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil and ignitor assembly. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ignition coil and ignitor assembly, and main relay connector • Poor contact in coupling connector • Blown out fuse
4	**CHECK HARNESS OF IGNITION COIL AND IGNITOR ASSEMBLY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) 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: • Open circuit of harness between ignition coil and ignitor assembly connector and engine grounding terminal
5	**CHECK IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 10 — 15 kΩ?	Go to step **6.**	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, Ignition Coil and Ignitor Assembly.>

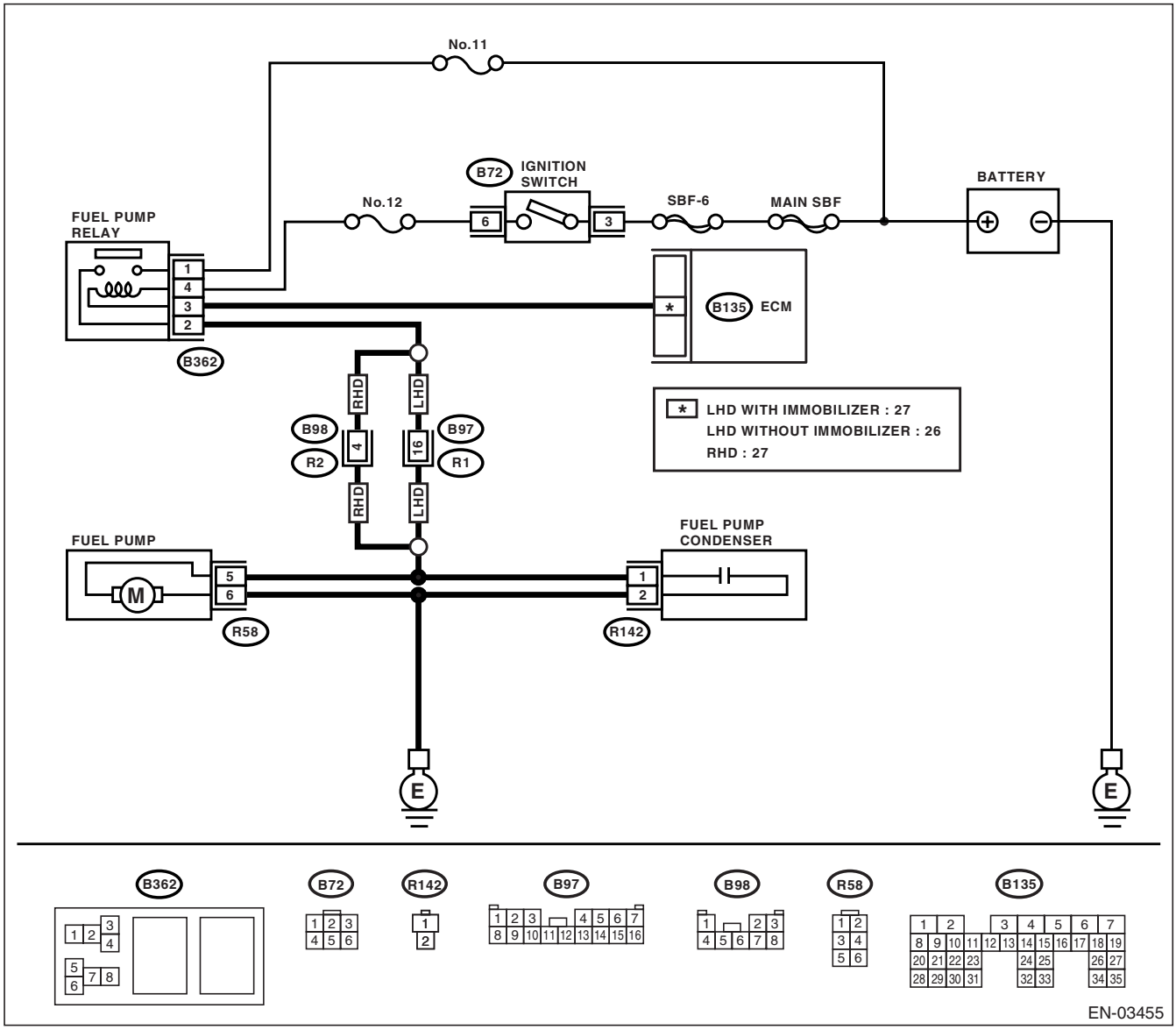
	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL OF IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Connect the connector to ignition coil and ignitor assembly. 2) Check if the voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 1 (+) — Engine ground (−):*** ***(E12) No. 4 (+) — Engine ground (−):***	Does the voltage vary more than 10 V?	Go to step **7.**	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO 2.0)-8, Ignition Coil and Ignitor Assembly.>
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil and ignitor assembly. 4) Measure the resistance of harness between ECM and ignition coil and ignitor assembly connector. ***Connector & terminal*** ***(B135) No. 18 — (E12) No. 1:*** ***(B135) No. 17 — (E12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and ignition coil and ignitor assembly connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B135) No. 18 — Engine ground:*** ***(B135) No. 17 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit of harness between ECM and ignition coil and ignitor assembly connector.
9	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel pump circuit. <Ref. to EN(H4SO 2.5)(diag)-63, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

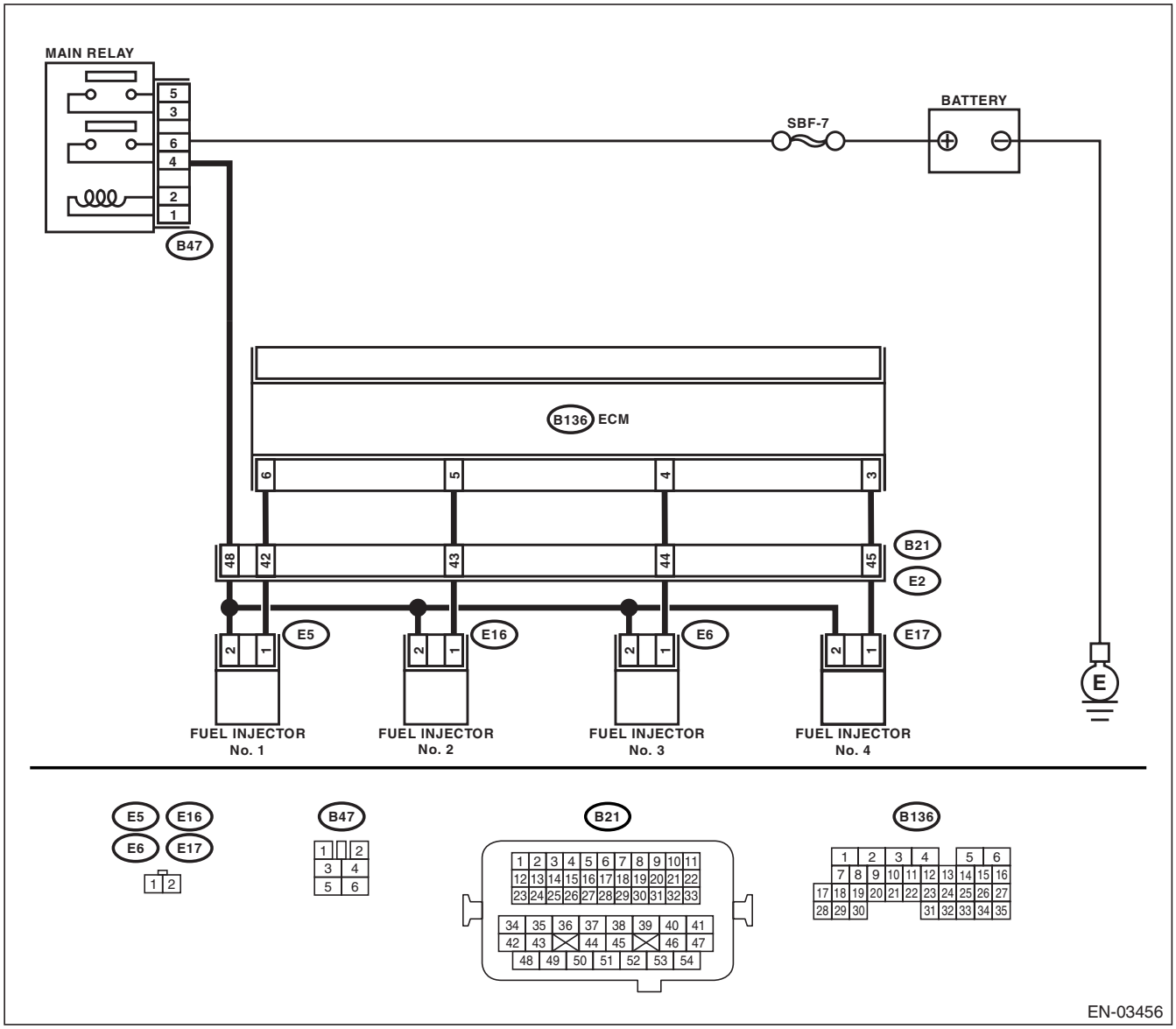
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATING 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 also be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO 2.5)(diag)-41, Compulsory Valve Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-66, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**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 connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 6 — 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: • Open circuit of harness between fuel pump connector and chassis grounding terminal
4	**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. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO 2.5)-50, Fuel Pump.>	Go to step **5.**
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 5 — (B362) 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: • Open circuit of harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
6	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit of harness between fuel pump and fuel pump relay connector.

	Step	Check	Yes	No
7	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 3 and No. 4. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Go to step **8.**	Replace the fuel pump relay. <Ref. to FU(H4SO 2.5)-50, Fuel Pump.>
8	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***RHD model*** ***(B135) No. 27 — (B362) No. 3:*** ***LHD model with immobilizer*** ***(B135) No. 27 — (B362) No. 3:*** ***LHD model without immobilizer*** ***(B135) No. 26 — (B362) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit of harness between ECM and fuel pump relay connector.
9	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-66, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**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 for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO 2.0)-27, INSPECTION, Fuel Pressure.>	Go to step **3.**
3	**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 more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — Chassis ground:*** ***#2 (B136) No. 5 — Chassis ground:*** ***#3 (B136) No. 4 — Chassis ground:*** ***#4 (B136) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness between ECM and fuel injector connector.

	Step	Check	Yes	No
6	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **7.**	Replace the faulty fuel injector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4SO 2.5)(diag)-257, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

1. EC, EK, EH, ER AND K4 MODEL

DTC	Item	Reference
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-78, 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(H4SO 2.5)(diag)-80, 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(H4SO 2.5)(diag)-83, 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(H4SO 2.5)(diag)-85, 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(H4SO 2.5)(diag)-88, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-90, 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(H4SO 2.5)(diag)-93, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-95, 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(H4SO 2.5)(diag)-98, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-101, 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(H4SO 2.5)(diag)-103, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-106, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4SO 2.5)(diag)-108, 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(H4SO 2.5)(diag)-110, 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(H4SO 2.5)(diag)-113, 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(H4SO 2.5)(diag)-116, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-118, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Reference
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-120, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-122, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (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(H4SO 2.5)(diag)-124, 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(H4SO 2.5)(diag)-126, 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(H4SO 2.5)(diag)-129, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-132, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-134, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-136, 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(H4SO 2.5)(diag)-139, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO 2.5)(diag)-142, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO 2.5)(diag)-142, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO 2.5)(diag)-142, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO 2.5)(diag)-143, 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(H4SO 2.5)(diag)-149, 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(H4SO 2.5)(diag)-151, 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(H4SO 2.5)(diag)-153, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.5)(diag)-156, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO 2.5)(diag)-159, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-162, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-164, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to EN(H4SO 2.5)(diag)-167, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-170, 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(H4SO 2.5)(diag)-170, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor “A”	<Ref. to EN(H4SO 2.5)(diag)-171, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.5)(diag)-171, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Air Control System Performance	<Ref. to EN(H4SO 2.5)(diag)-174, DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.5)(diag)-174, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4SO 2.5)(diag)-175, 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(H4SO 2.5)(diag)-176, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.5)(diag)-177, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-178, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-179, DTC P0691 FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.5)(diag)-180, DTC P0692 FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.5)(diag)-180, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Position Switch Input Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-181, DTC P0851 PARK/NEUTRAL POSITION SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Position Switch Input Circuit High	<Ref. to EN(H4SO 2.5)(diag)-186, DTC P0852 PARK/NEUTRAL POSITION SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to EN(H4SO 2.5)(diag)-191, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to EN(H4SO 2.5)(diag)-193, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.5)(diag)-195, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-195, 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(H4SO 2.5)(diag)-195, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-195, 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(H4SO 2.5)(diag)-195, 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(H4SO 2.5)(diag)-195, 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(H4SO 2.5)(diag)-195, 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(H4SO 2.5)(diag)-196, 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(H4SO 2.5)(diag)-198, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-199, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.5)(diag)-202, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-20, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-21, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-24, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-25, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-204, 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(H4SO 2.5)(diag)-204, 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(H4SO 2.5)(diag)-205, 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(H4SO 2.5)(diag)-205, DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2008	Intake Manifold Runner Control Circuit / Open (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-206, DTC P2008 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-208, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P2011	Intake Manifold Runner Control Circuit / Open (Bank 2)	<Ref. to EN(H4SO 2.5)(diag)-210, DTC P2011 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)	<Ref. to EN(H4SO 2.5)(diag)-212, DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-214, DTC P2016 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2017	Intake Manifold Runner Position Sensor / Switch Circuit High (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-217, DTC P2017 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2021	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 2)	<Ref. to EN(H4SO 2.5)(diag)-219, DTC P2021 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2022	Intake Manifold Runner Position Sensor / Switch Circuit High (Bank 2)	<Ref. to EN(H4SO 2.5)(diag)-222, DTC P2022 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.5)(diag)-224, 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(H4SO 2.5)(diag)-230, 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(H4SO 2.5)(diag)-233, 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(H4SO 2.5)(diag)-234, DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-235, 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(H4SO 2.5)(diag)-238, 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(H4SO 2.5)(diag)-241, 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(H4SO 2.5)(diag)-244, 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(H4SO 2.5)(diag)-246, 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(H4SO 2.5)(diag)-251, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2503	Charging System Voltage Low	<Ref. to EN(H4SO 2.5)(diag)-254, DTC P2503 CHARGING SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2504	Charging System Voltage High	<Ref. to EN(H4SO 2.5)(diag)-255, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

2. KA AND KS MODEL

DTC	Item	Reference
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-69, 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(H4SO 2.0)(diag)-71, 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(H4SO 2.0)(diag)-74, 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(H4SO 2.0)(diag)-76, 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(H4SO 2.0)(diag)-79, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-81, 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(H4SO 2.0)(diag)-84, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-87, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Sensor 1 Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-89, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-92, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4SO 2.0)(diag)-94, 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(H4SO 2.0)(diag)-96, 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(H4SO 2.0)(diag)-99, 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(H4SO 2.0)(diag)-102, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-104, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-107, 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(H4SO 2.0)(diag)-109, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-111, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-113, 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(H4SO 2.0)(diag)-115, 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(H4SO 2.0)(diag)-118, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-121, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-123, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-123, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-125, 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(H4SO 2.0)(diag)-128, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-132, 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(H4SO 2.0)(diag)-139, 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(H4SO 2.0)(diag)-141, 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(H4SO 2.0)(diag)-143, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-145, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-150, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-152, 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(H4SO 2.0)(diag)-154, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor “A” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Reference
P0500	Vehicle Speed Sensor “A”	<Ref. to EN(H4SO 2.0)(diag)-156, DTC P0500 VEHICLE SPEED SENSOR “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.0)(diag)-157, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Air Control System Performance	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4SO 2.0)(diag)-160, 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(H4SO 2.0)(diag)-161, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.0)(diag)-162, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0691 FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0692 FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Position Switch Input Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-165, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Position Switch Input Circuit High	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-Computer Problem	<Ref. to EN(H4SO 2.0)(diag)-175, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	O2 Sensor Circuit (Bank1 Sensor1)	<Ref. to EN(H4SO 2.0)(diag)-177, DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.0)(diag)-180, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-184, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	<Ref. to EN(H4SO 2.0)(diag)-187, DTC P1521 BRAKE CIRCUIT RANGE/PERFORMANCE PROBLEM(HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.0)(diag)-189, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-20, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-21, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-24, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-25, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2100	Throttle Actuator Control Motor Circuit/Open	<Ref. to EN(H4SO 2.0)(diag)-190, DTC P2100 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT/OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.0)(diag)-190, 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(H4SO 2.0)(diag)-197, 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(H4SO 2.0)(diag)-200, 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(H4SO 2.0)(diag)-202, DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2111	Throttle Actuator Control System - Stuck Open	<Ref. to EN(H4SO 2.0)(diag)-202, DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-203, 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(H4SO 2.0)(diag)-206, 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(H4SO 2.0)(diag)-208, 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(H4SO 2.0)(diag)-211, 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(H4SO 2.0)(diag)-213, 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(H4SO 2.0)(diag)-218, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2503	Charging System Voltage Low	<Ref. to EN(H4SO 2.0)(diag)-221, DTC P2503 CHARGING SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2504	Charging System Voltage High	<Ref. to EN(H4SO 2.0)(diag)-222, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

DTC DETECTING CONDITION:

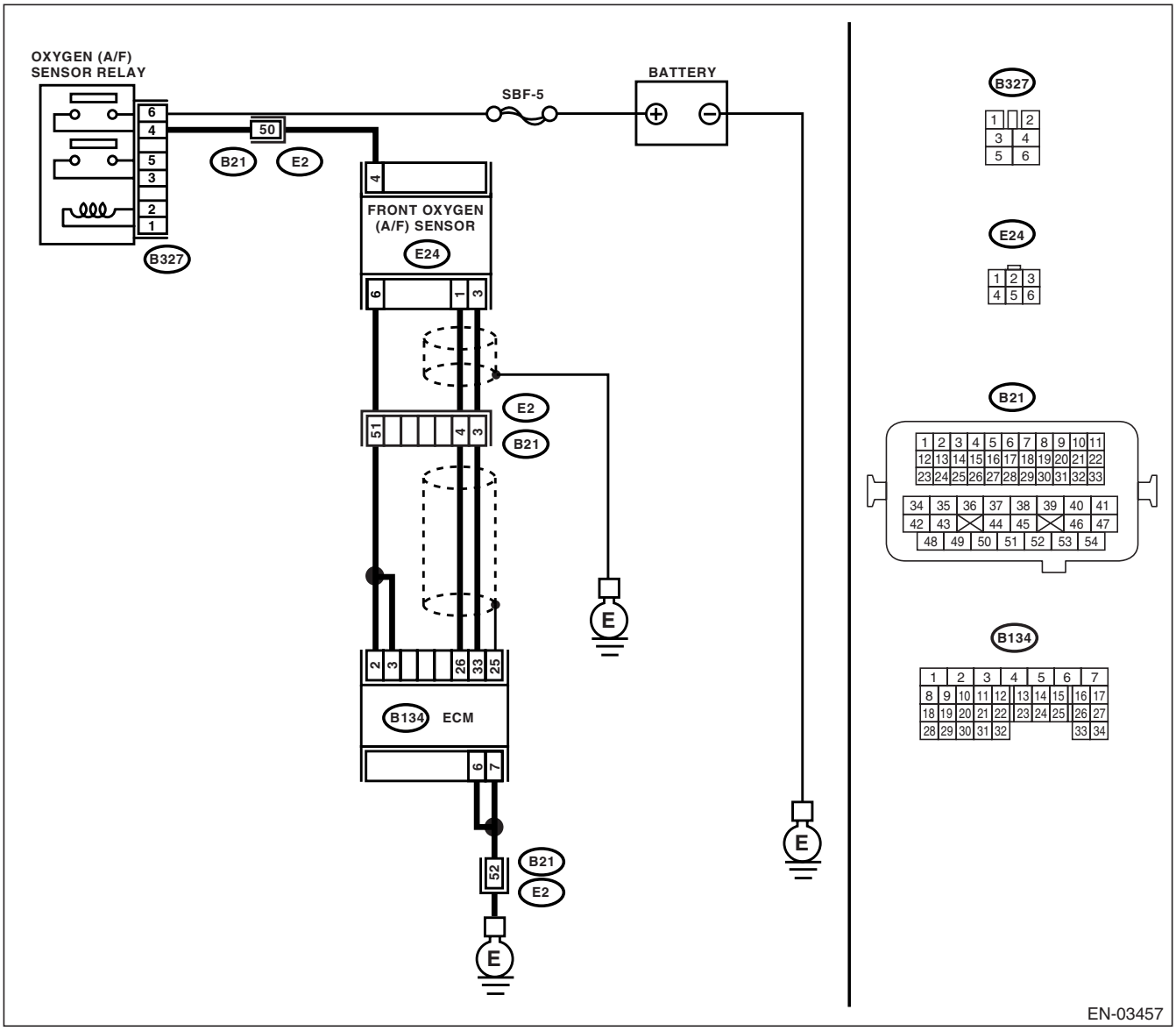
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**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 and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 2 — (E24) No. 6:*** ***(B134) No. 3 — (E24) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK HARNESS BETWEEN OXYGEN (A/F) SENSOR RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between oxygen (A/F) sensor relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B327) No. 4 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness between oxygen (A/F) sensor relay and front oxygen (A/F) sensor connector.
5	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 4 — No. 6:***	Is the resistance less than 5 Ω?	Go to step **6.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>
6	**CHECK POOR CONTACT.** Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>

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

DTC DETECTING CONDITION:

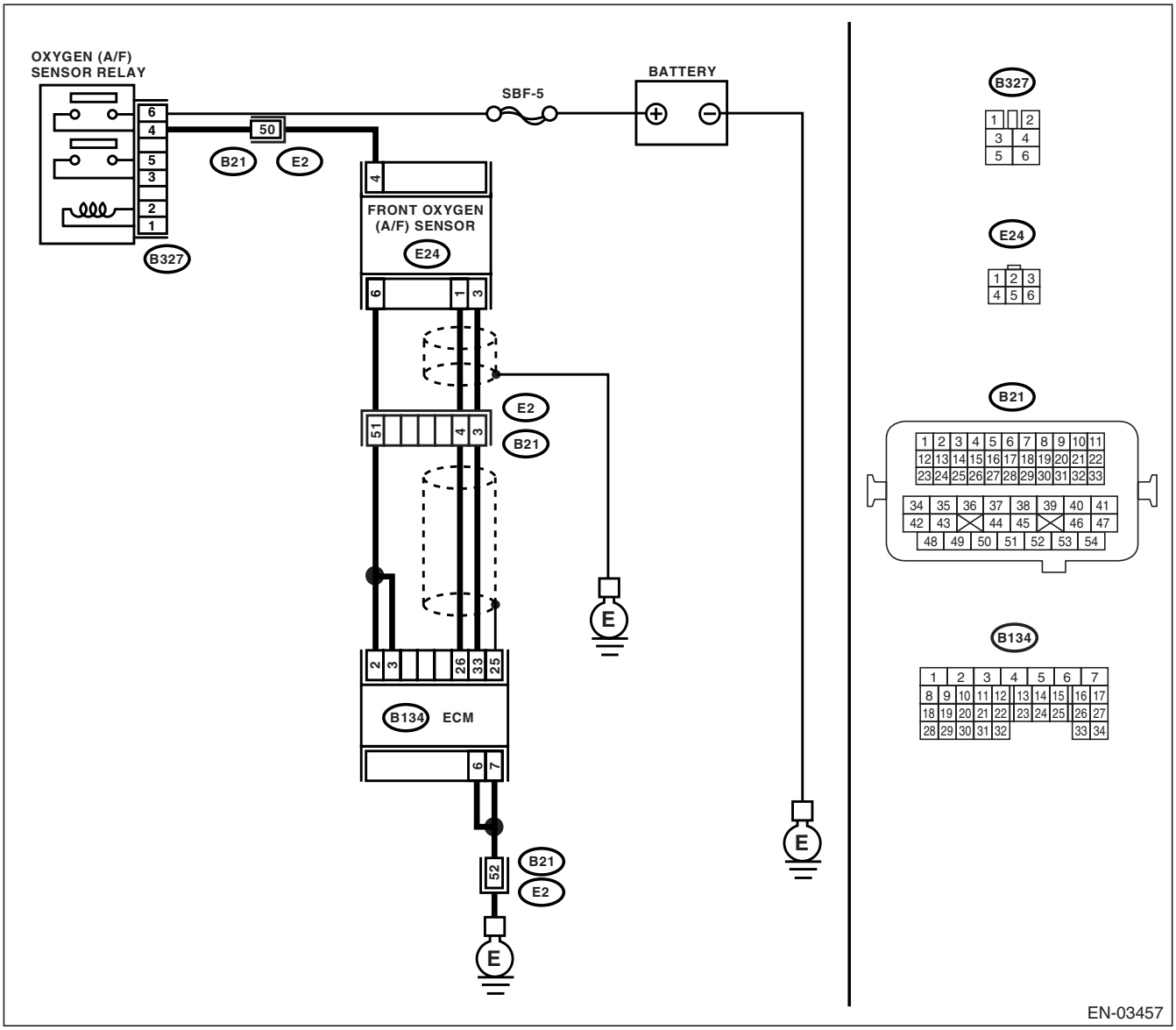
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Do DTC P0031 and P0037 display at the same time on the Subaru Select Monitor?	Go to step **3.**	Go to step **6.**
3	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector 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. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit of harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
4	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the poor contact in connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **7.**
7	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **8.**
8	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit of harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>

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

DTC DETECTING CONDITION:

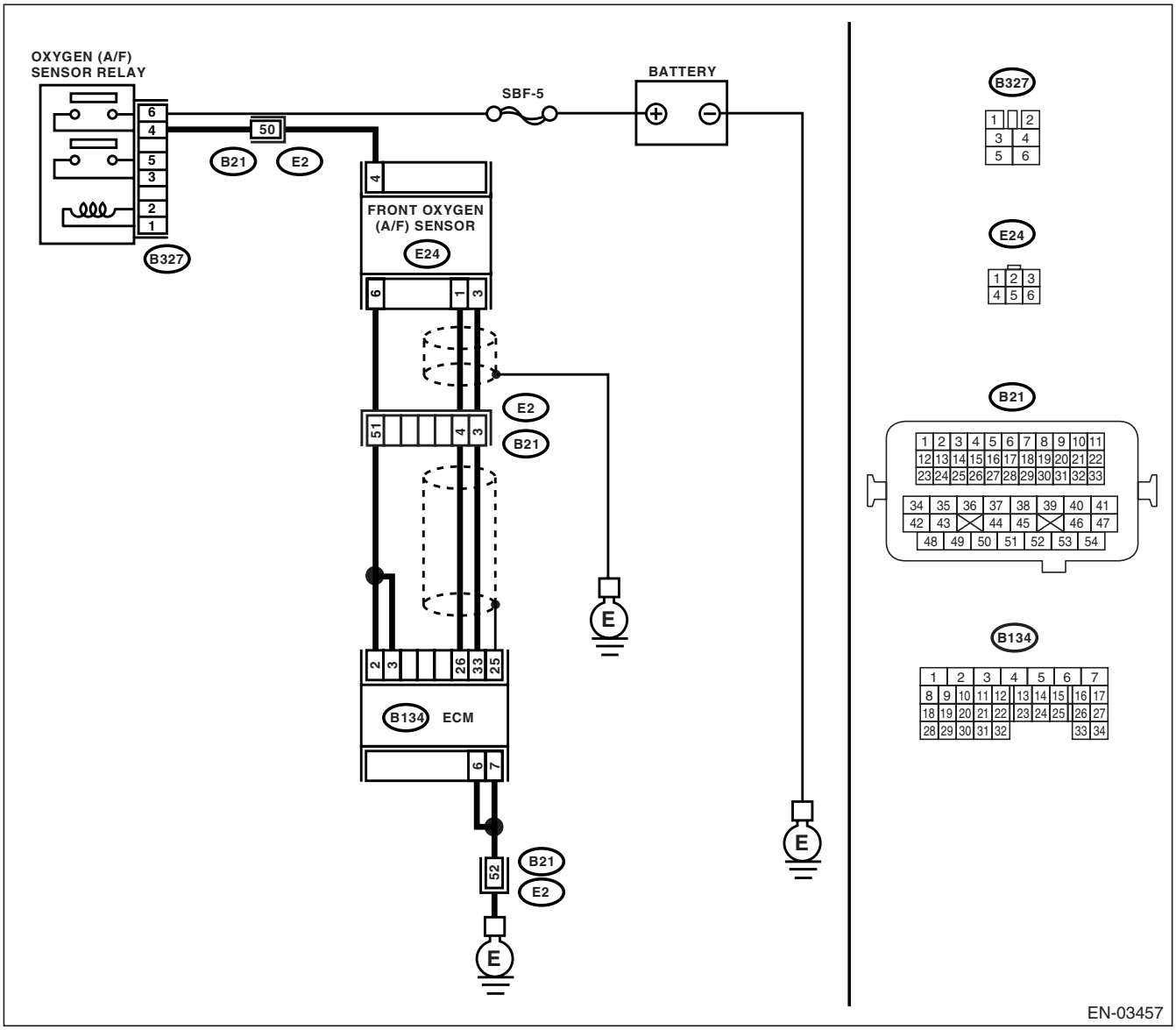
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Finish the diagnosis.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.	Finish the diagnosis.

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

DTC DETECTING CONDITION:

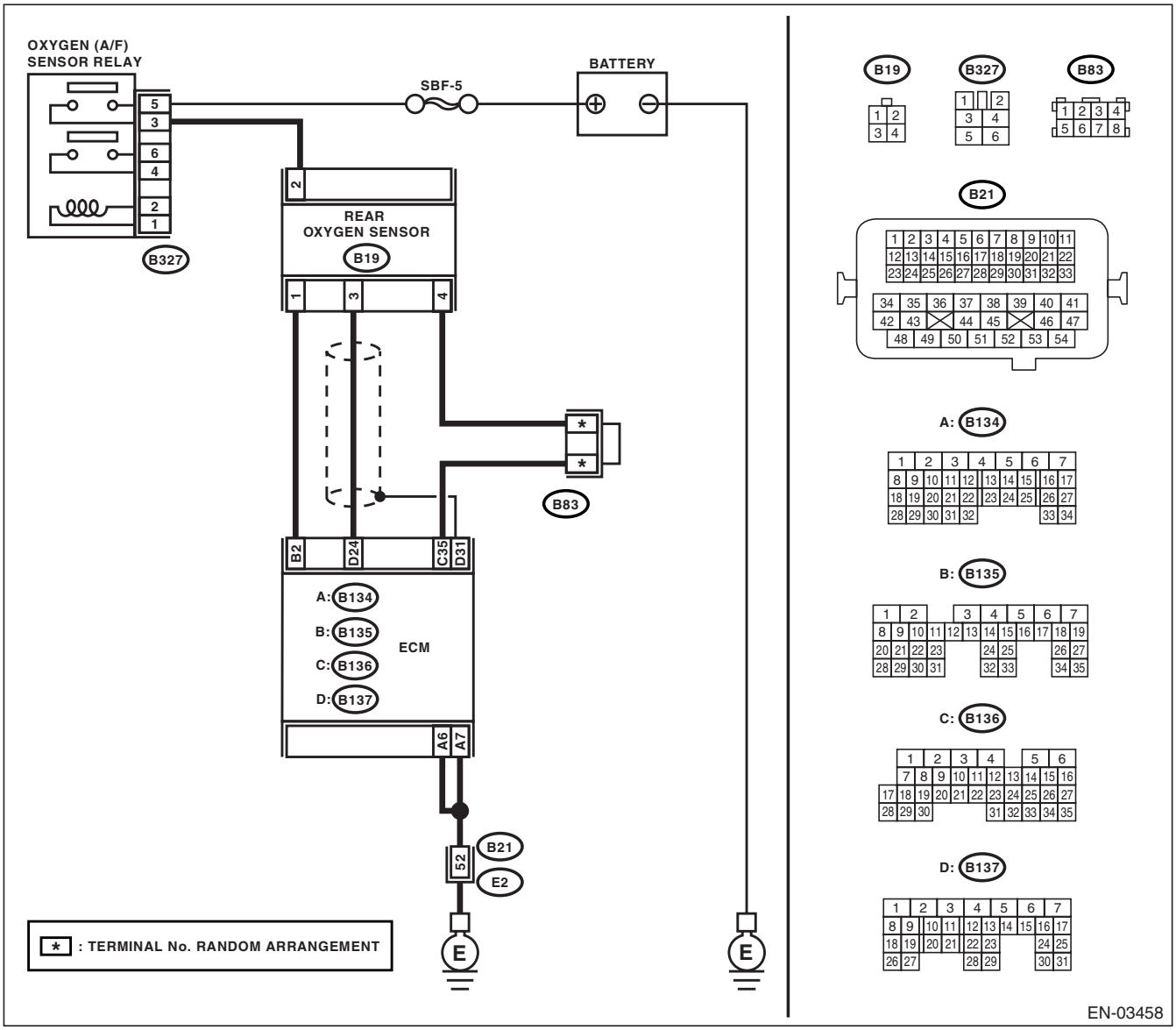
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — 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: • Open circuit of harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
7	**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 chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit of harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
8	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-36, Rear Oxygen Sensor.>

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

DTC DETECTING CONDITION:

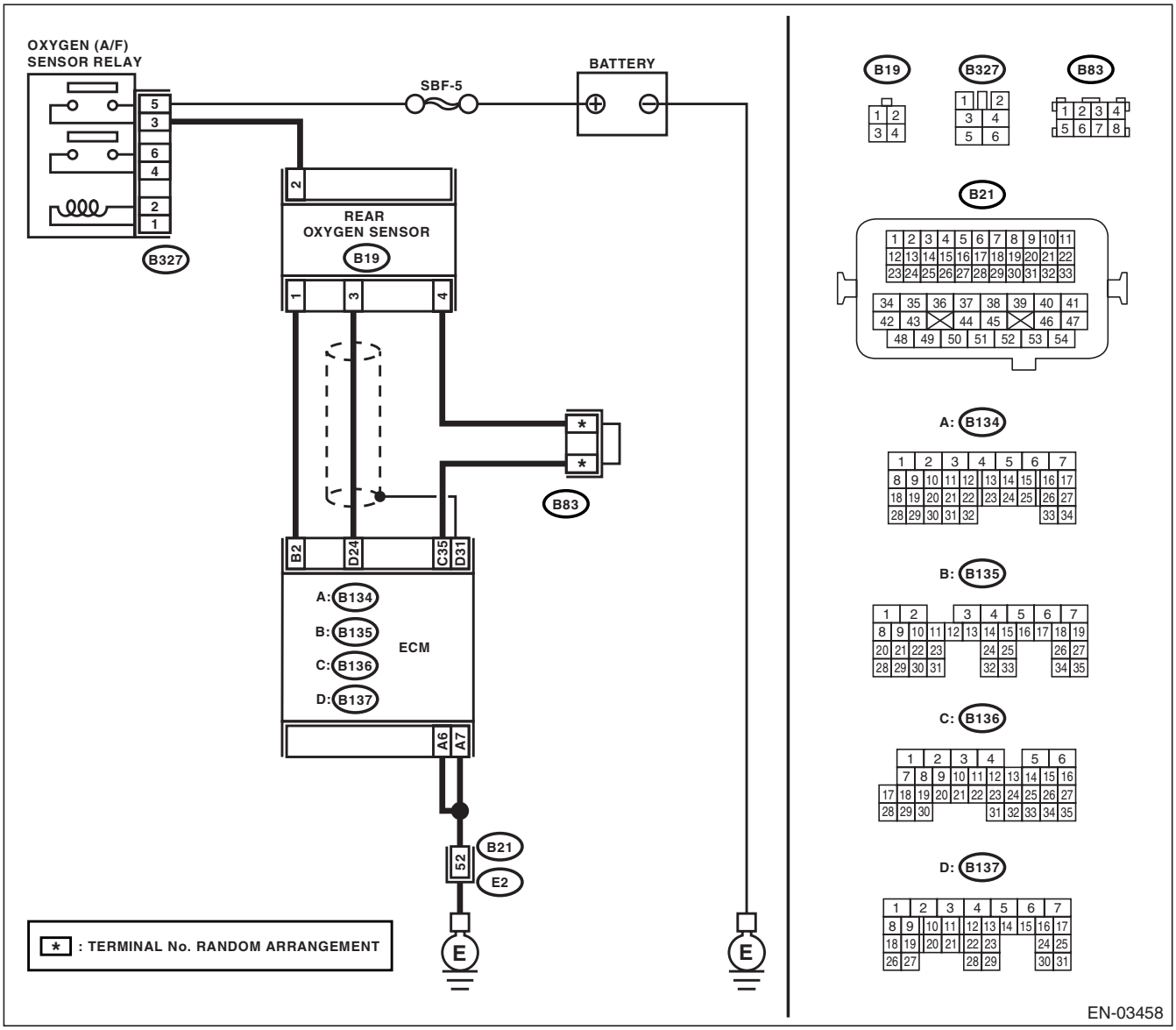
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

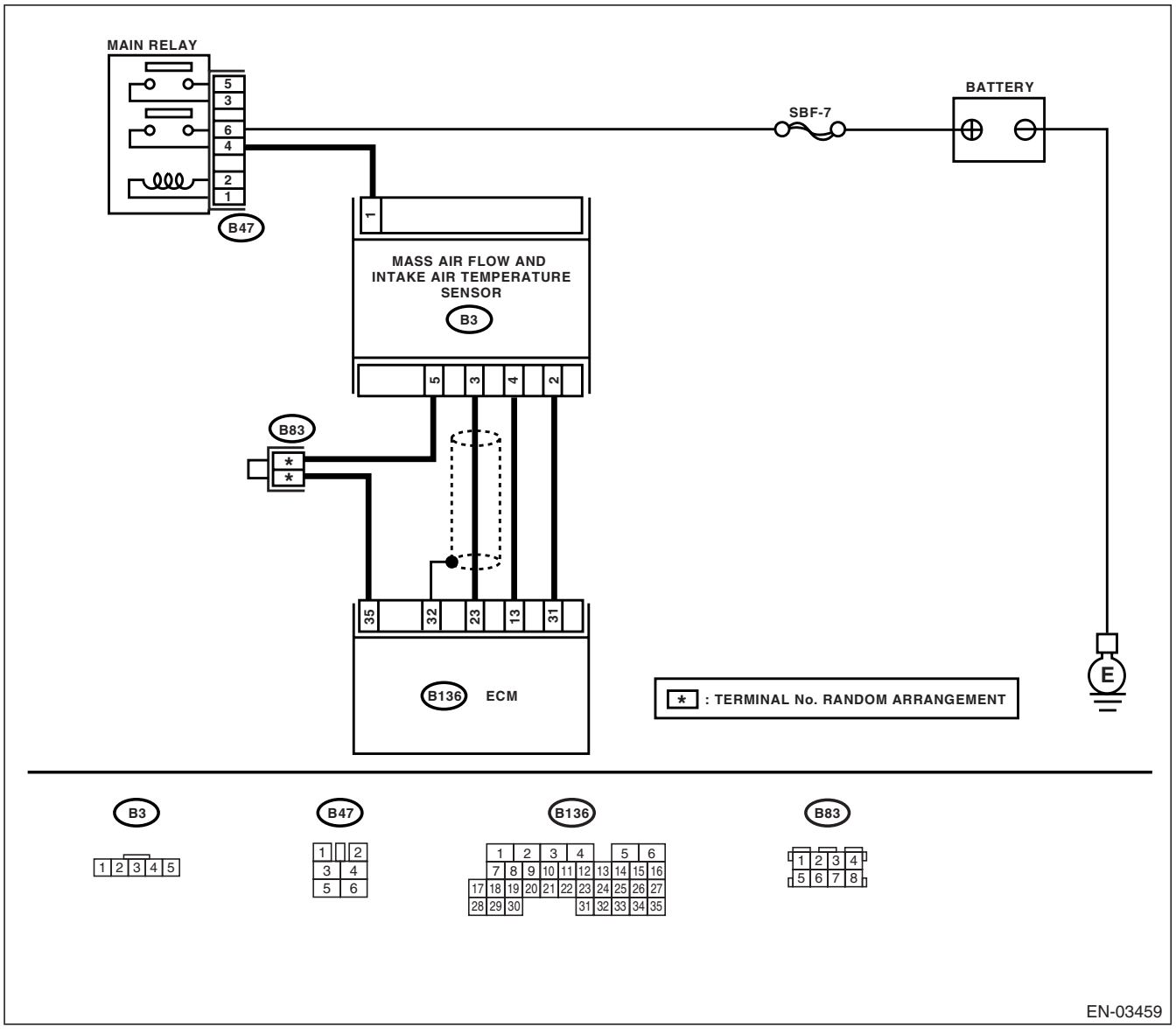
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Finish the diagnosis.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Finish the diagnosis.

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

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON, and turn the power switch of Subaru Select Monitor or general scan tool to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact in connector or harness may be the cause. Repair the harness or connector in mass air flow sensor. NOTE: In this case, repair the following: • Open or ground short circuit of harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **2.**
2	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **5.**	Repair the open circuit between mass air flow sensor and main relay.
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B136) No. 23 — (B3) No. 3:*** ***(B136) No. 31 — (B3) No. 2:*** ***(B136) No. 35 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit between ECM and mass air flow sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:*** ***(B136) No. 31 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact in mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>

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

DTC DETECTING CONDITION:

Immediately at fault recognition

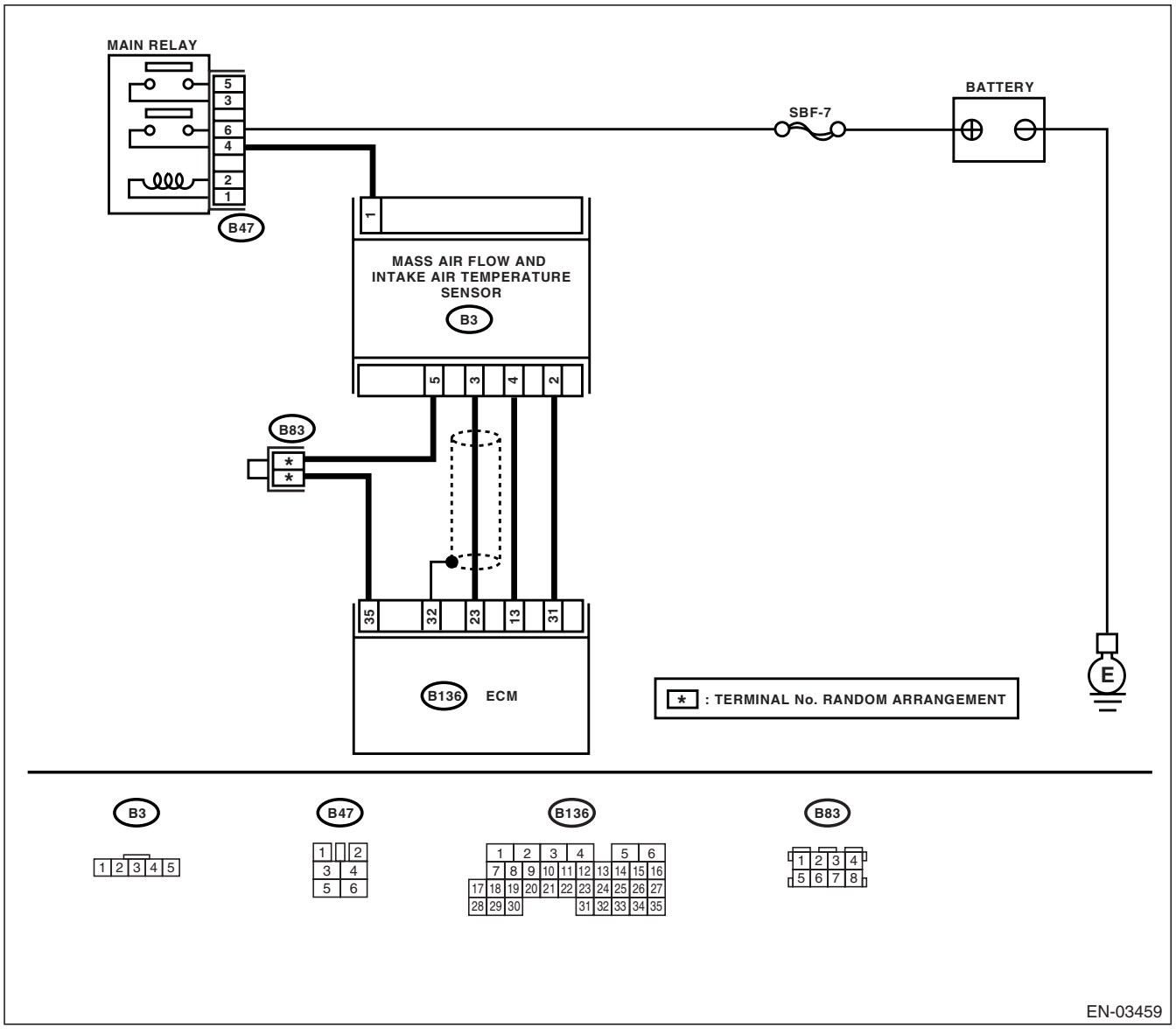
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON, and turn the power switch of Subaru Select Monitor or general scan tool to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass airflow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Repair the battery short circuit of harness between mass air flow sensor connector and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW 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 mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B136) No. 31:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open circuit of harness between mass air flow sensor connector and ECM connector.

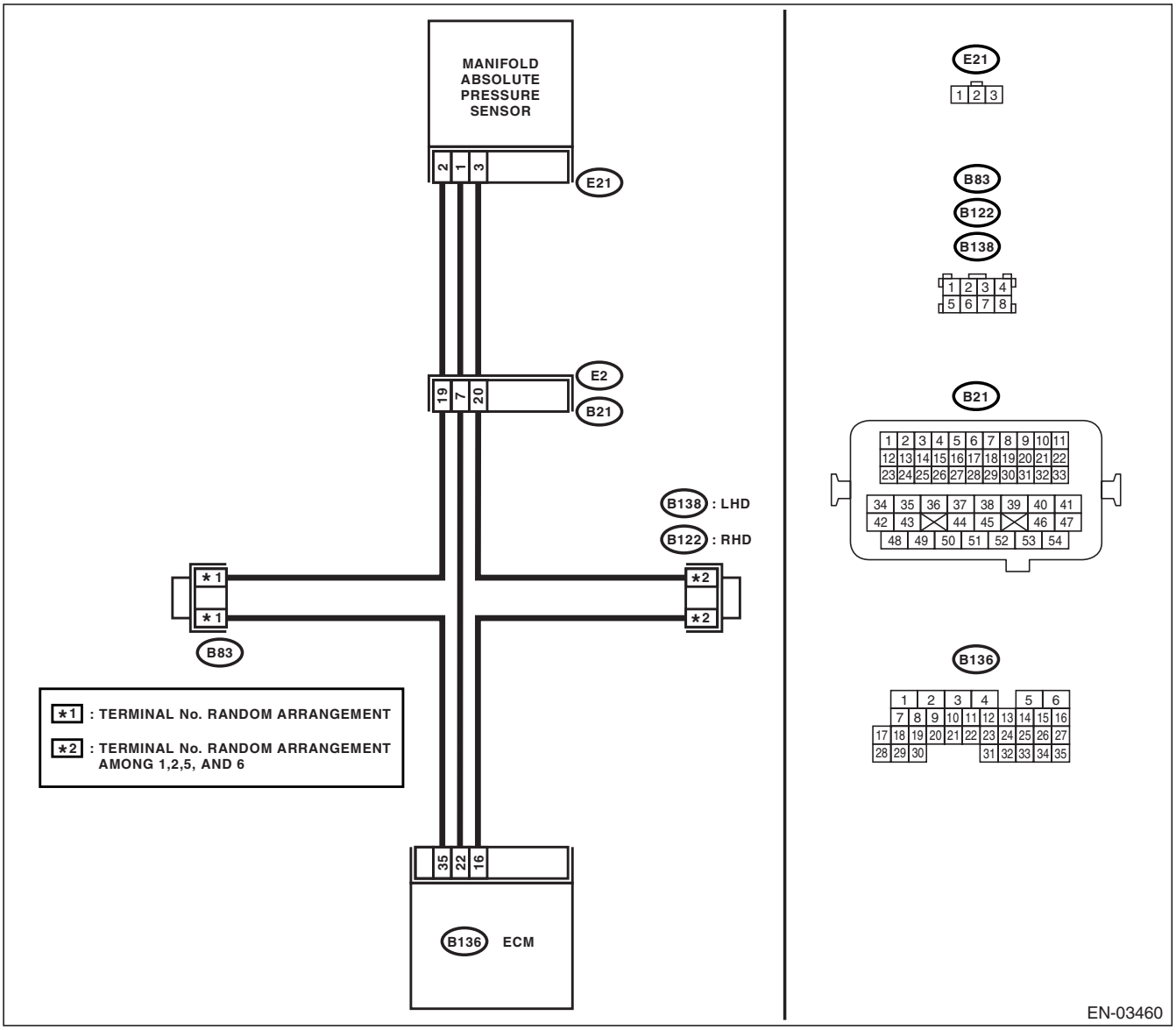
H: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM and manifold absolute pressure sensor connector.	Is there poor contact in ECM or manifold absolute pressure sensor connector?	Repair the poor contact in ECM or manifold absolute pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **6.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **8.**	Go to step **7.**
7	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **8.**

	Step	Check	Yes	No
8	**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) 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 more than 4.5 V?	Go to step **9.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
9	**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 and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
10	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

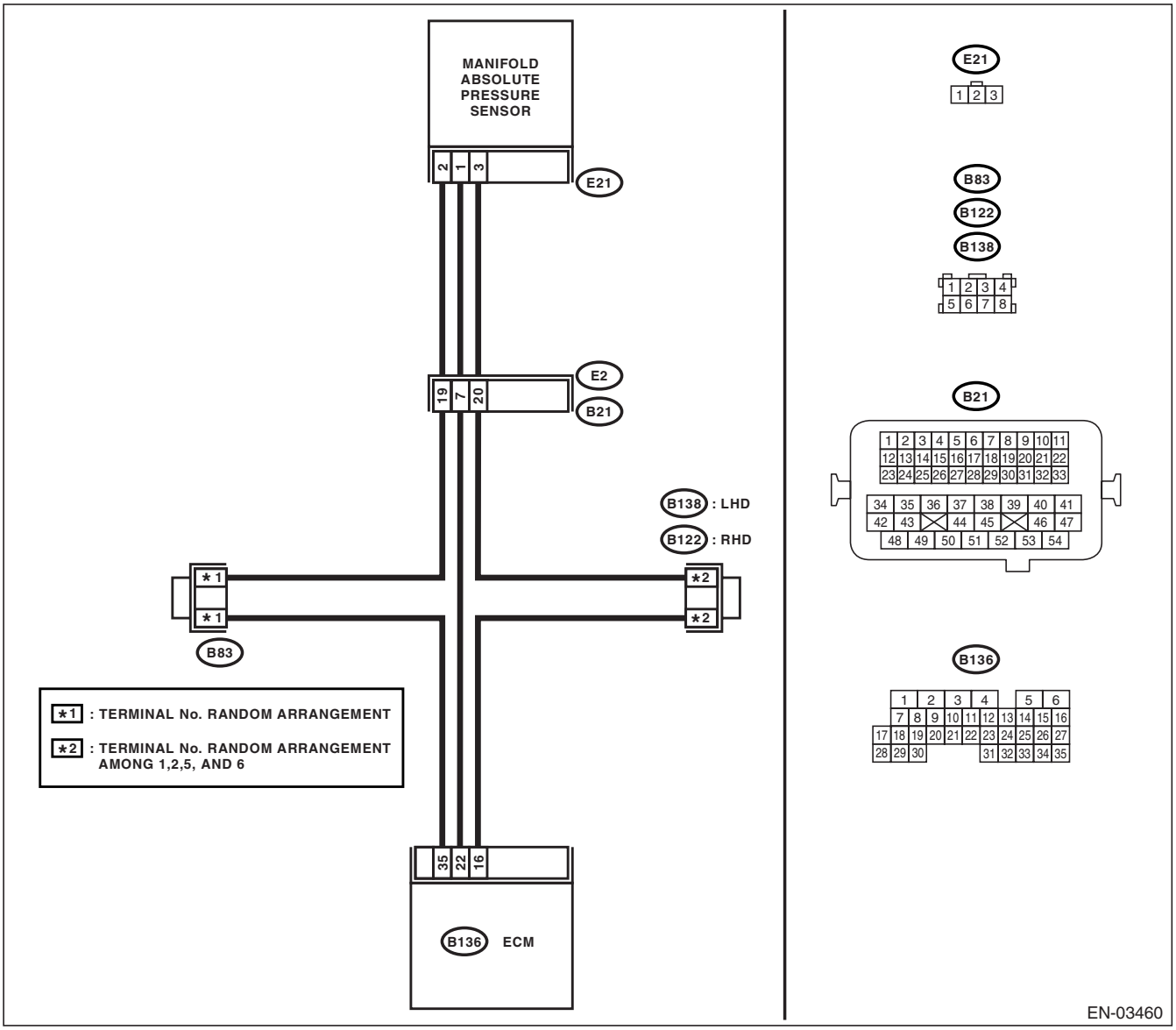
I: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**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) 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 more than 4.5 V?	Go to step **7.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
7	**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 and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 22 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Repair the short circuit of harness between ECU and manifold absolute pressure sensor connector.	Go to step **9.**
9	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
10	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

J: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

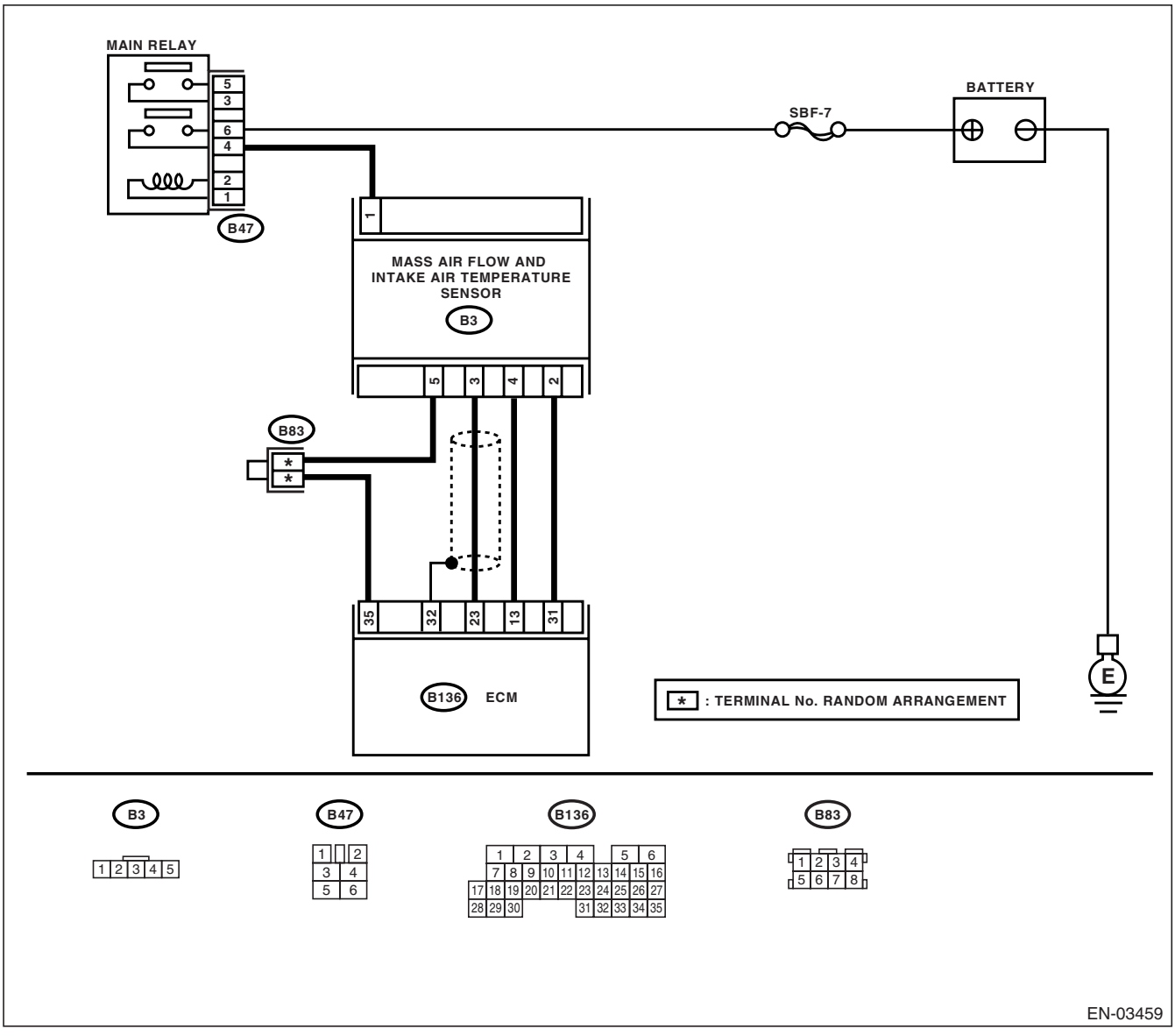
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature more than 120°C (248°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than −40°C (−40°F)?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.

K: DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

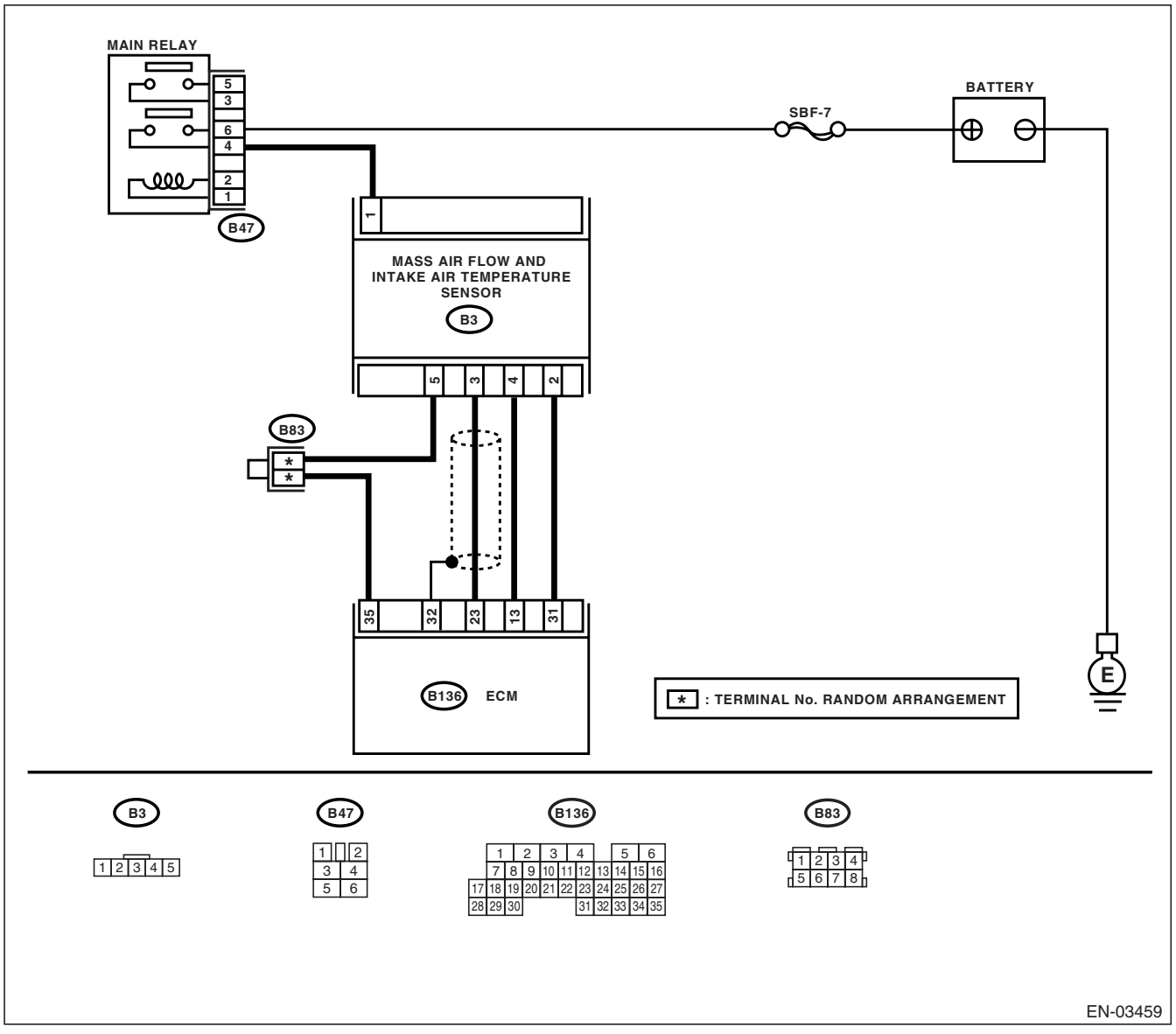
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than −40°C (−40°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 3 V?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
6	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM 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. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

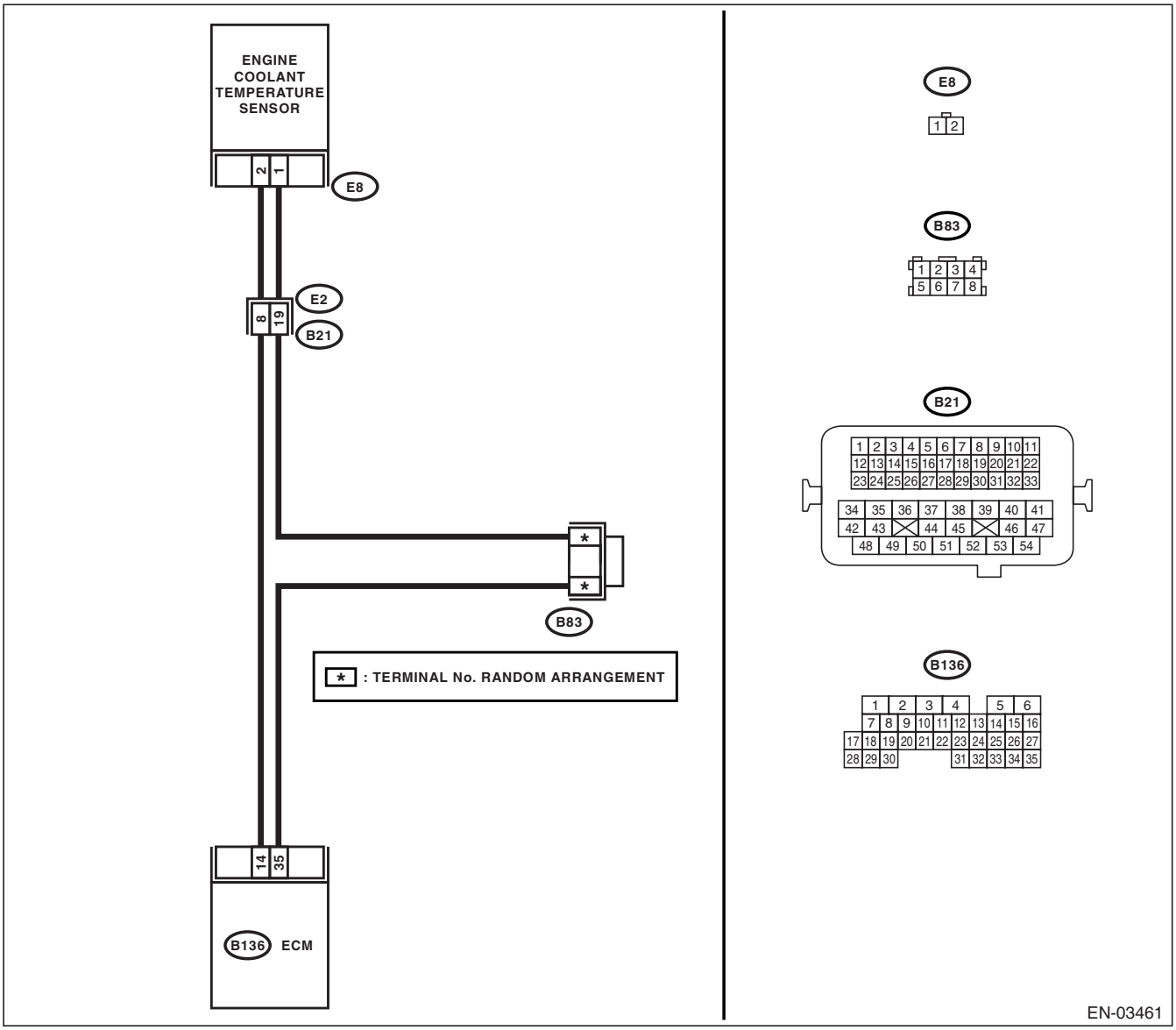
L: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition

TROUBLE SYMPTOM:
- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature more than 150°C (302°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>	Repair the ground short circuit of harness between engine coolant temperature sensor and ECM connector.

M: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

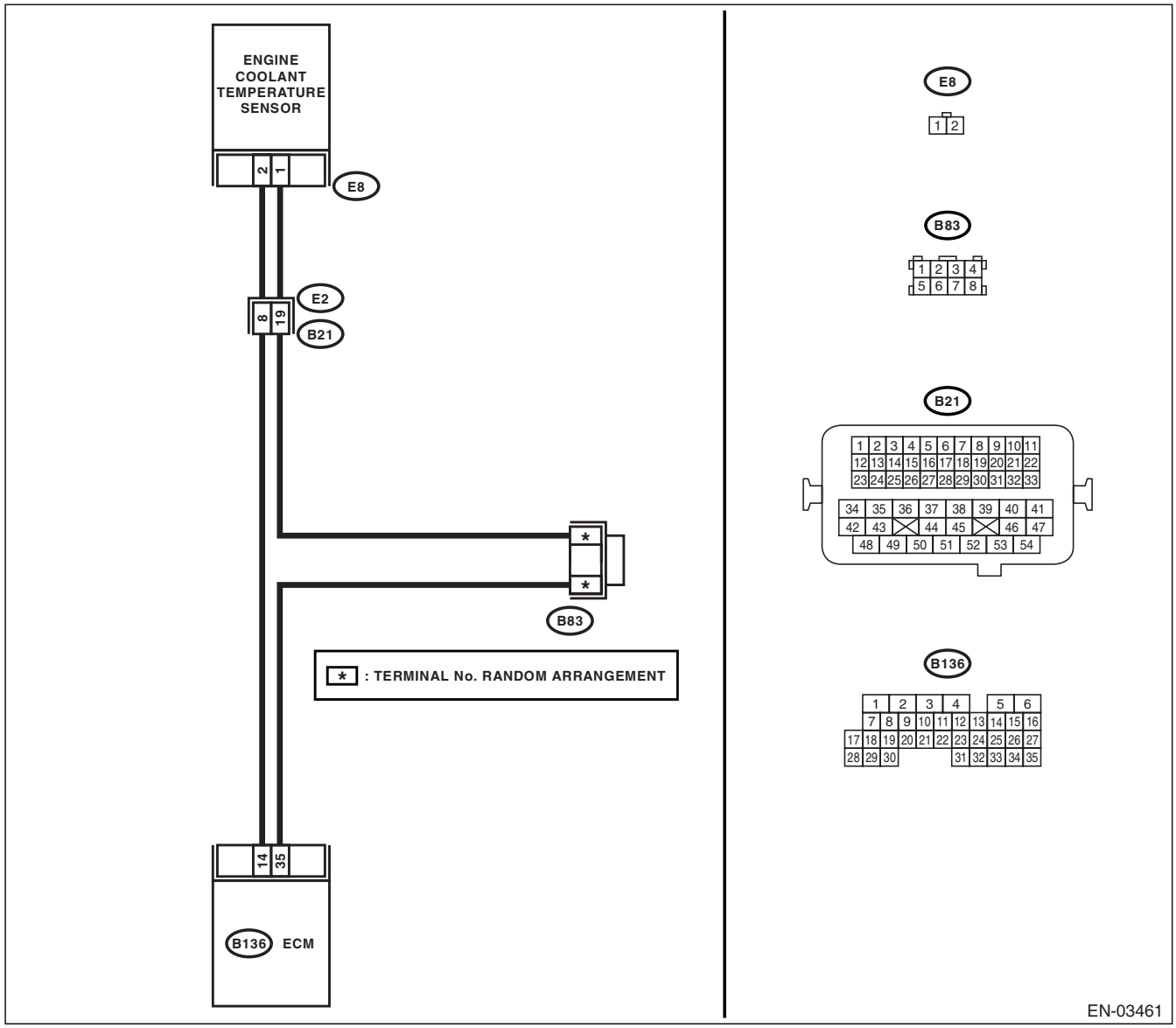
- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
6	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

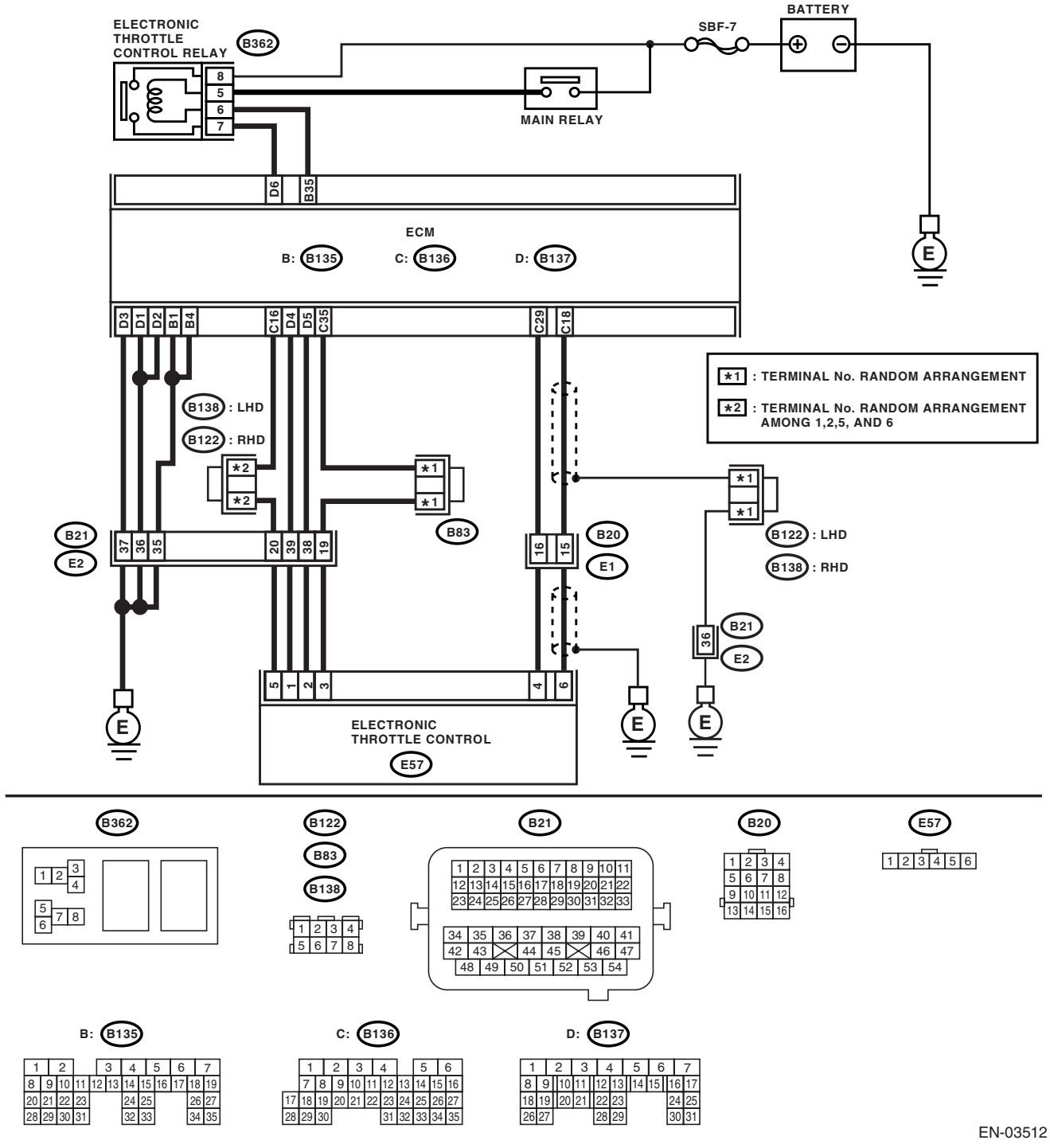
N: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



EN-03512

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the accelerator pedal position sensor if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

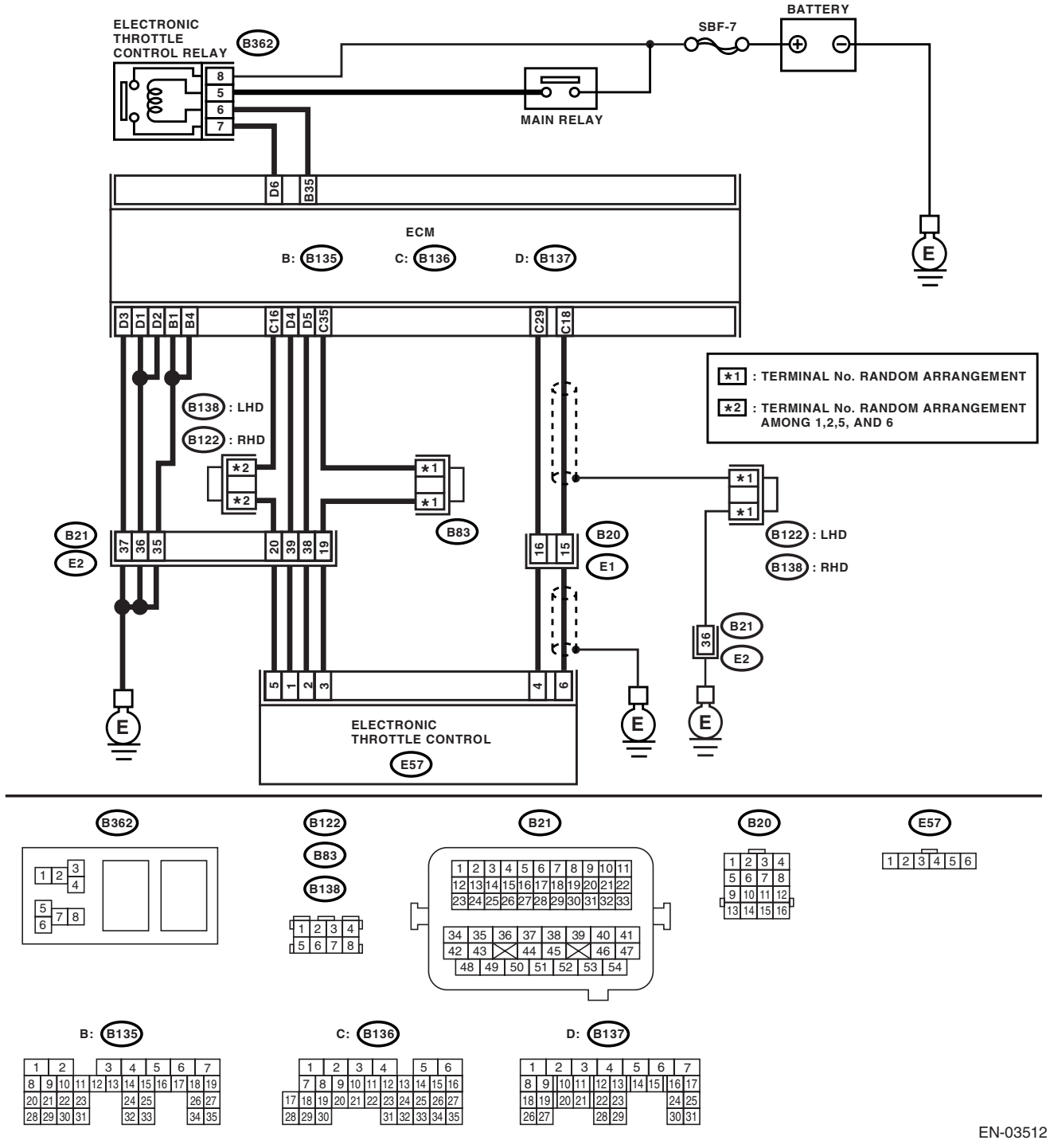
O: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



EN-03512

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 35 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **7.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
7	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Replace the electronic throttle control.	Repair the short circuit to sensor power supply.

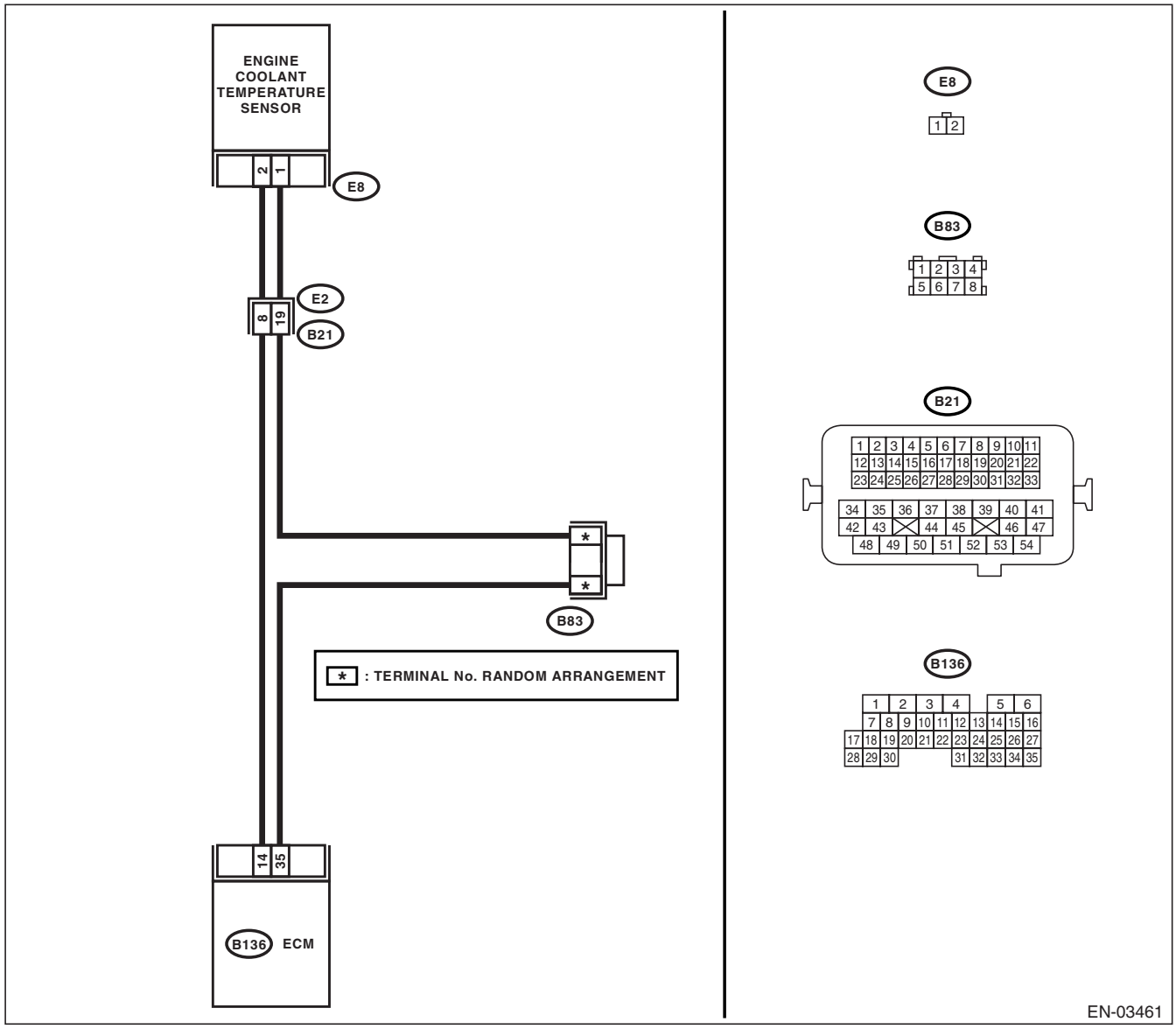
P: DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Engine would not return to idling.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **3.**
3	**CHECK ENGINE COOLING SYSTEM.** NOTE: Check the following items. • Thermostat open stuck • Engine coolant level • Coolant freeze • Tire diameter	Is there any fault in engine cooling system?	Replace the thermostat. <Ref. to CO(H4SO 2.0)-18, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>

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

DTC DETECTING CONDITION:

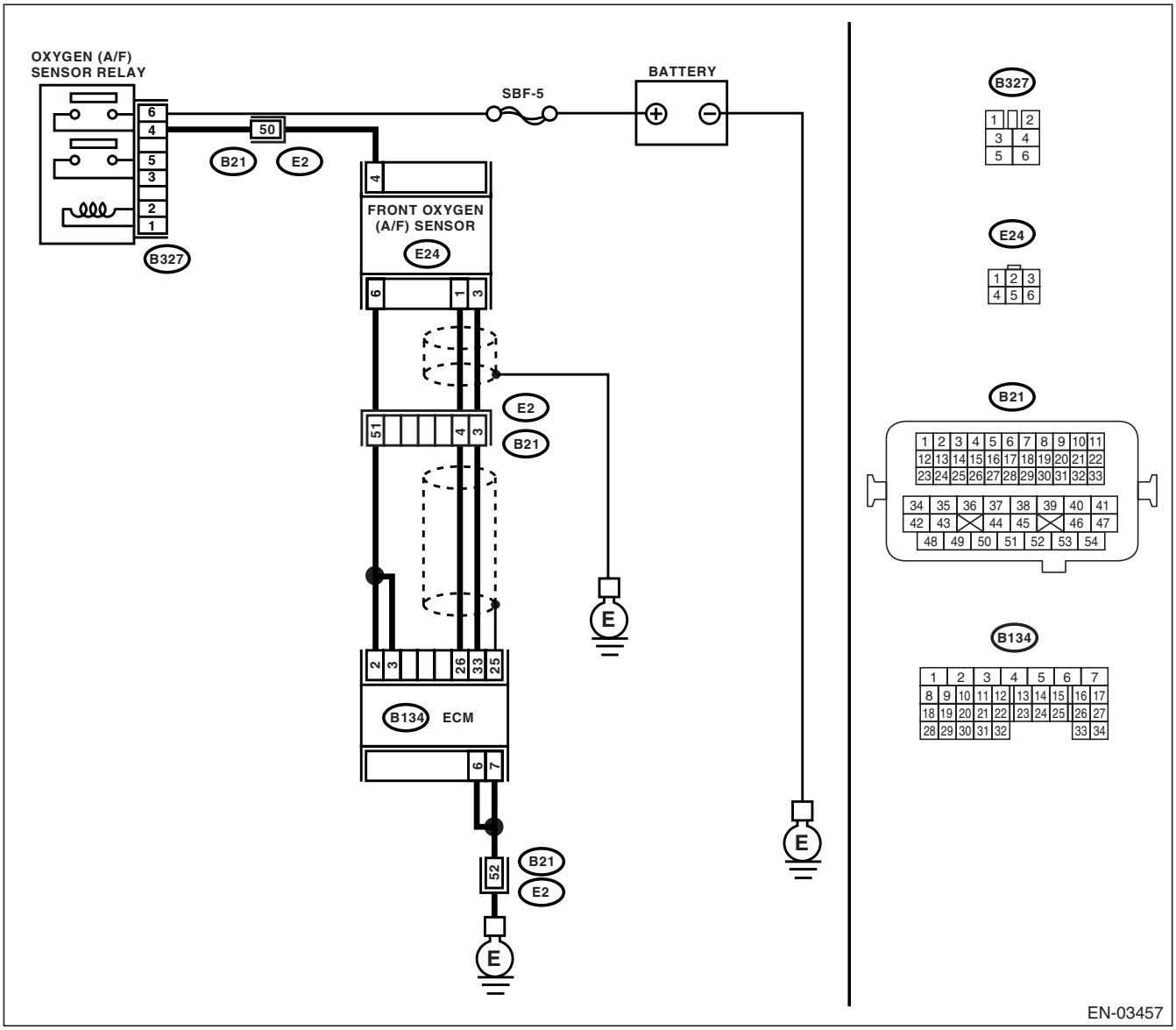
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
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 and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.

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

DTC DETECTING CONDITION:

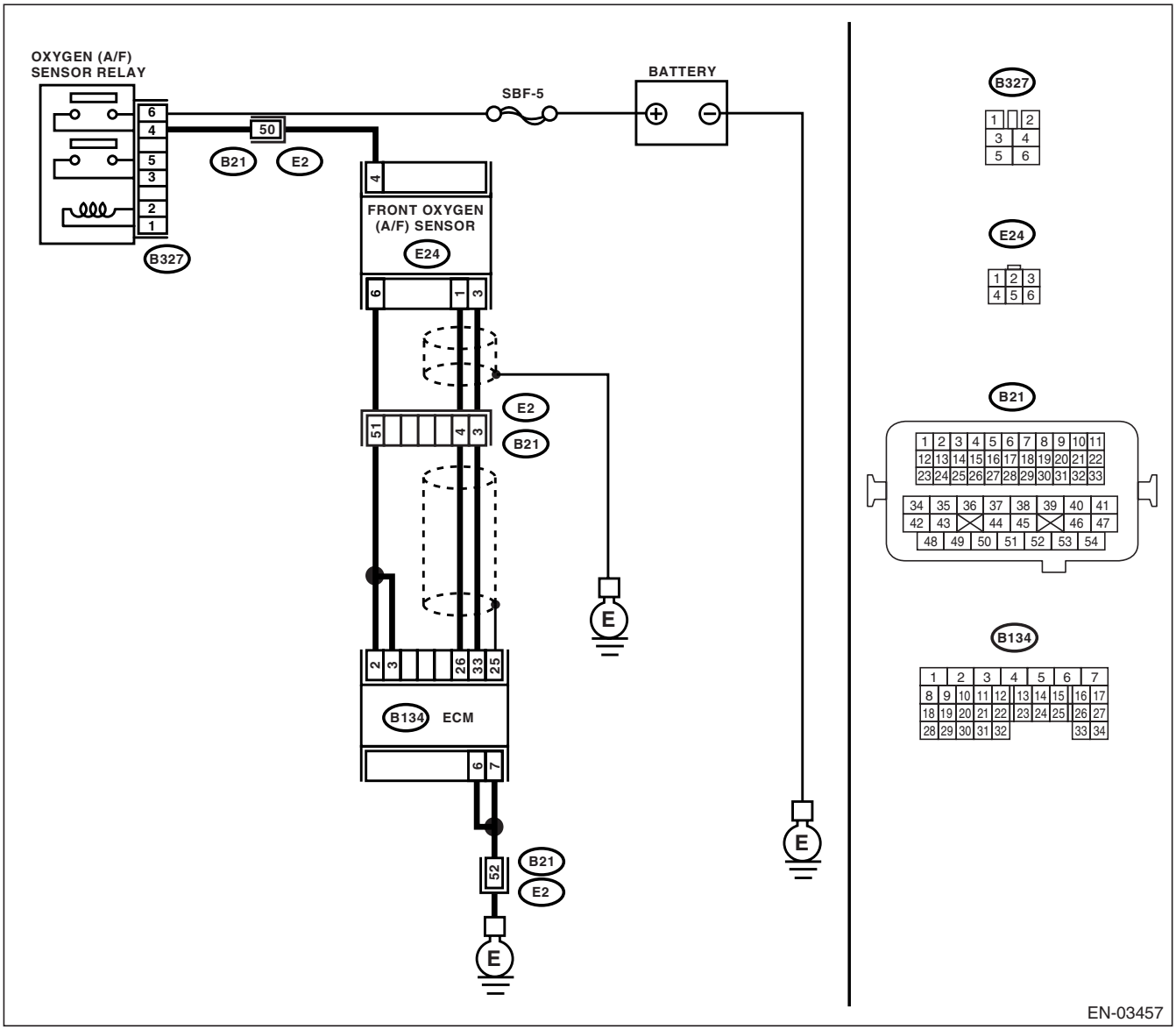
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.

S: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

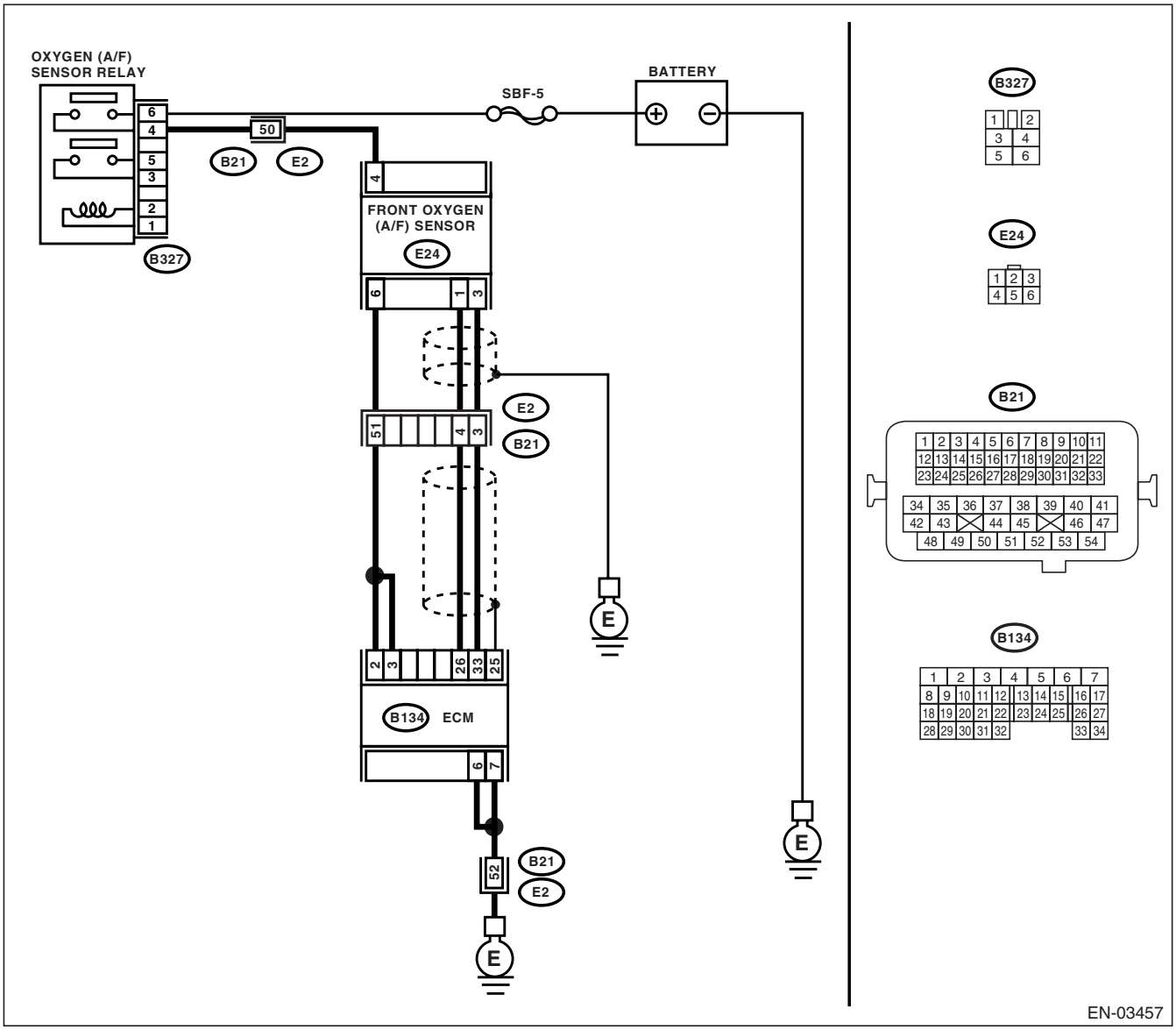
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **3.**
3	**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(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>

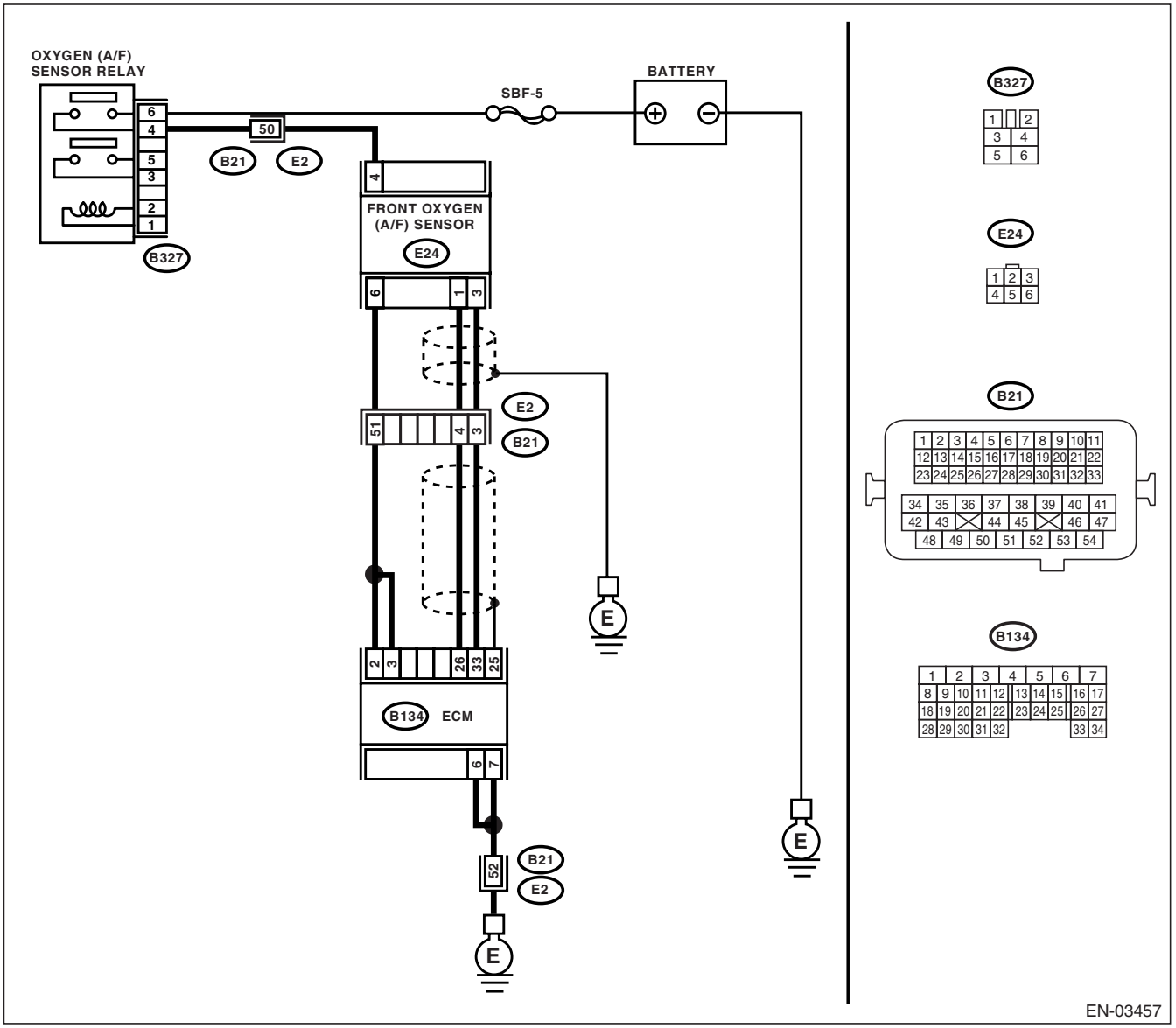
T: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
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 and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) 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: • Open circuit of harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
3	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>

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

DTC DETECTING CONDITION:

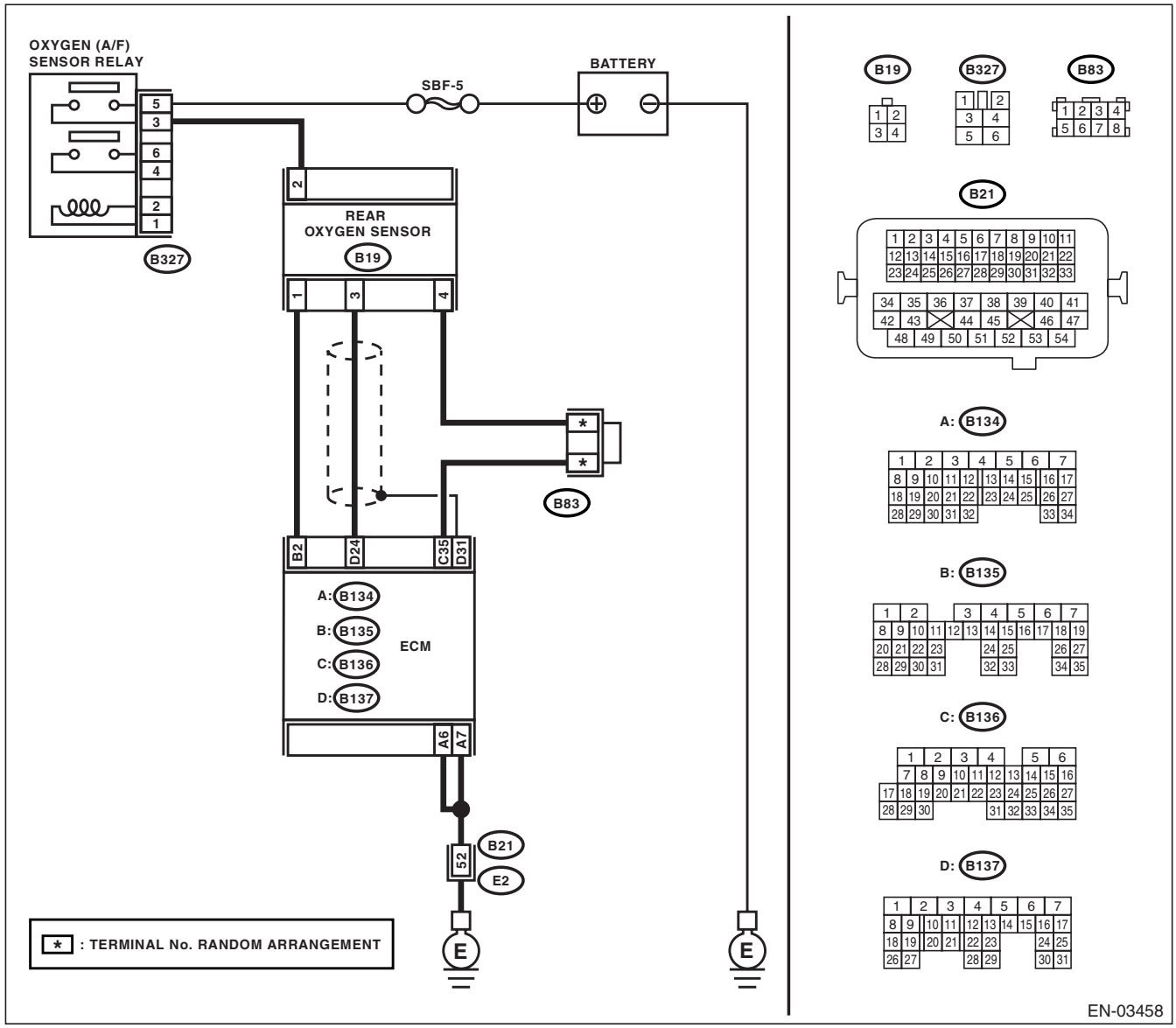
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **6.**	Go to step **4.**
4	**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 and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:*** ***(B136) No. 35 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **5.**

Step		Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 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 harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-36, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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(H4SO 2.5)-36, Rear Oxygen Sensor.>

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

DTC DETECTING CONDITION:

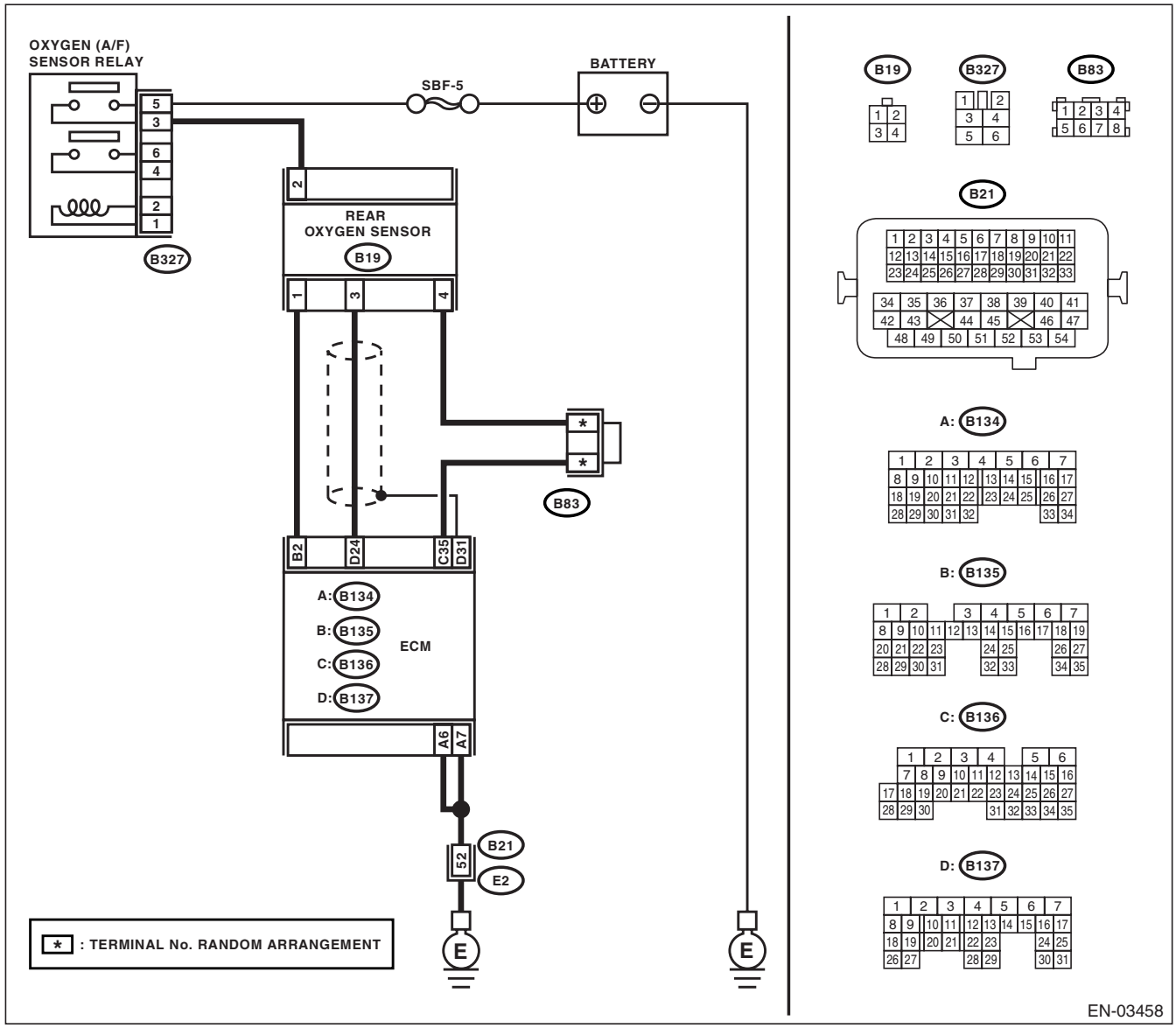
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 250 mV?	Go to step **6.**	Go to step **4.**
4	**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 and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:*** ***(B136) No. 35 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 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 harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-36, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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(H4SO 2.5)-36, Rear Oxygen Sensor.>

W: DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

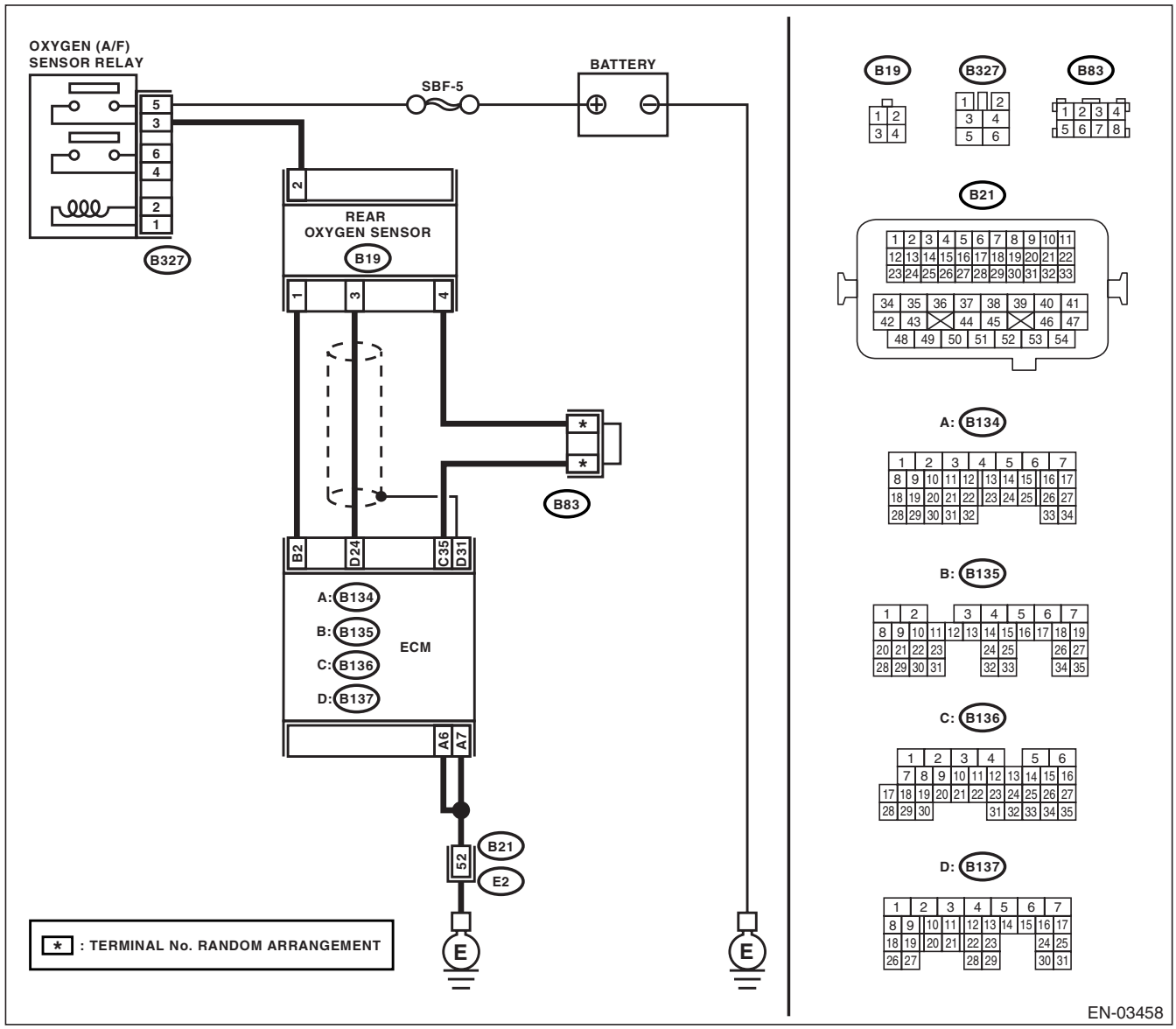
Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair short circuit to ground in harness.
5	**CHECK REAR OXYGEN SENSOR DATA.** Measure the resistance between connector terminals of rear oxygen sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-36, Rear Oxygen Sensor.>	A temporary poor compact occurs. Check poor contact in connector.

X: DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Y: DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **3.**
3	**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 **4.**
4	**CHECK EGR VALVE.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **6.**
6	**CHECK PCV VALVE.**	Is the PCV valve stuck?	Replace the PCV valve.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)?	Go to step **8.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.	Is fuel pressure 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)?	Go to step **9.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
9	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature 70°C (158°F) — 100°C (212°F)?	Go to step **10.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>

	Step	Check	Yes	No
10	**CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL.** 1) Start and warm-up the engine until engine coolant temperature is above 60°C (140°F). 2) Place the select lever in “N” or “P” position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of manifold absolute pressure sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measurement value 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg) when idling, and 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when ignition turned ON?	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

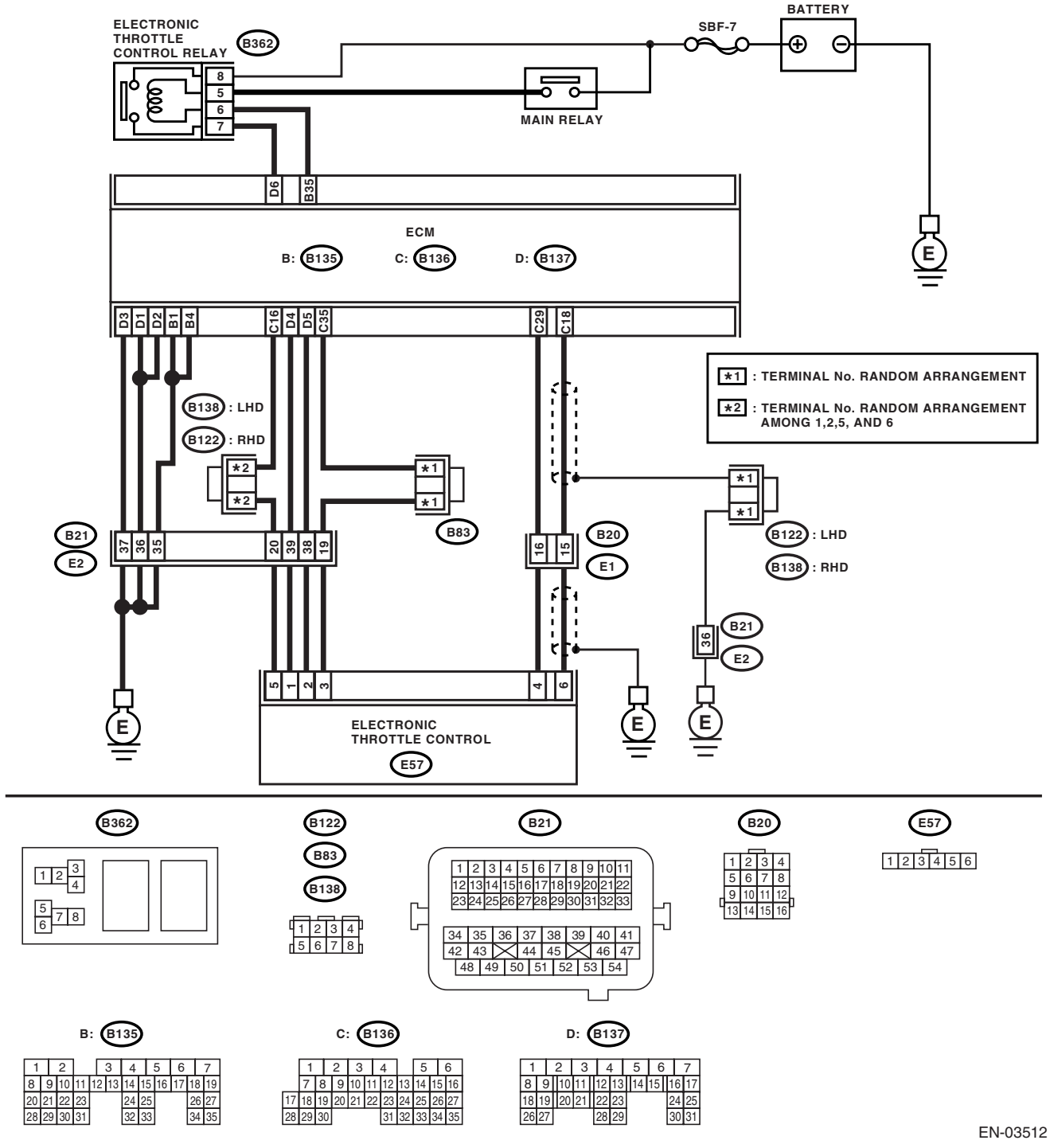
Z: DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



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- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

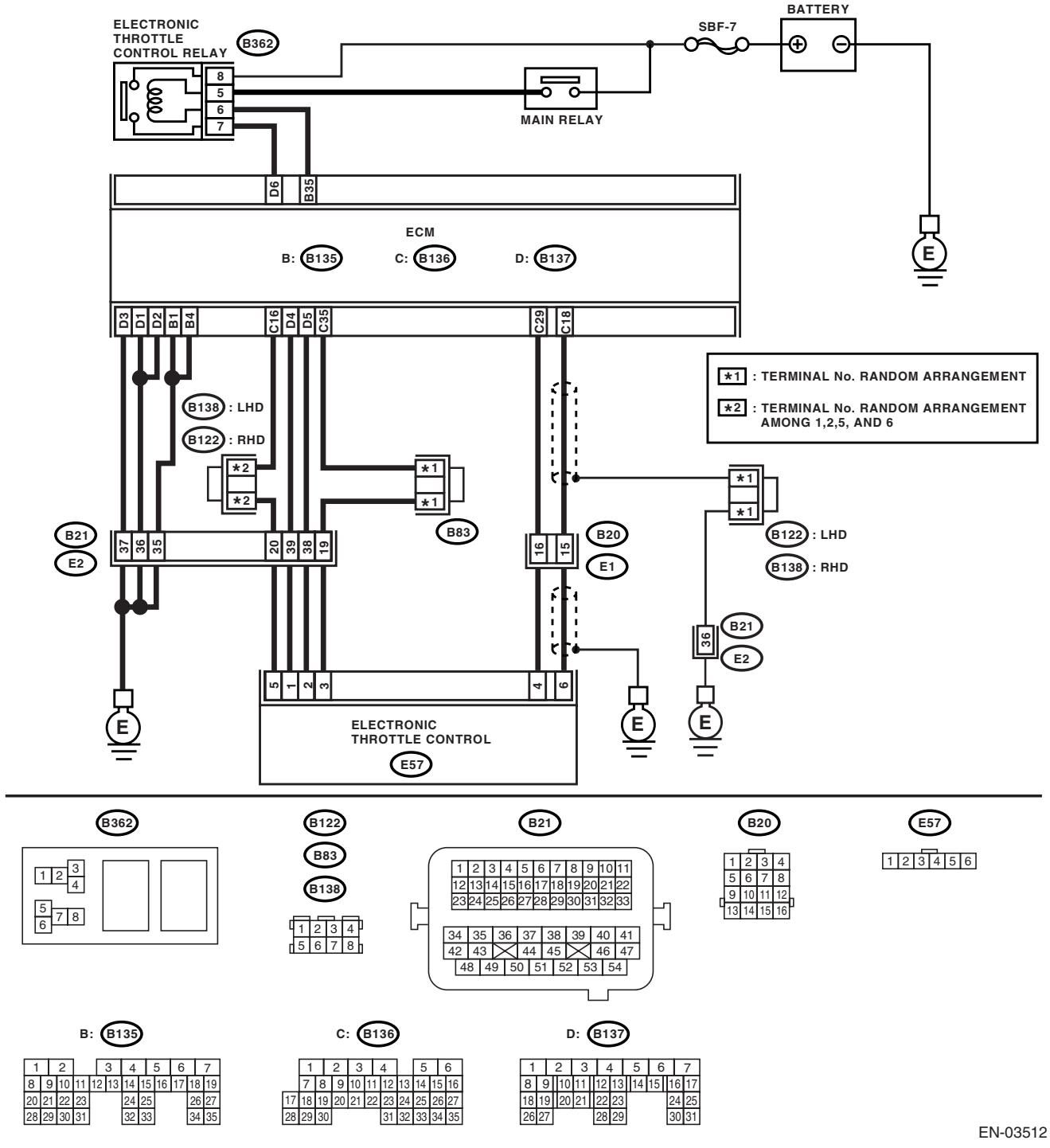
AA:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



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- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 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 **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **7.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
7	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Replace the electronic throttle control.	Sensor power supply circuit may be shorted.

AB:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-143, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-143, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-143, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Detects when malfunction occurs in 2 continuous driving cycles.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

TROUBLE SYMPTOM:

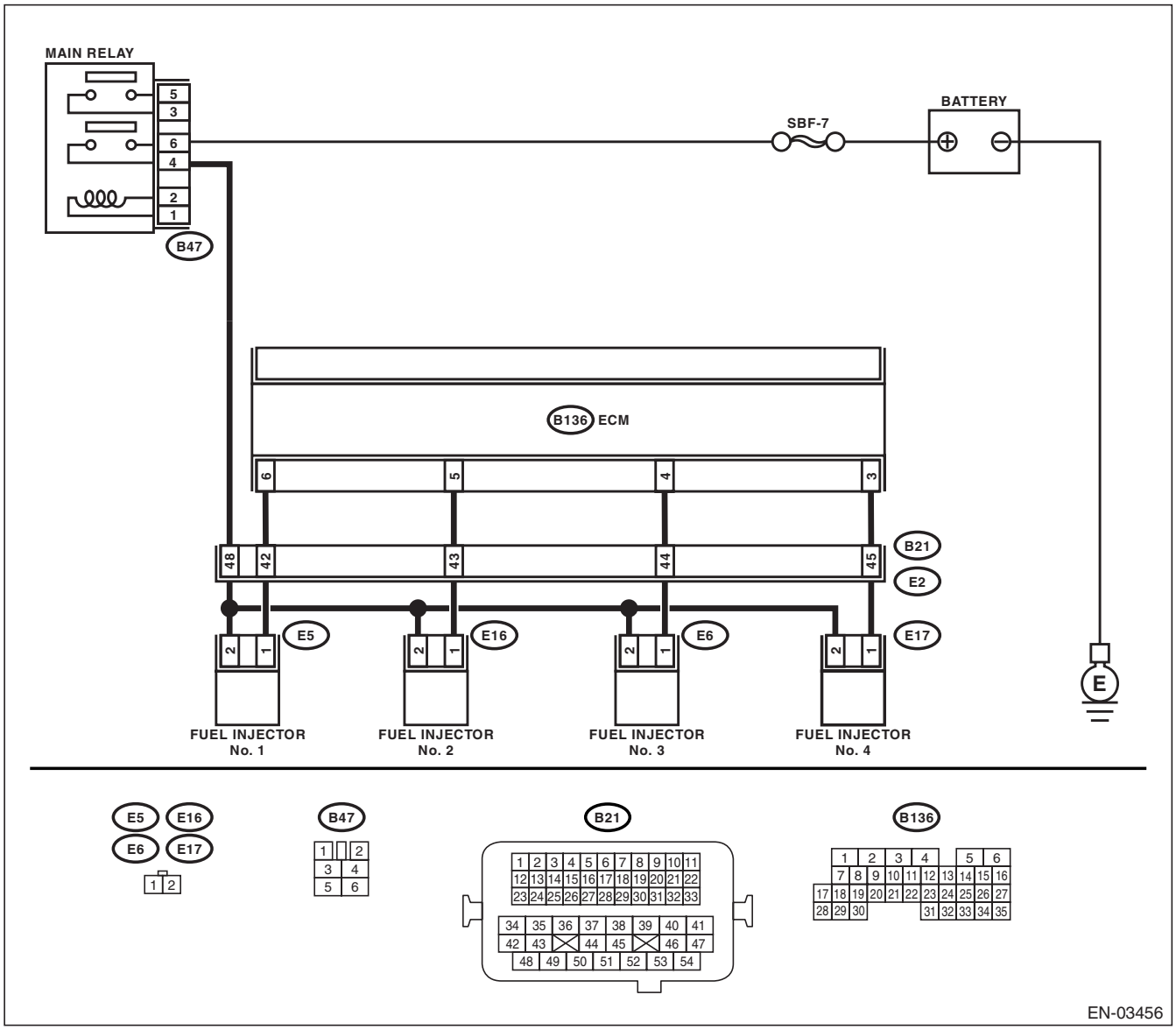
- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Disconnect the connector from ECM. 4) Measure the resistance between ECM 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 more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between fuel injector and ECM connector.
5	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) 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: • Open circuit of harness between ECM and fuel injector connector • Poor contact in coupling connector
6	**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 **7.**	Replace the faulty fuel injector. <Ref. to FU(H4SO 2.5)-32, Fuel Injector.>

	Step	Check	Yes	No
7	**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 more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
8	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM 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 connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Go to step **9.**
9	**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 less than 1 Ω?	Replace the faulty fuel injector and ECM. <Ref. to FU(H4SO 2.5)-32, Fuel Injector.> <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Go to step **10.**
10	**CHECK INSTALLATION 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.	Go to step **11.**
11	**CHECK CRANK SPROCKET.** Remove the timing belt cover.	Is the crank sprocket rusted or does it have broken teeth?	Replace the crank sprocket. <Ref. to ME(H4SO 2.0)-50, Crank Sprocket.>	Go to step **12.**
12	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft to align the alignment mark on crank sprocket with the alignment mark on cylinder block.	Is the timing belt dislocated from its proper position?	Correct the installation condition of timing belt. <Ref. to ME(H4SO 2.0)-43, Timing Belt.>	Go to step **13.**

	Step	Check	Yes	No
13	**CHECK FUEL LEVEL.**	Is the fuel gauge indication higher than the “Lower” level?	Go to step **14.**	Replenish fuel so fuel gauge indication is higher than the “Lower” level. After replenishing fuel, Go to step **14.**
14	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Perform the clear memory mode using Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **16.**	Go to step **15.**
15	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Has the cause of misfire been detected while running the engine? EX. Disconnection of spark plug cord.	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
16	**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 **17.**
17	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read the DTC. • Subaru Select Monitor <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual. NOTE: Perform diagnosis according to the items listed below.	Does the Subaru Select Monitor or general scan tool display only one DTC?	Go to step **22.**	Go to step **18.**
18	**CHECK ANY OTHER DTC ON DISPLAY.**	Are DTC P0301 and P0302 displayed?	Go to step **23.**	Go to step **19.**
19	**CHECK DTC ON DISPLAY.**	Are DTC P0303 and P0304 displayed?	Go to step **24.**	Go to step **20.**

Step		Check	Yes	No
20	CHECK DTC ON DISPLAY.	Are DTC P0301 and P0303 displayed?	Go to step **25.**	Go to step **21.**
21	CHECK DTC ON DISPLAY.	Are DTC P0302 and P0304 displayed?	Go to step **26.**	Go to step **27.**
22	ONLY ONE CYLINDER	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Spark plug cord • Fuel injector • Compression ratio	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	GROUP OF #1 AND #2 CYLINDERS	Are there any faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: (1) Check the following items. • Spark plug • Fuel injector • Ignition coil • Compression ratio (2) If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H4SO 2.5)(diag)-60, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	GROUP OF #3 AND #4 CYLINDERS	Are there any faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: (1) Check the following items. • Spark plug • Fuel injector • Ignition coil (2) If no abnormal is discovered, check for “16. D: IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN(H4SO 2.5)(diag)-60, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
25	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 • Fuel injector • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	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 • Fuel injector • Compression ratio • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	CYLINDER AT RANDOM	Is the engine idle rough?	Go to DTC P0171. <Ref. to EN(H4SO 2.5)(diag)-134, 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 • Fuel injector • Compression ratio

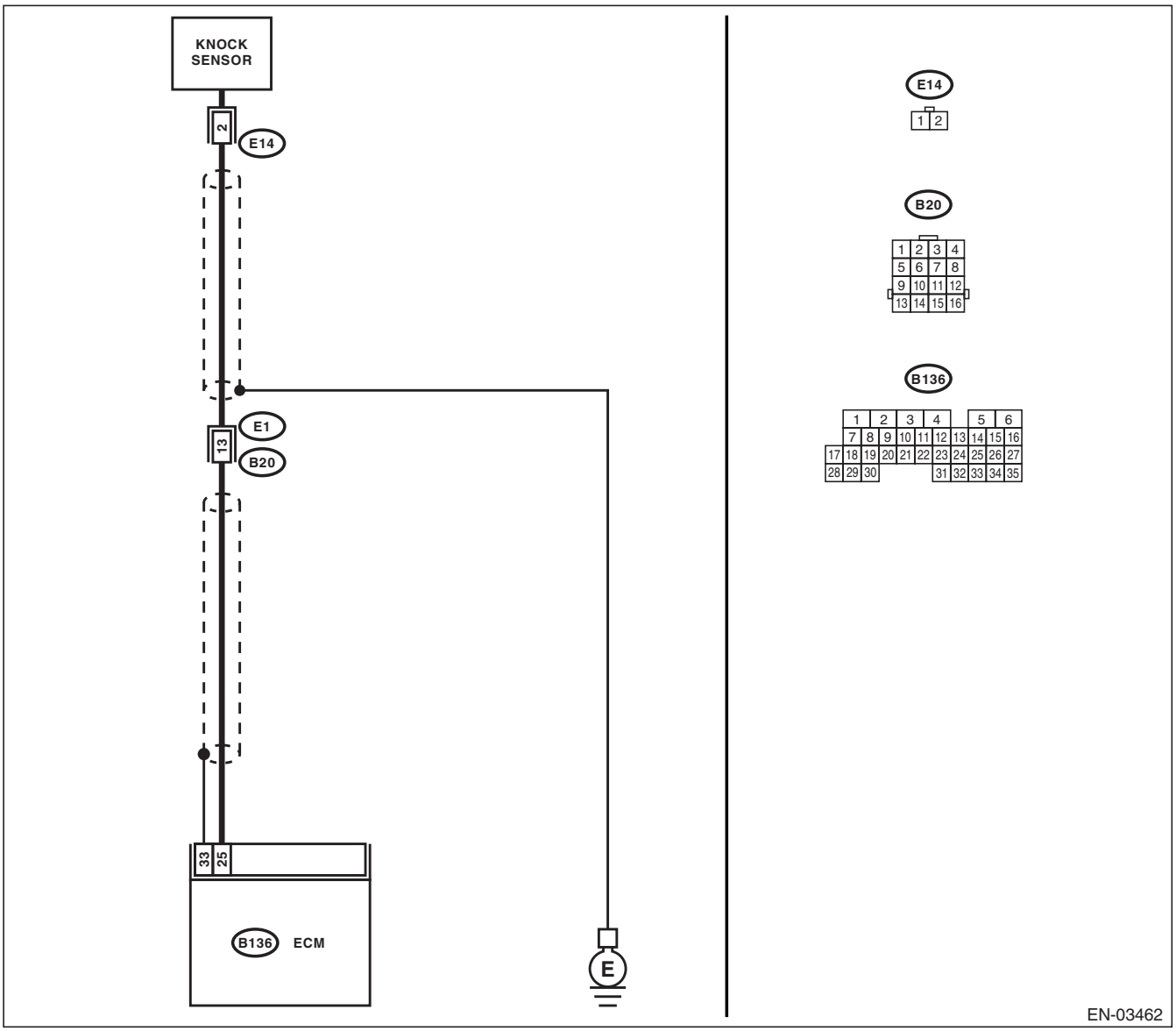
AF:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:
Immediately at fault recognition

TROUBLE SYMPTOM:
- Poor driving performance
- Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Poor contact in knock sensor connector
4	**CHECK INSTALLATION CONDITION OF KNOCK SENSOR.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4SO 2.5)-23, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

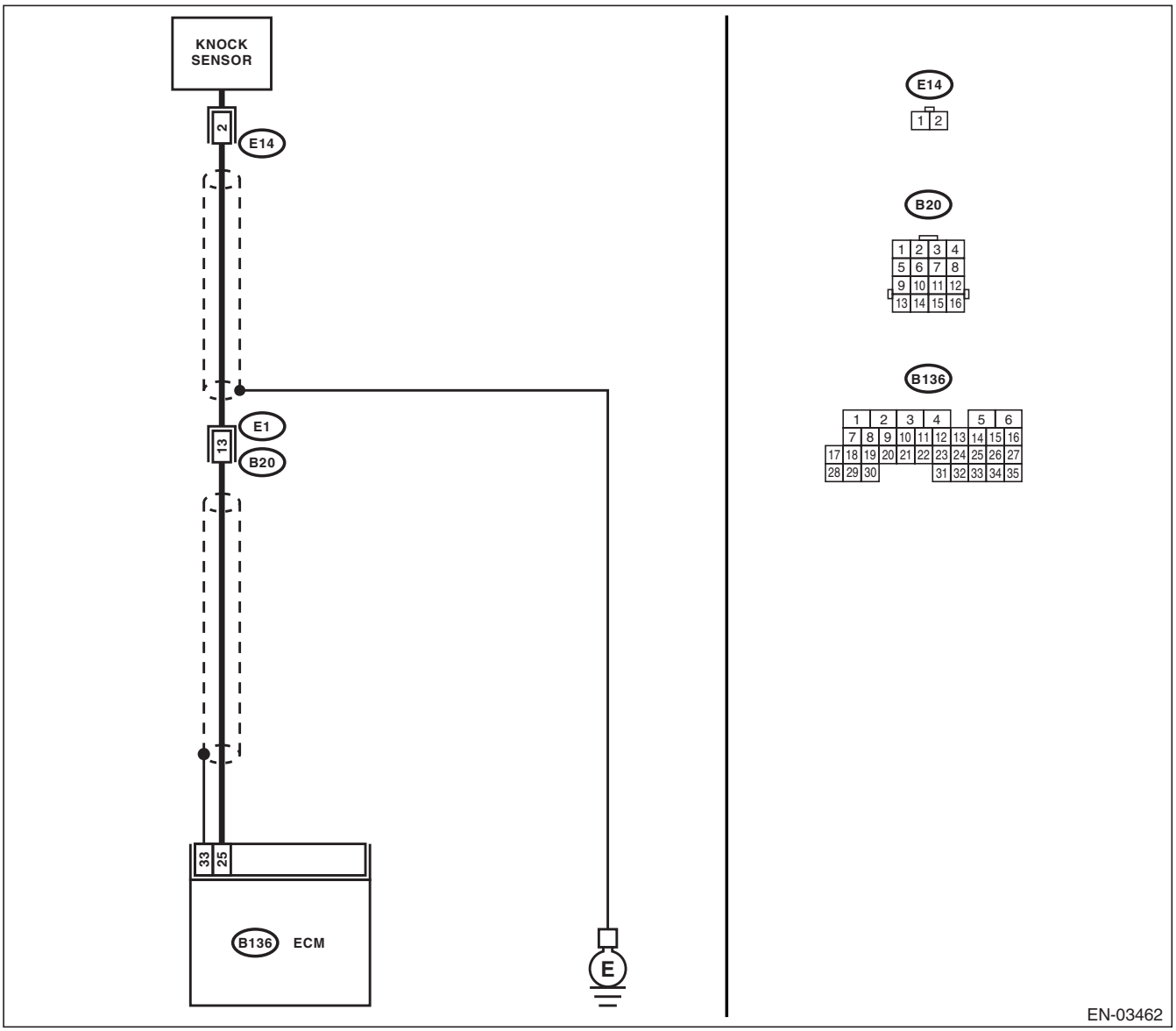
AG:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:
Immediately at fault recognition

TROUBLE SYMPTOM:
- Poor driving performance
- Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **3.**	Go to step **4.**
3	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4SO 2.5)-23, Knock Sensor.>	Repair the ground short circuit of harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit of harness covered with shield.
4	**CHECK INPUT SIGNAL OF ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AH:DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

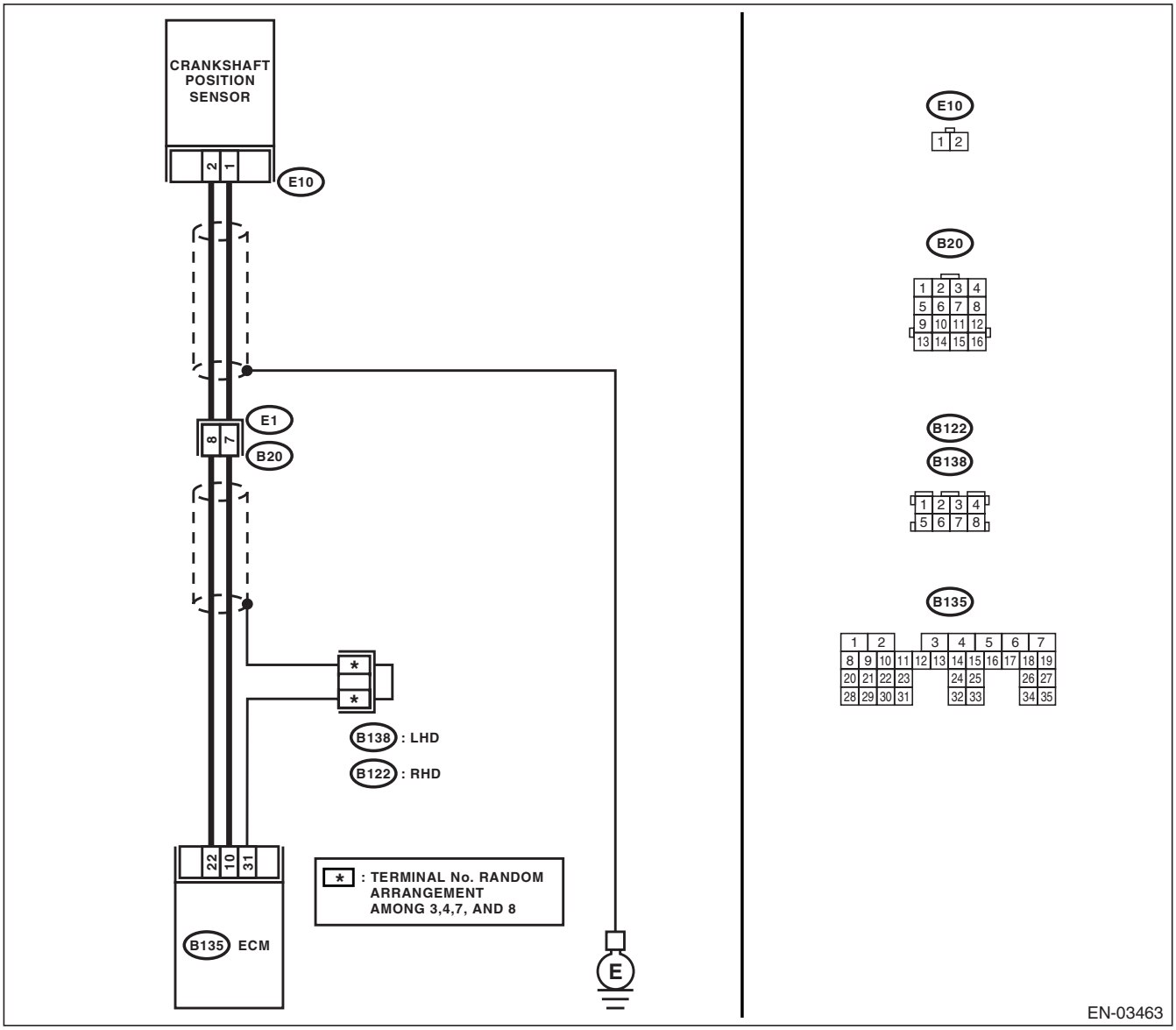
- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

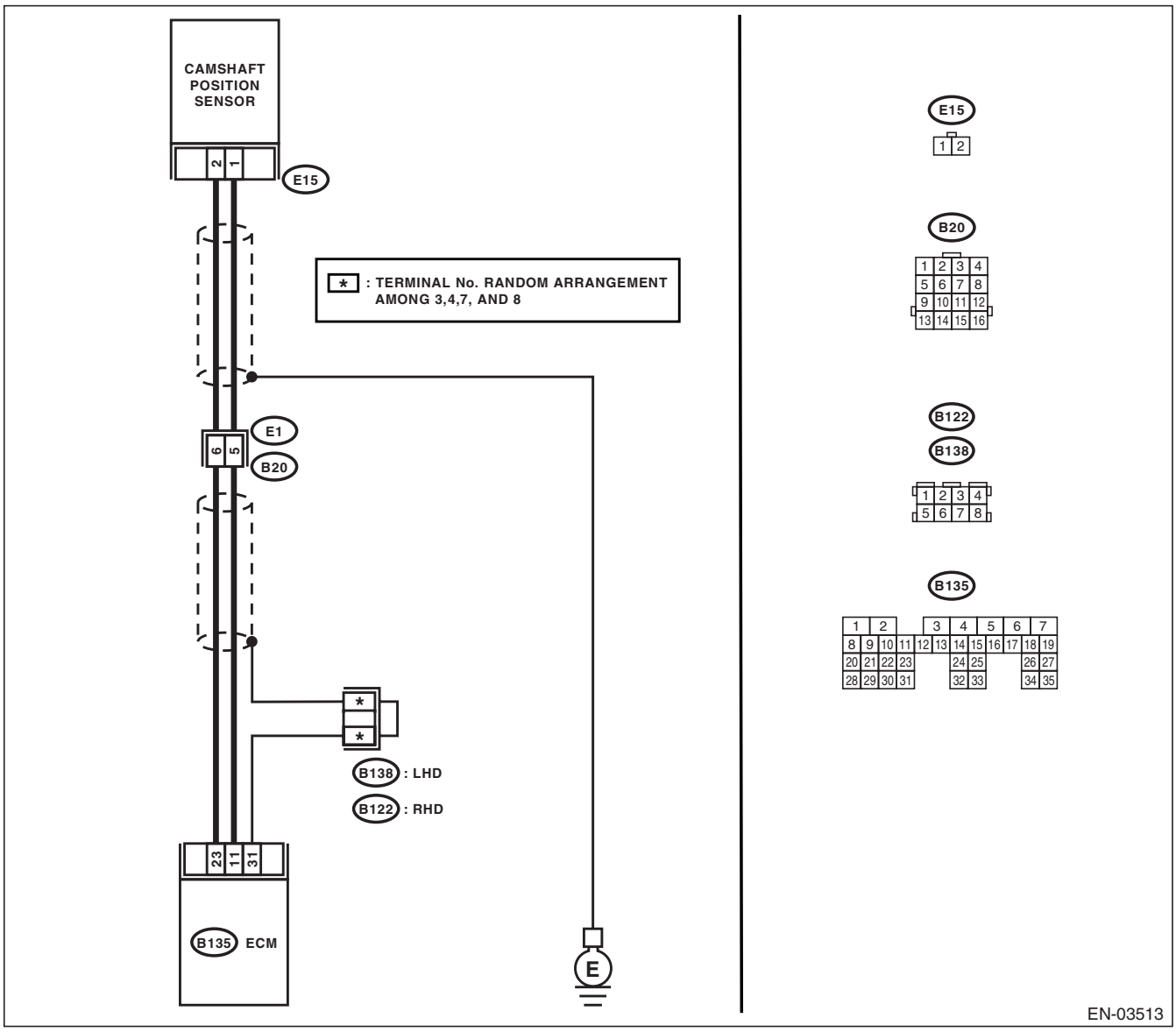
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit of harness with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — 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: • Open circuit of harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **6.**	Tighten the crankshaft position sensor installation bolt securely.

	Step	Check	Yes	No
6	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4SO 2.5)-21, Crankshaft Position Sensor.>

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

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Engine stalls.
- Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit of harness with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — 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: • Open circuit of harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
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.

	Step	Check	Yes	No
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4SO 2.5)-22, Camshaft Position Sensor.>

AJ:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

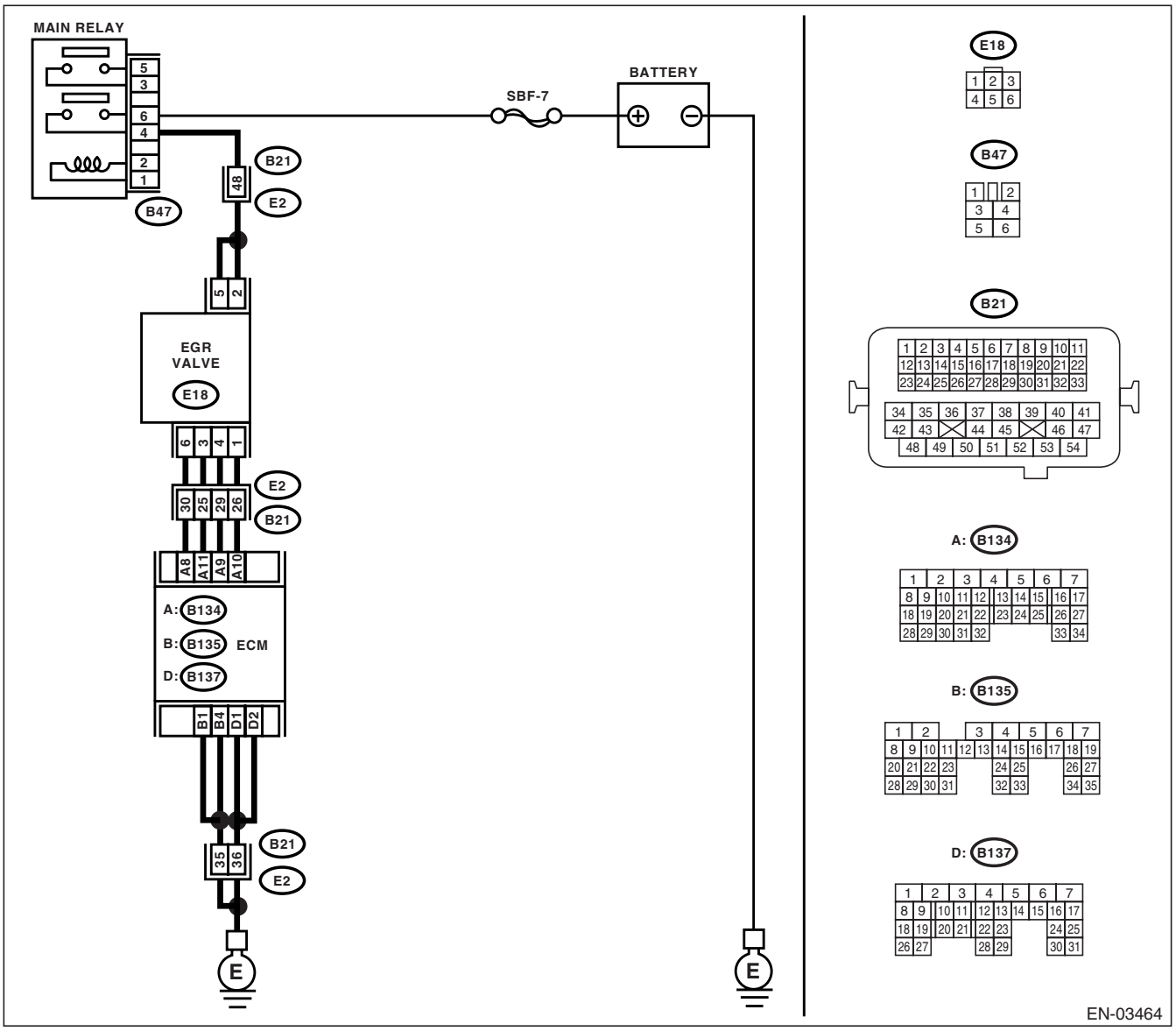
TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed.
- Erroneous idling
- Movement performance problem

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Make sure that the EGR valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step **3.**
3	**CHECK POWER SUPPLY OF EGR SOLENOID VALVE.** 1) Disconnect the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit of harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there is no foreign material between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	Is the resistance 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.5)-31, EGR Valve.>
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** ***(B134) No. 9 (+) — Chassis ground (−):*** ***(B134) No. 10 (+) — Chassis ground (−):*** ***(B134) No. 11 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact portion in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 8 — (E18) No. 6:*** ***(B134) No. 10 — (E18) No. 1:*** ***(B134) No. 9 — (E18) No. 4:*** ***(B134) No. 11 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:*** ***(B134) No. 9 — Chassis ground:*** ***(B134) No. 10 — Chassis ground:*** ***(B134) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit of harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM and EGR solenoid valve connector.	Is there poor contact of ECM and EGR solenoid valve connector?	Repair the poor contact of ECM and EGR solenoid valve connector.	Even if the malfunction indicator light illuminates, the circuit has returned to the specified condition at this time.

AK:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK1)

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

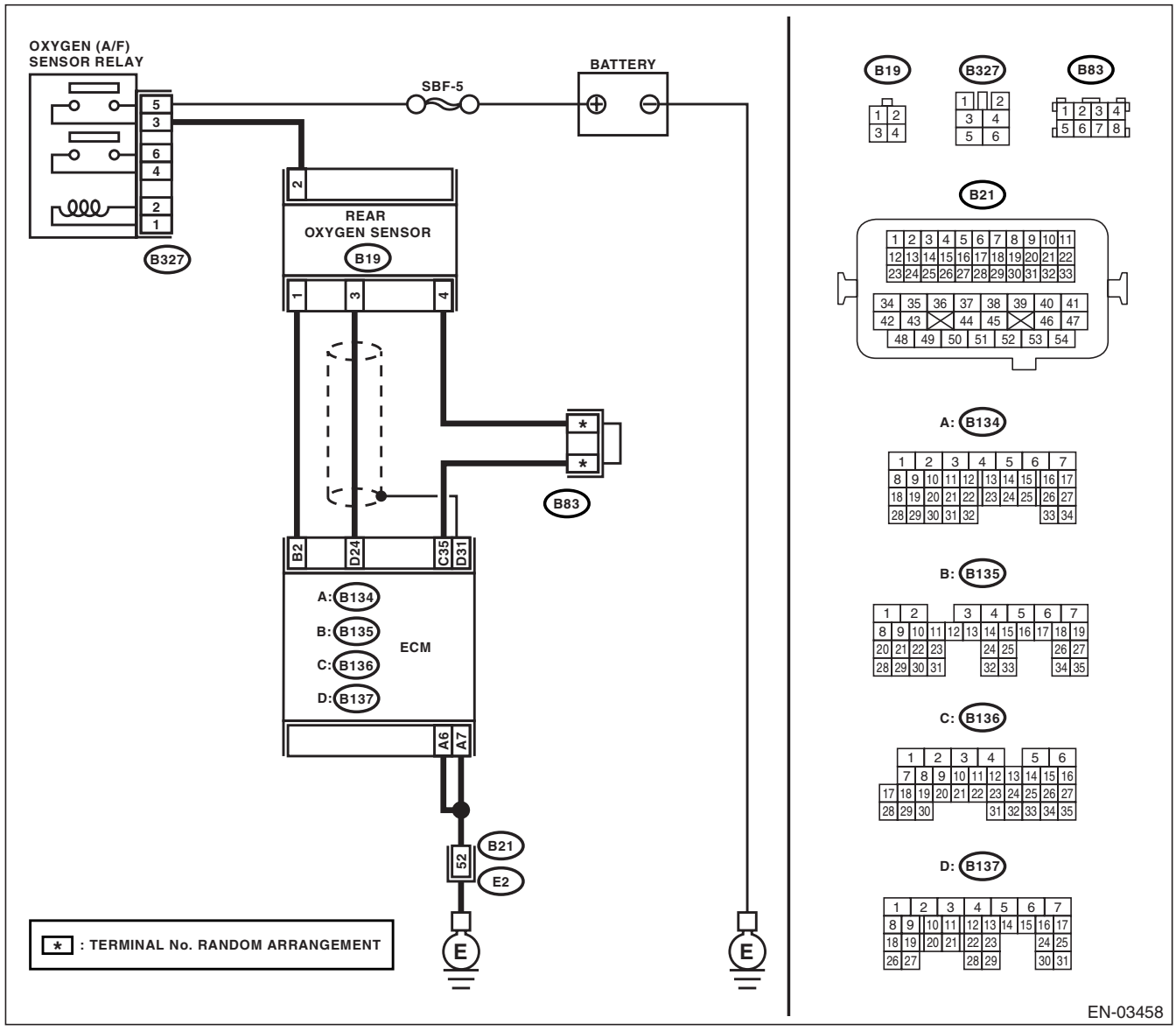
- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:*** ***(B136) No. 35 — (B19) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B137) No. 31 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
5	**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	Is there a fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4SO 2.0)-2, General Description.>	Go to step **6.**
6	**CHECK CATALYTIC CONVERTER.**	Is there damage at rear face or front face of front catalyst?	Replace the catalytic converter. <Ref. to EC(H4SO 2.0)-3, Front Catalytic Converter.>	Contact the SUBARU dealer.

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

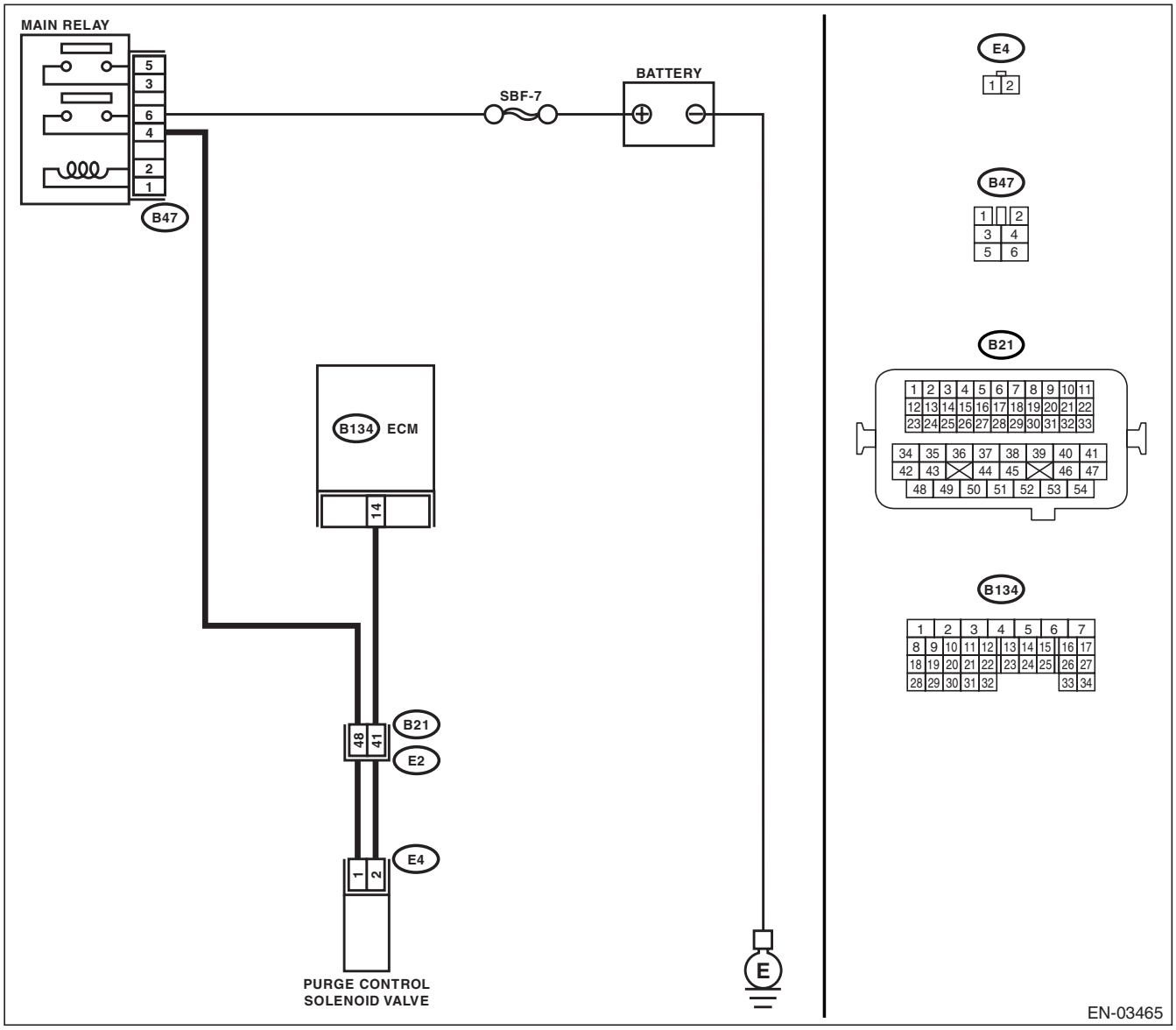
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B134) No. 14 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
5	**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?	Go to step **6.**	Replace the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.>
6	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit of harness between main relay and purge control solenoid valve connector.

	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

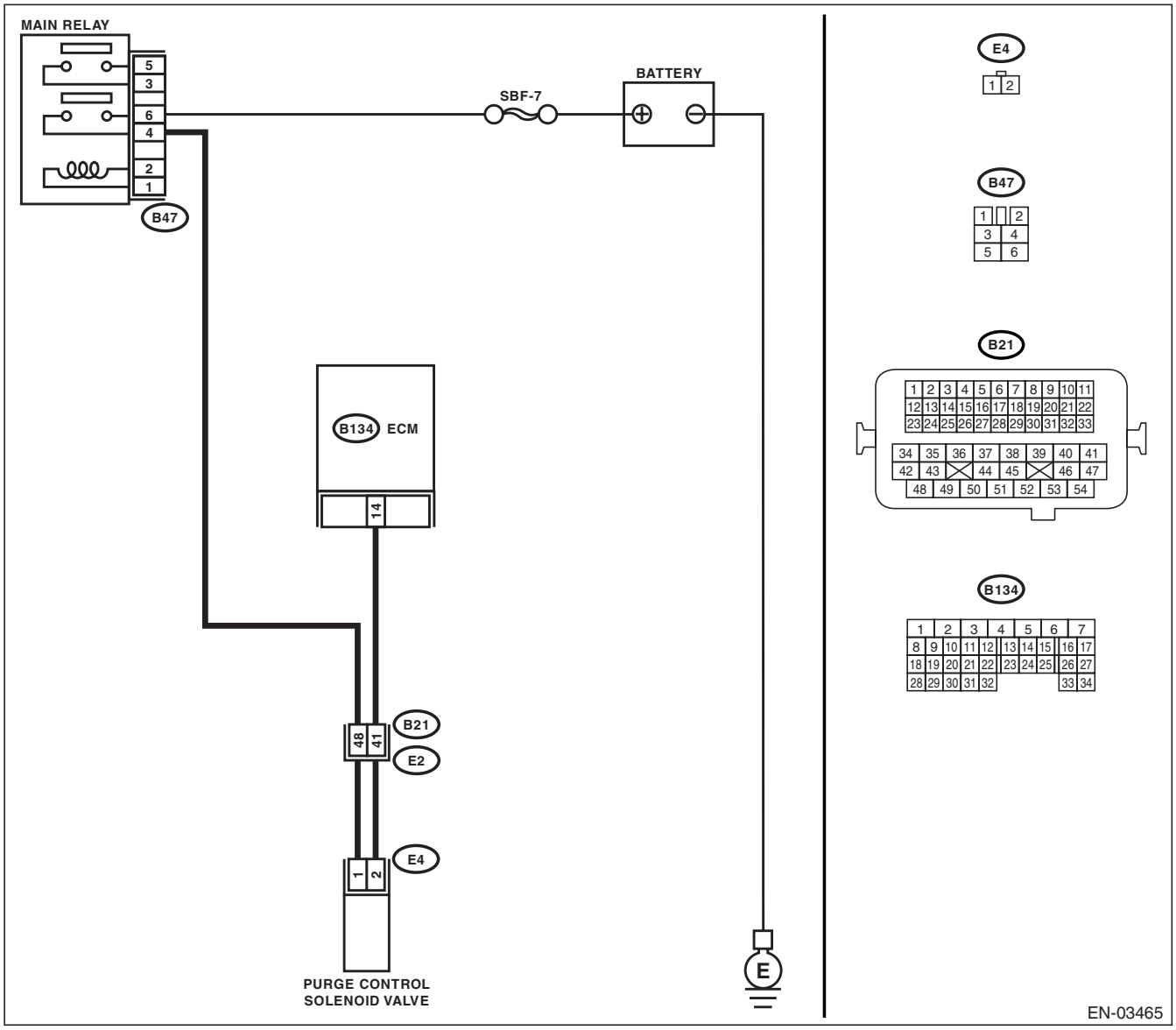
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector located at the lower portion of glove box. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground while operating the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO 2.5)(diag)-41, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Go to step **3.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **4.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Go to step **6.**

	Step	Check	Yes	No
6	**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(H4SO 2.0)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>.	Go to step **7.**
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0462 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

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

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0463 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AP:DTC P0500 VEHICLE SPEED SENSOR "A"

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to DTC. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

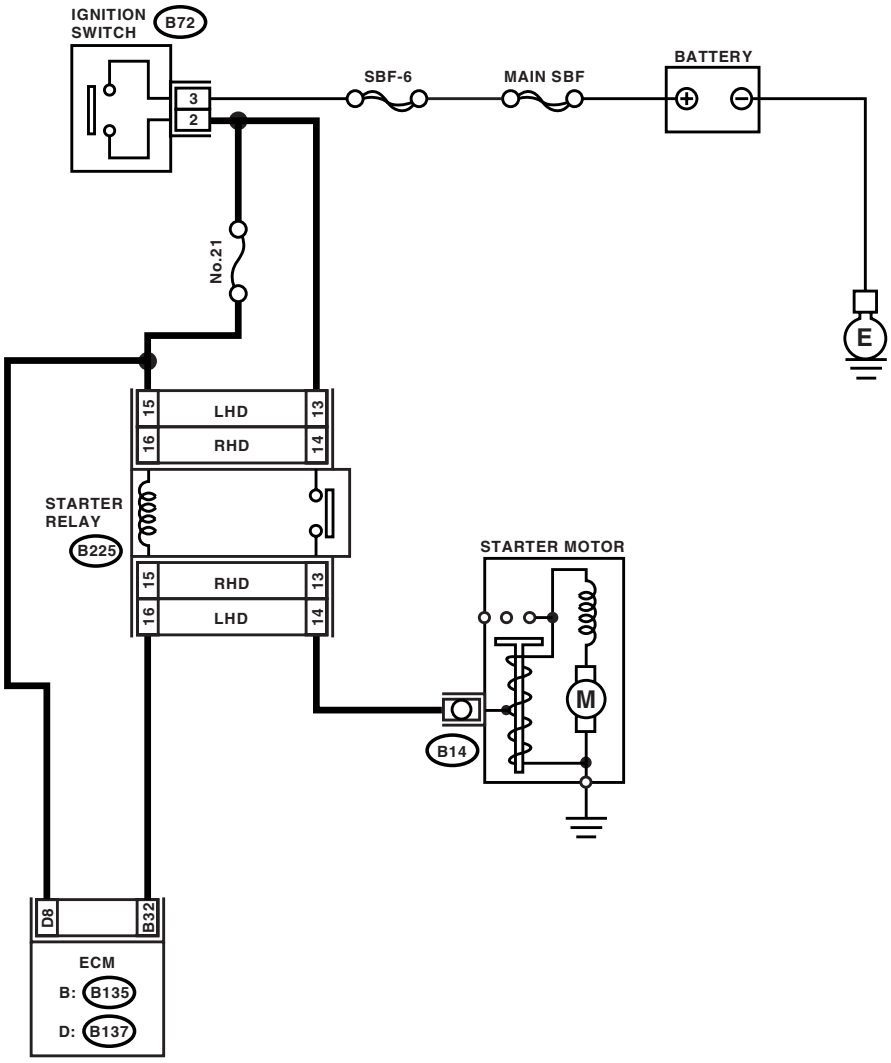
AQ:DTC P0512 STARTER REQUEST CIRCUIT

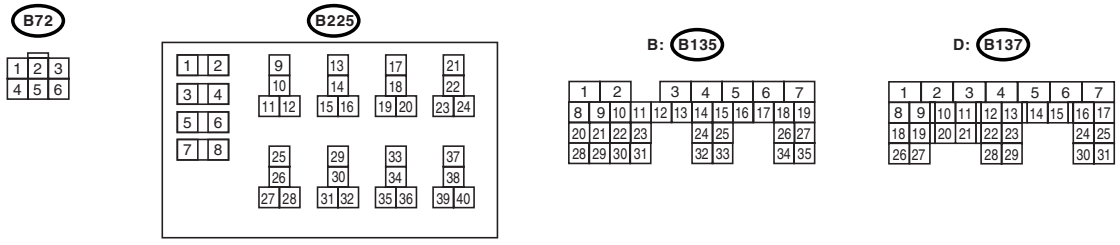
DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model





EN-03453

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN IGNITION SWITCH AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ignition switch and ECM.	Repair the poor contact in ECM.

AR:DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
Engine keeps running at higher speed than specified idle speed.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **3.**
3	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items. • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **4.**
4	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

AS:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AT:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

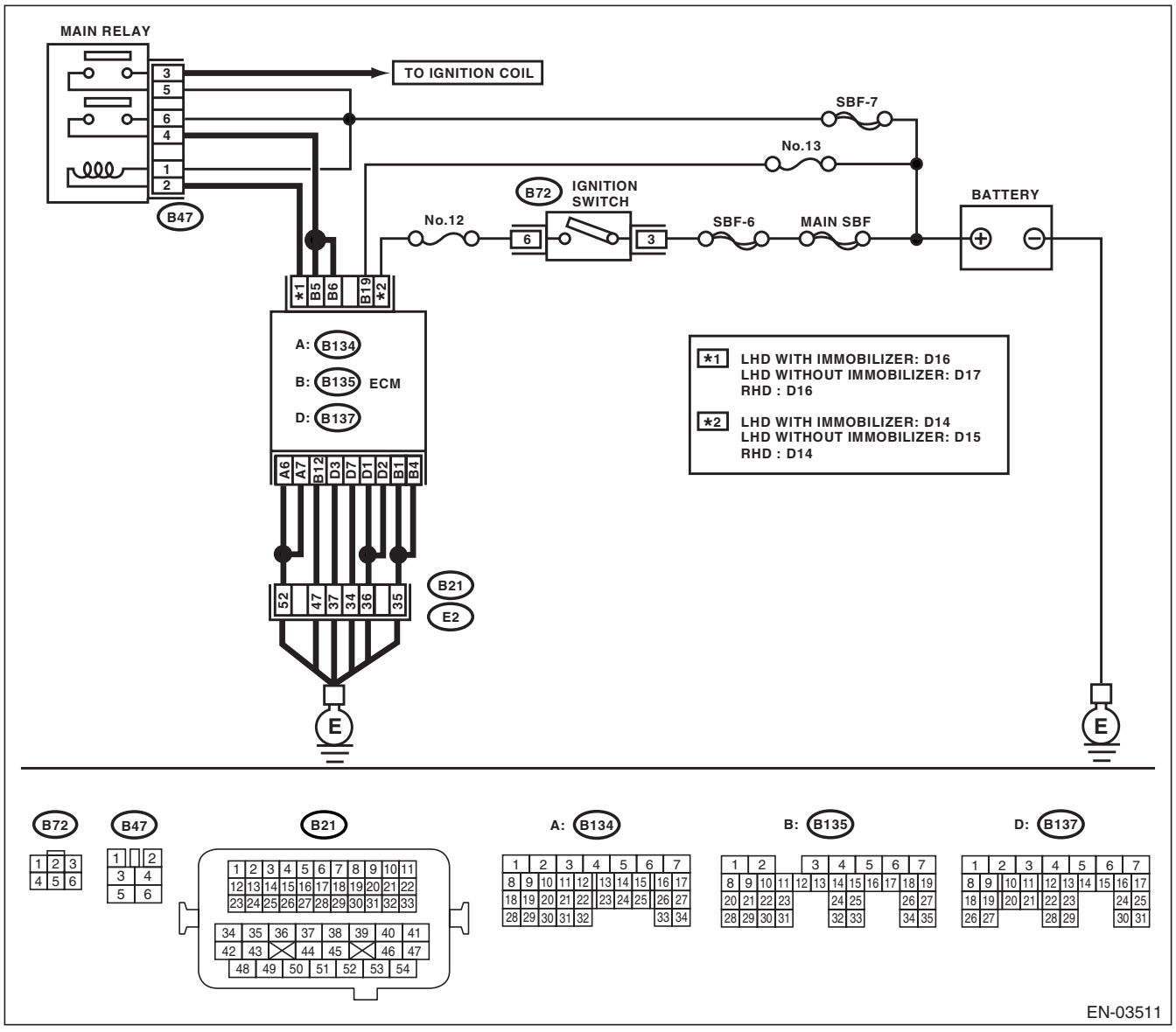
- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AU:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4SO 2.5)(diag)-177, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AV:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

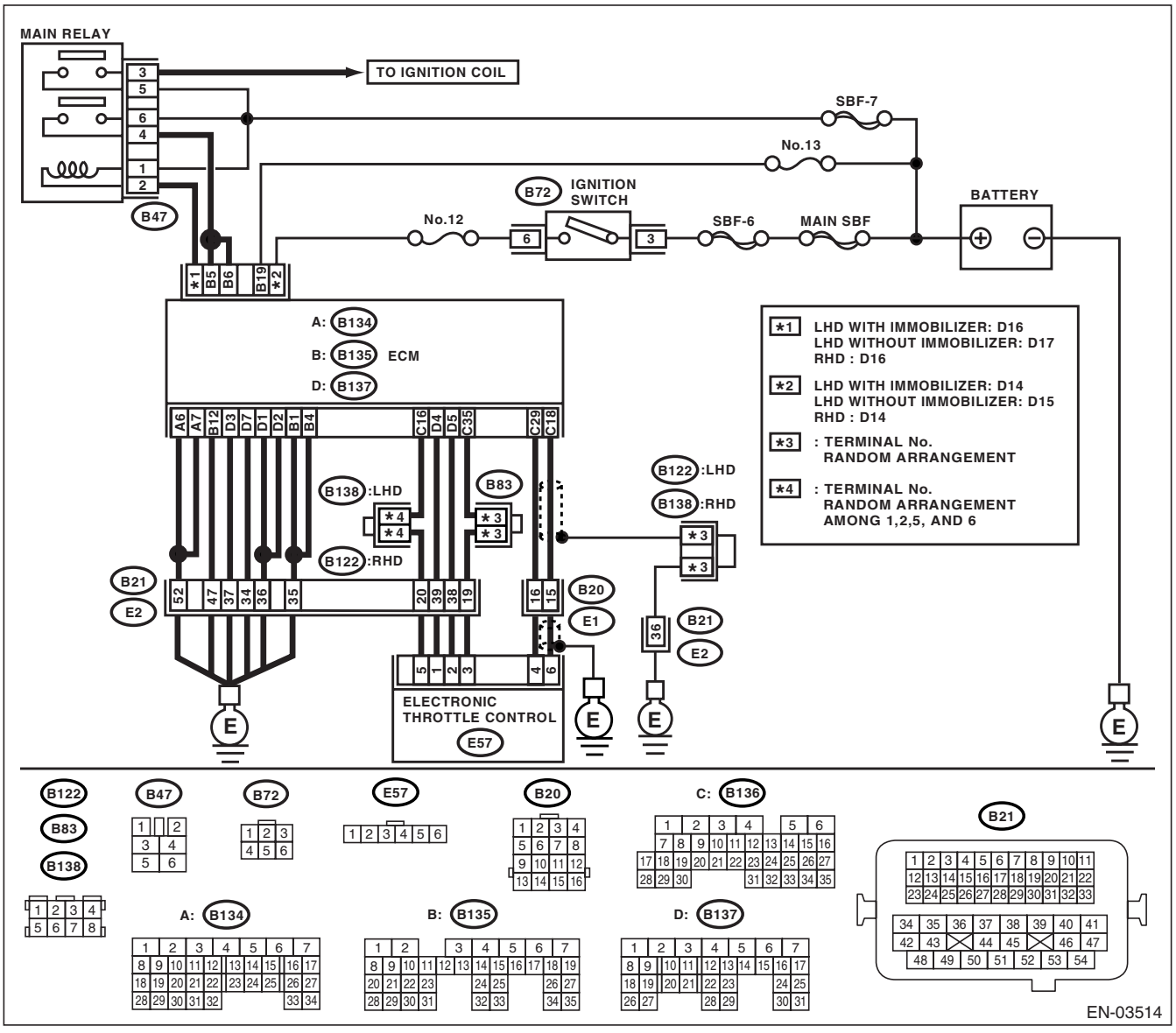
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 13 — 15 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 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 and electronic throttle control connector. ***Connector & terminal*** ***(E57) No. 5 — (B136) No. 16:*** ***(E57) No. 3 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness between ECM and electronic throttle control connector.
5	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 4 (+) — Chassis ground (−):*** ***(B137) No. 1 (+) — Chassis ground (−):*** ***(B137) No. 2 (+) — Chassis ground (−):*** ***(B137) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

AW:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AX:DTC P0691 FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0691 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

AY:DTC P0692 FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0692 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

AZ:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:

For the diagnostic procedure, refer to AT section. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

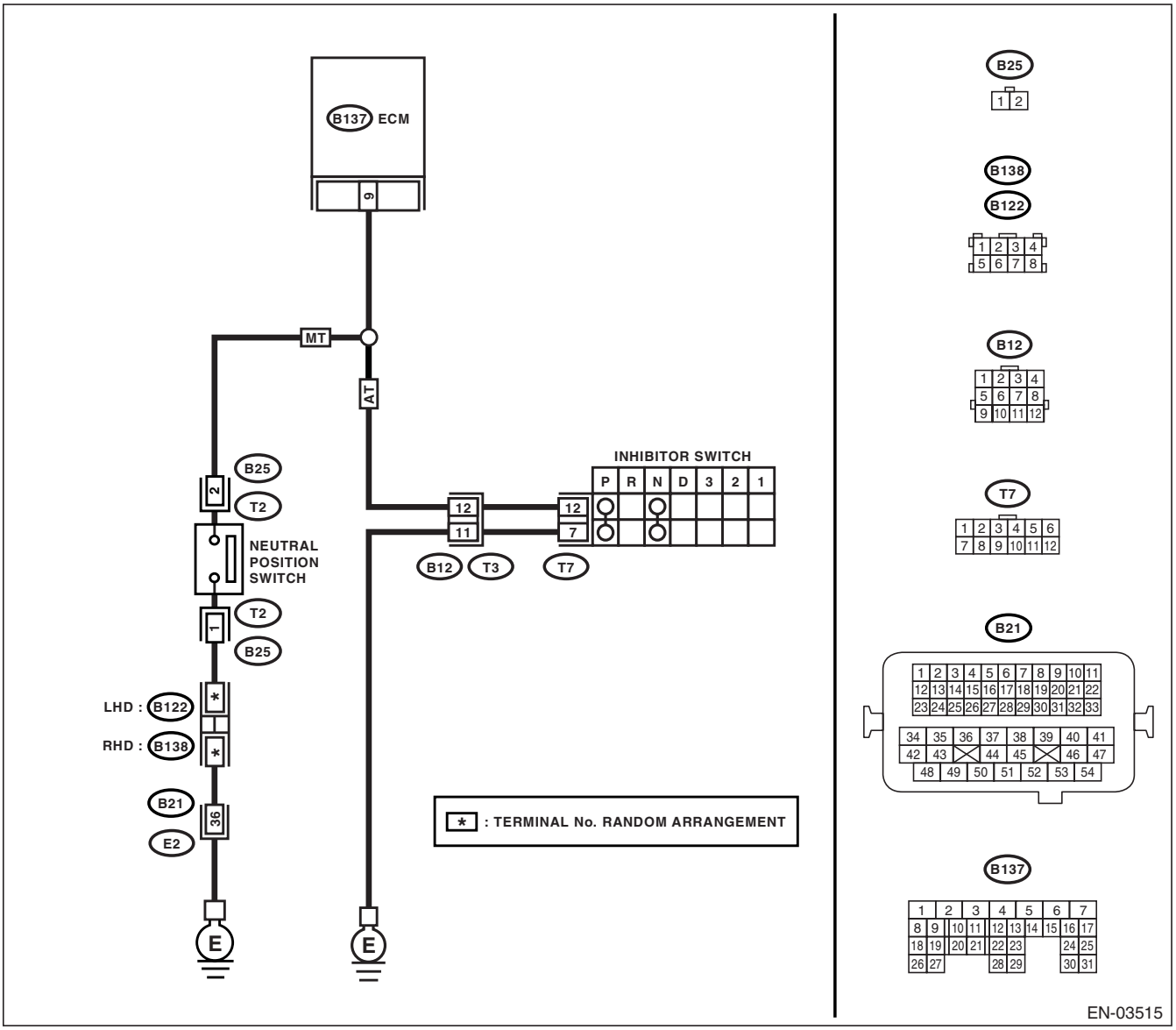
BA:DTC P0851 PARK/NEUTRAL POSITION SWITCH INPUT CIRCUIT LOW

1. AT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

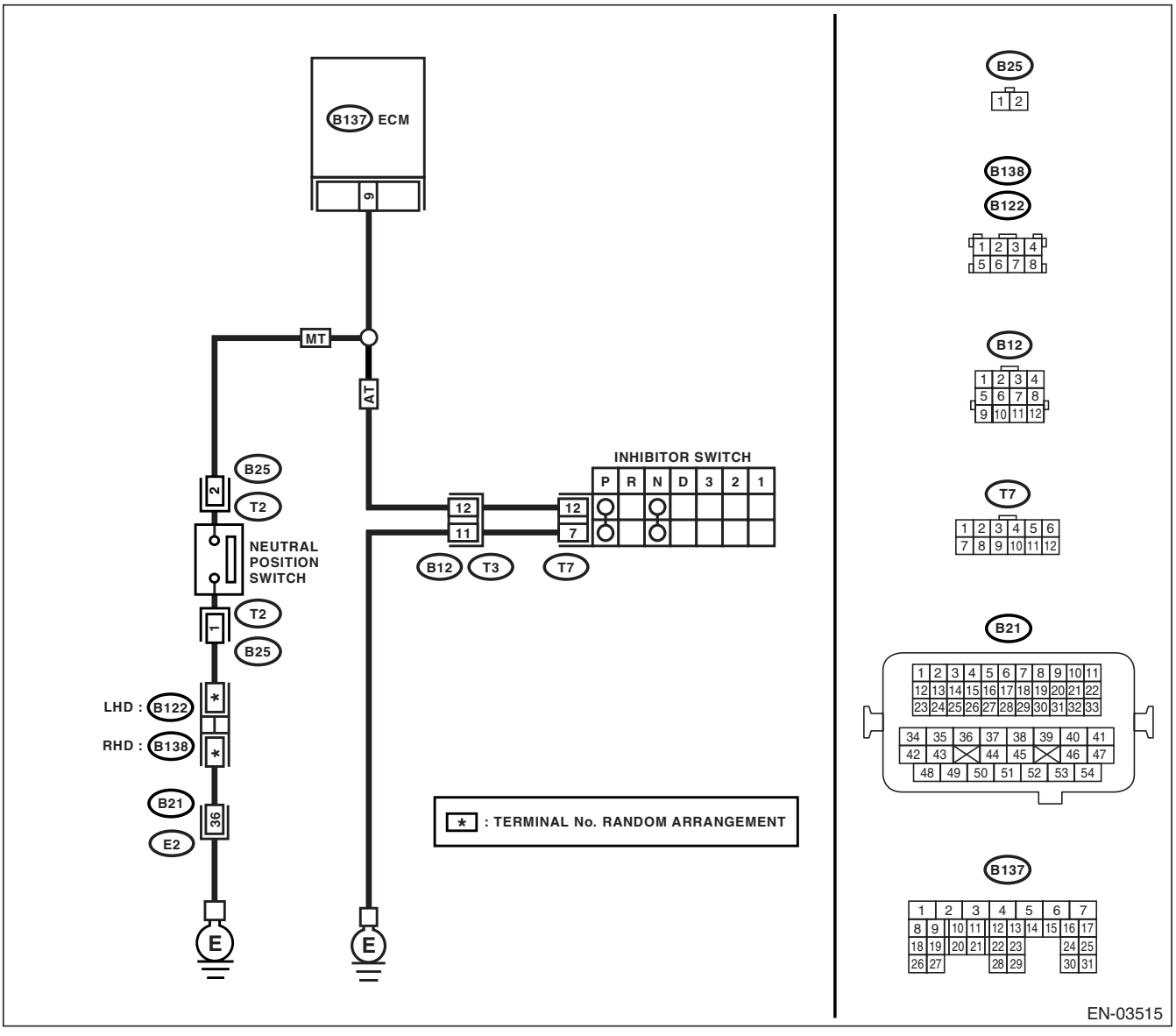
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Shift the select lever to other than "N" or "P" range. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **4.**
4	**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 of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness between ECM and transmission harness connector.
5	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness between transmission harness connector and inhibitor switch connector.
6	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at other than "N" and "P" range. ***Terminals*** ***(T7) No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the inhibitor switch. <Ref. to 4AT-51, Inhibitor Switch.>
7	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-29, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

2. MT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL OF ECM.** 1) Place the shift lever except in neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Place the shift lever in neutral. 4) Measure the resistance between transmission harness connector terminals. ***Terminals*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the short circuit in transmission harness, or replace the neutral position switch.
6	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever except in neutral. 2) Measure the resistance between transmission harness connector terminals. ***Terminals*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in transmission harness, or replace the neutral position switch.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the ground short circuit of harness between ECM and transmission harness connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B137) No. 9 — (B25) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit of harness between ECM and transmission harness connector.
9	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B25) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **10.**	Repair the open circuit of harness between ECM and transmission harness connector.
10	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair the poor contact in transmission harness connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

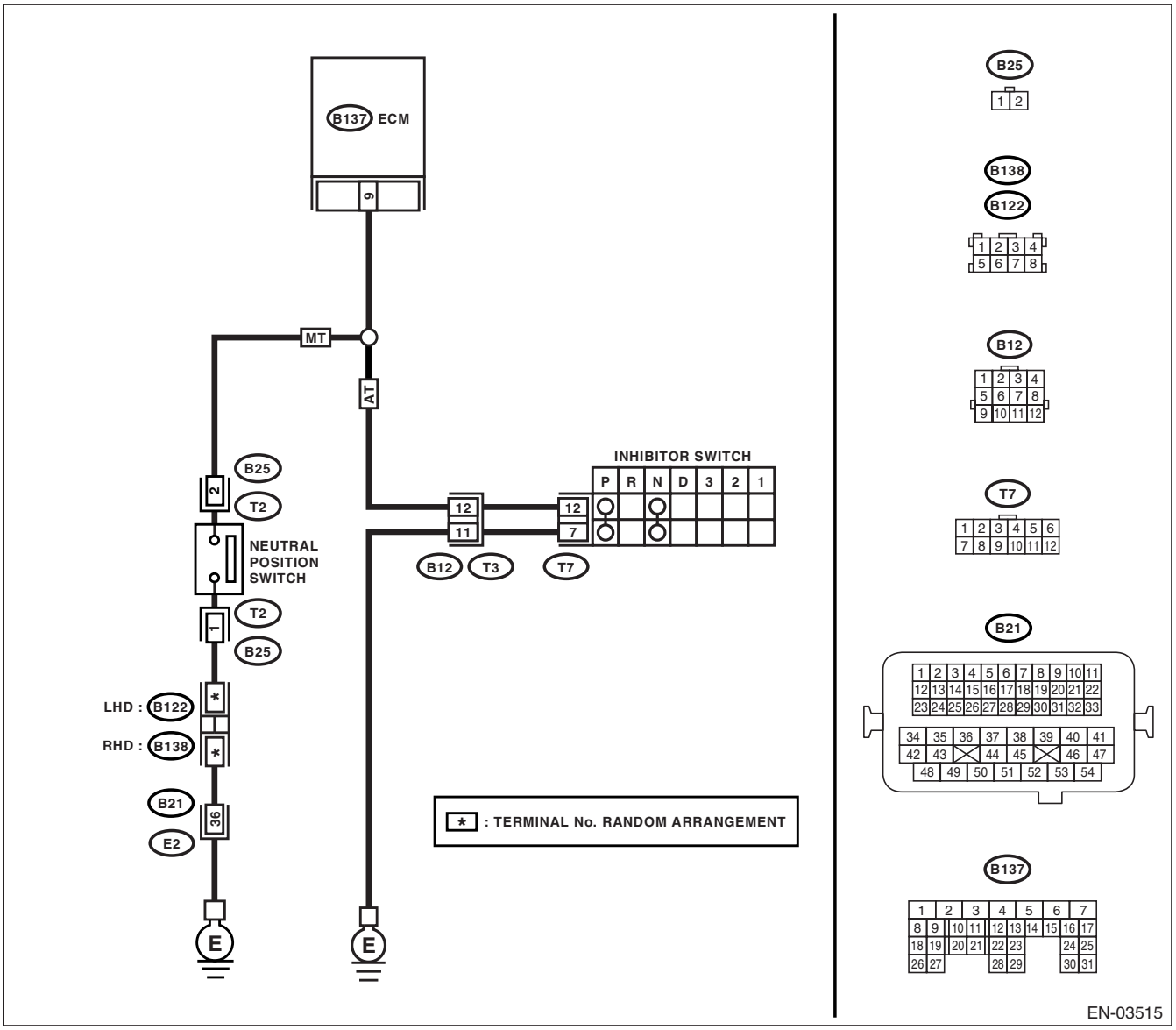
BB:DTC P0852 PARK/NEUTRAL POSITION SWITCH INPUT CIRCUIT HIGH

1. AT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**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 "N" and "P" range. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **6.**
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground with select lever at other than "N" and "P" range. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **6.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and inhibitor switch connector.	Go to step **7.**
7	**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 and inhibitor switch connector. ***Connector & terminal*** ***(B137) No. 9 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

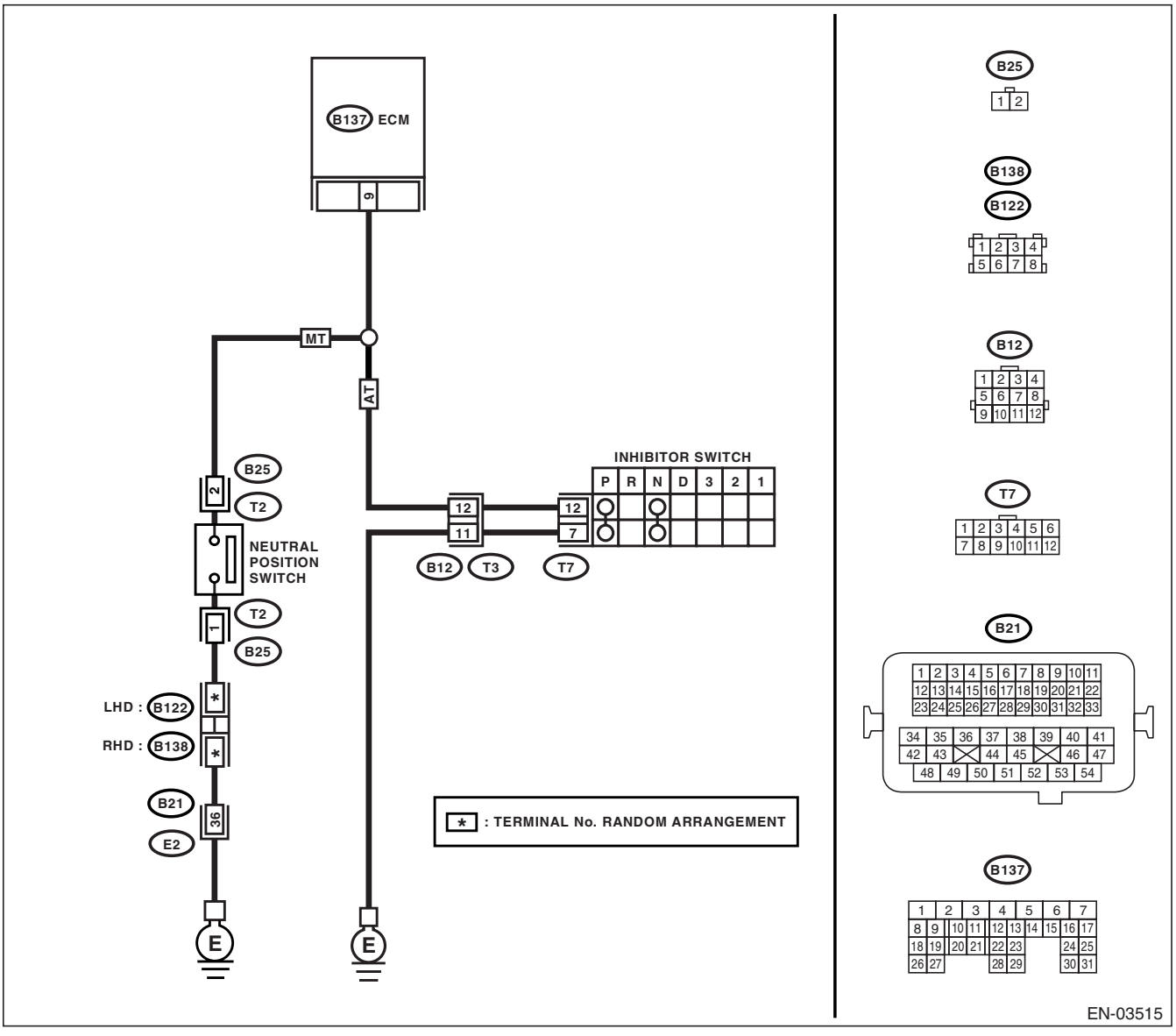
	Step	Check	Yes	No
8	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair the open circuit of harness between inhibitor switch connector and ground line. NOTE: In this case, repair the following: • Open circuit of harness between inhibitor switch connector and ground line
9	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at "N" and "P" range. ***Terminals*** ***(T7) No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the inhibitor switch. <Ref. to 4AT-51, Inhibitor Switch.>
10	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-29, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

2. MT MODEL

DTC DETECTING CONDITION:
Detects when malfunction occurs in 2 continuous driving cycles.
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever except in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL OF ECM.** 1) Place the shift lever in neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever in neutral. 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in transmission harness or replace the neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B137) No. 9 — (B25) No. 2:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B25) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and transmission harness connector • Poor contact in coupling connector

	Step	Check	Yes	No
8	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair the poor contact in transmission harness connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

BC:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1)

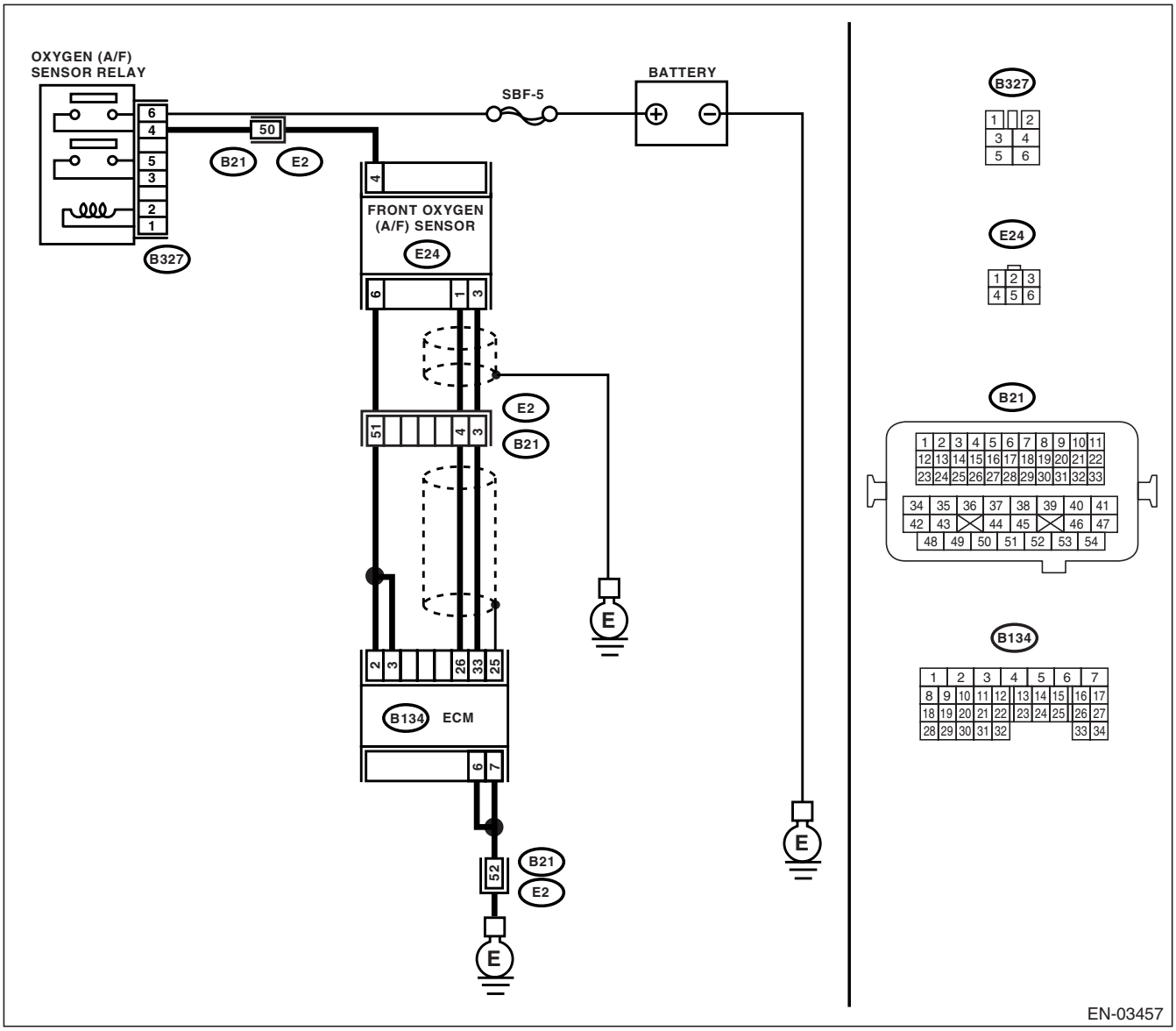
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	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 connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) 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: • Open circuit of harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>

BD:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1)

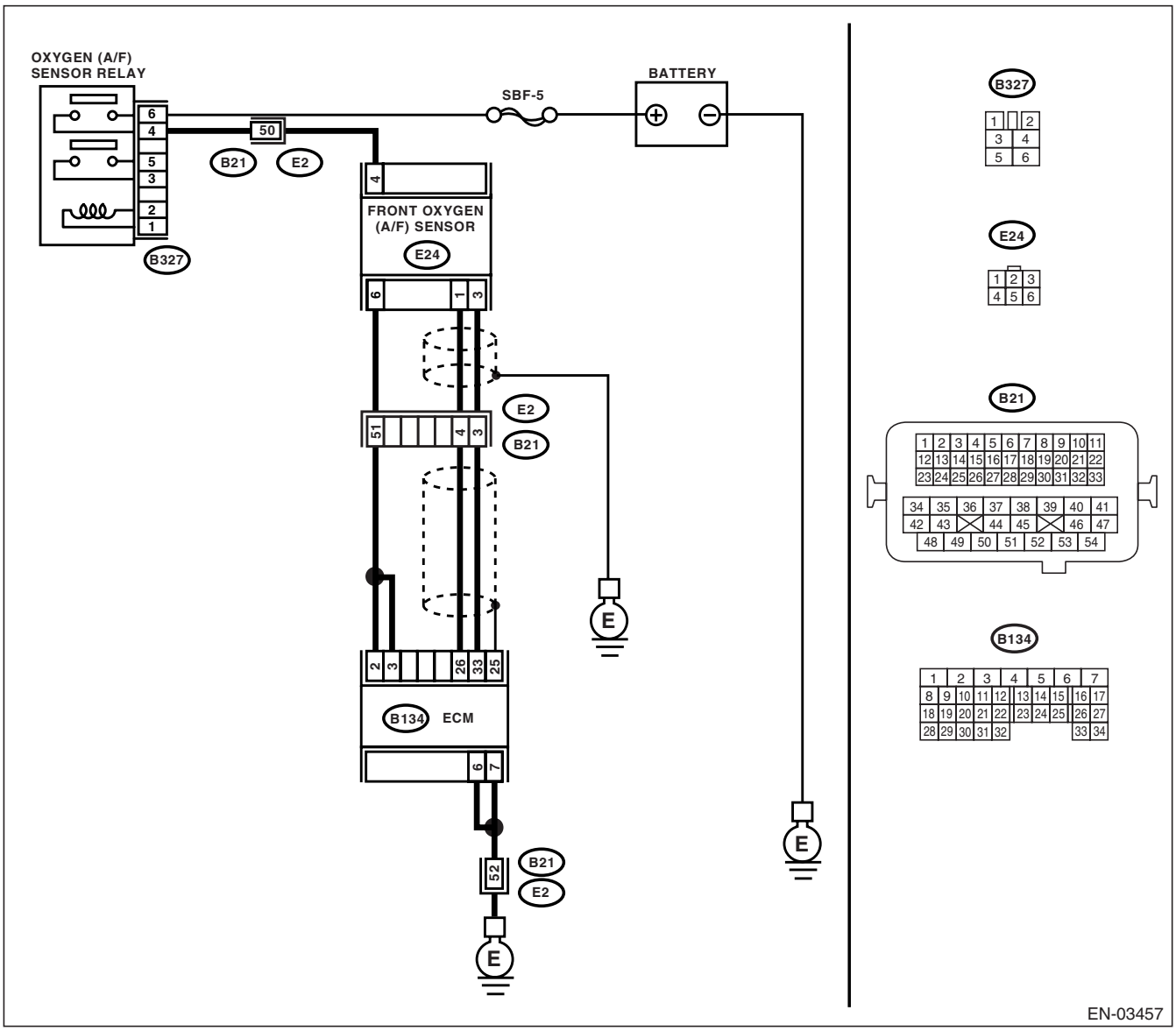
DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	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 chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connectors to ECM and front oxygen (A/F) sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **5.**
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 4.95 V?	Go to step **6.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-35, Front Oxygen (A/F) Sensor.>
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.

BE:DTC P1160 RETURN SPRING FAILURE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BF:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-196, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BG:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-198, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BH:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-196, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-198, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BJ:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-196, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BK:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-198, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BL:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

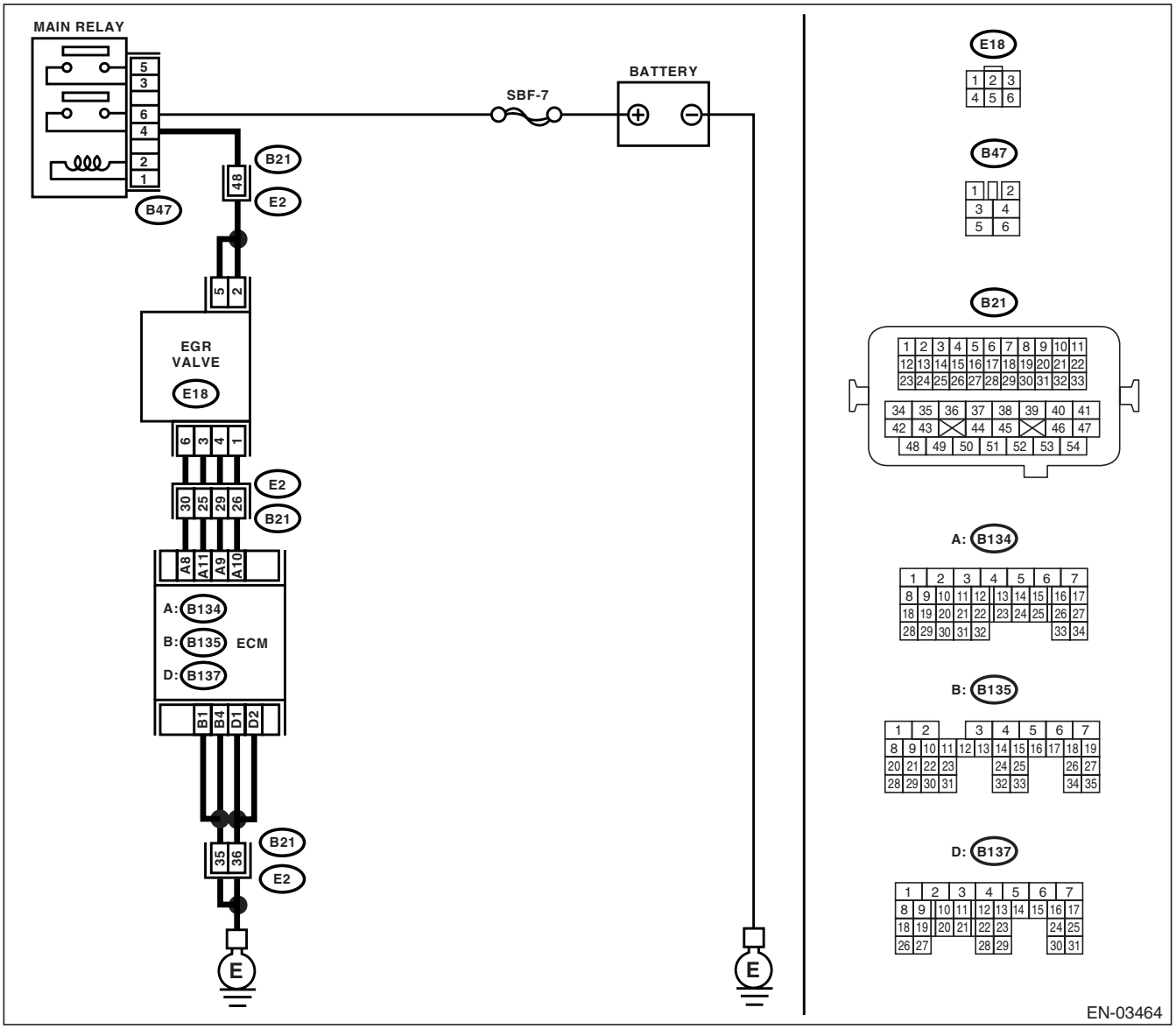
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — (E18) No. 3:*** ***DTC P1494; (B134) No. 10 — (E18) No. 1:*** ***DTC P1496; (B134) No. 9 — (E18) No. 4:*** ***DTC P1498; (B134) No. 8 — (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: • Open circuit of harness between ECM and EGR solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — Chassis ground:*** ***DTC P1494; (B134) No. 10 — Chassis ground:*** ***DTC P1496; (B134) No. 9 — Chassis ground:*** ***DTC P1498; (B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair the poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.5)-31, EGR Valve.>

BM:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

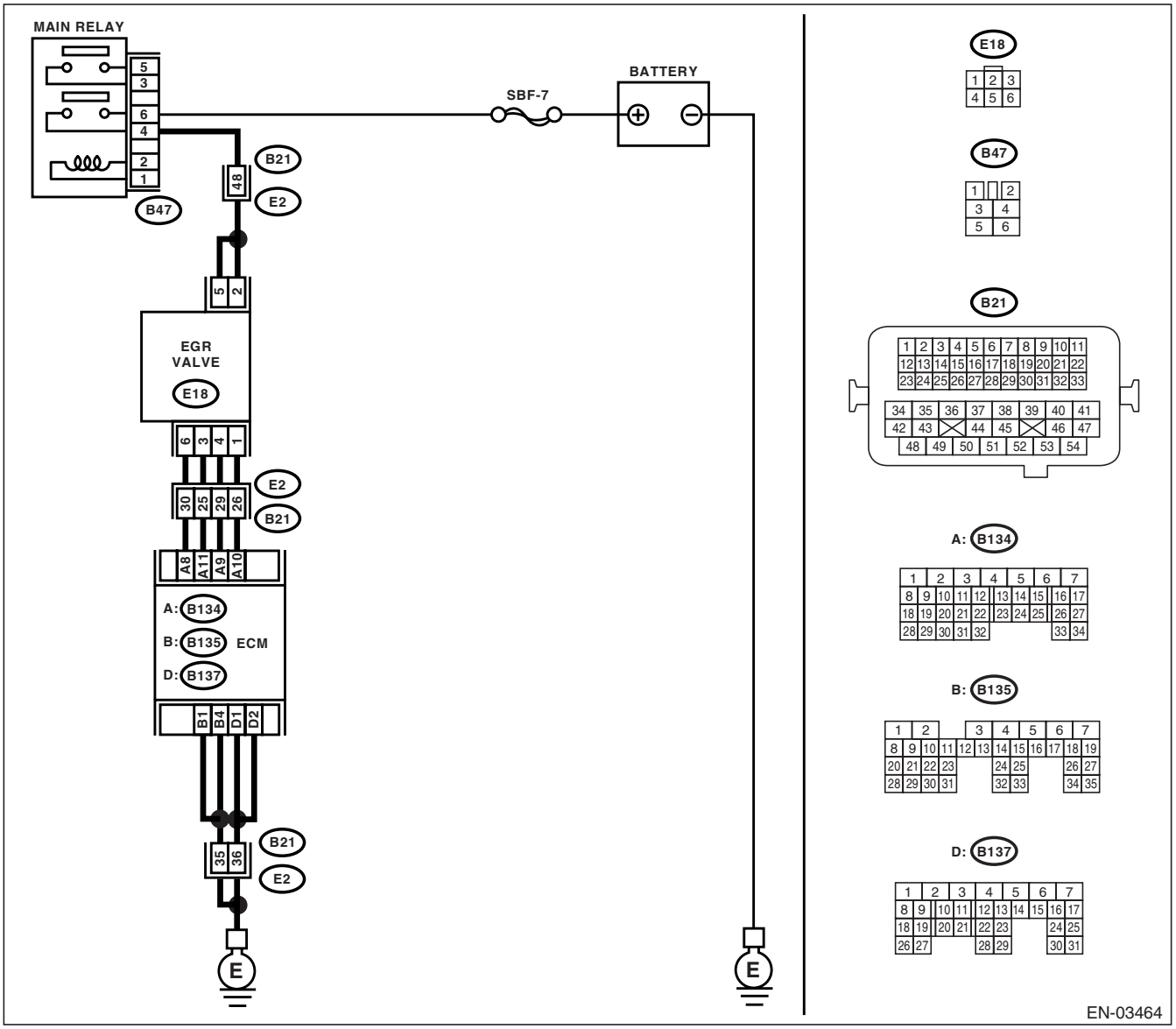
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — 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: • Open circuit of harness between ECM connector and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 11 (+) — Chassis ground (−):*** ***DTC P1495; (B134) No. 10 (+) — Chassis ground (−):*** ***DTC P1497; (B134) No. 9 (+) — Chassis ground (−):*** ***DTC P1499; (B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and EGR solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

BN:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Detects when malfunction occurs in 2 continuous driving cycles.

TROUBLE SYMPTOM:

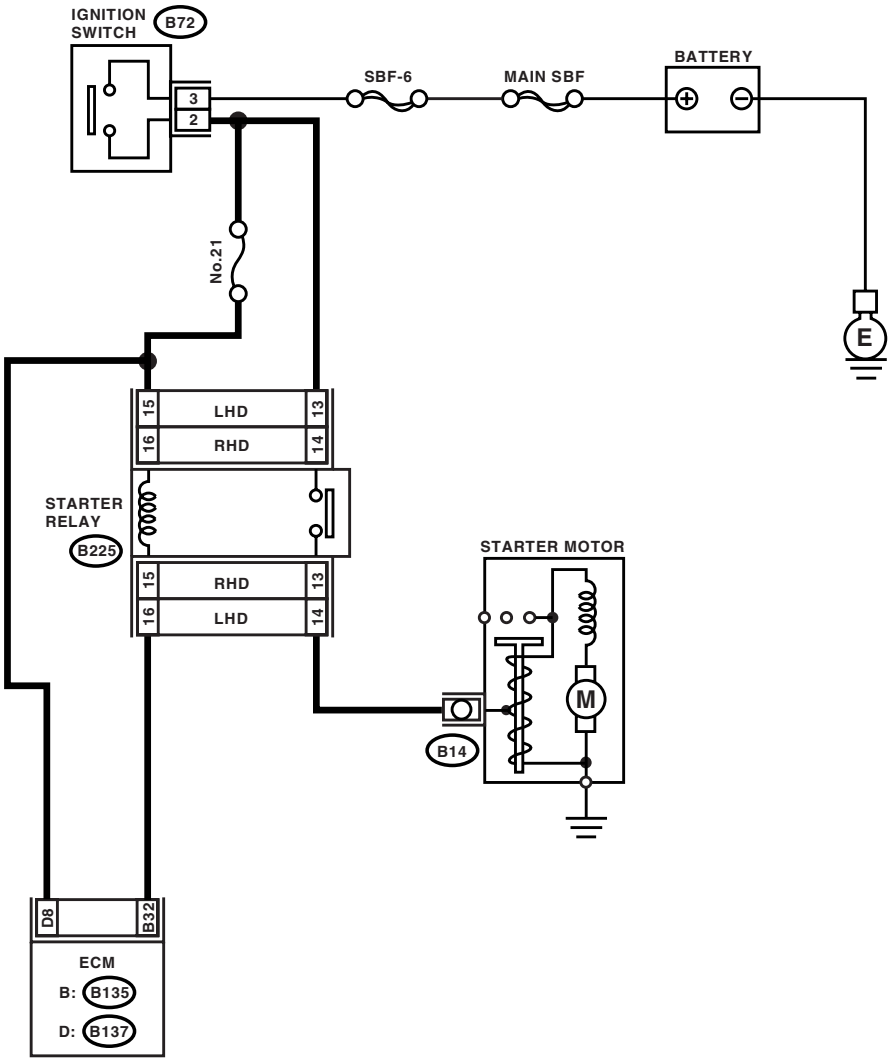
Failure of engine to start

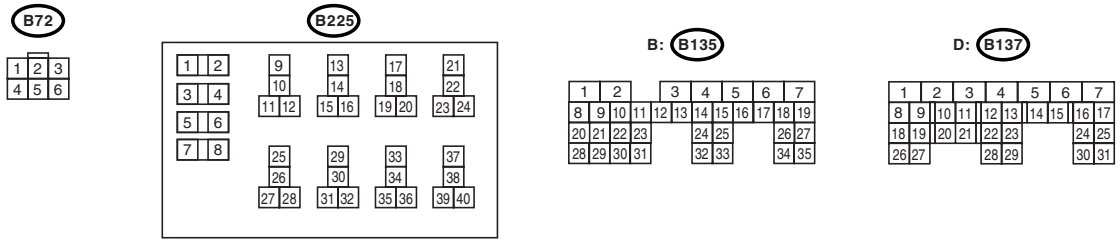
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model





EN-03453

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to START. NOTE: • For AT model, set the selector lever in the "P" or "N" range. • For MT model, depress the clutch pedal.	Does the starter motor operate?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit of harness between ECM and starter motor connector • Poor contact in ECM connector	Check the starter motor circuit. <Ref. to EN(H4SO 2.5)(diag)-54, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BO:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

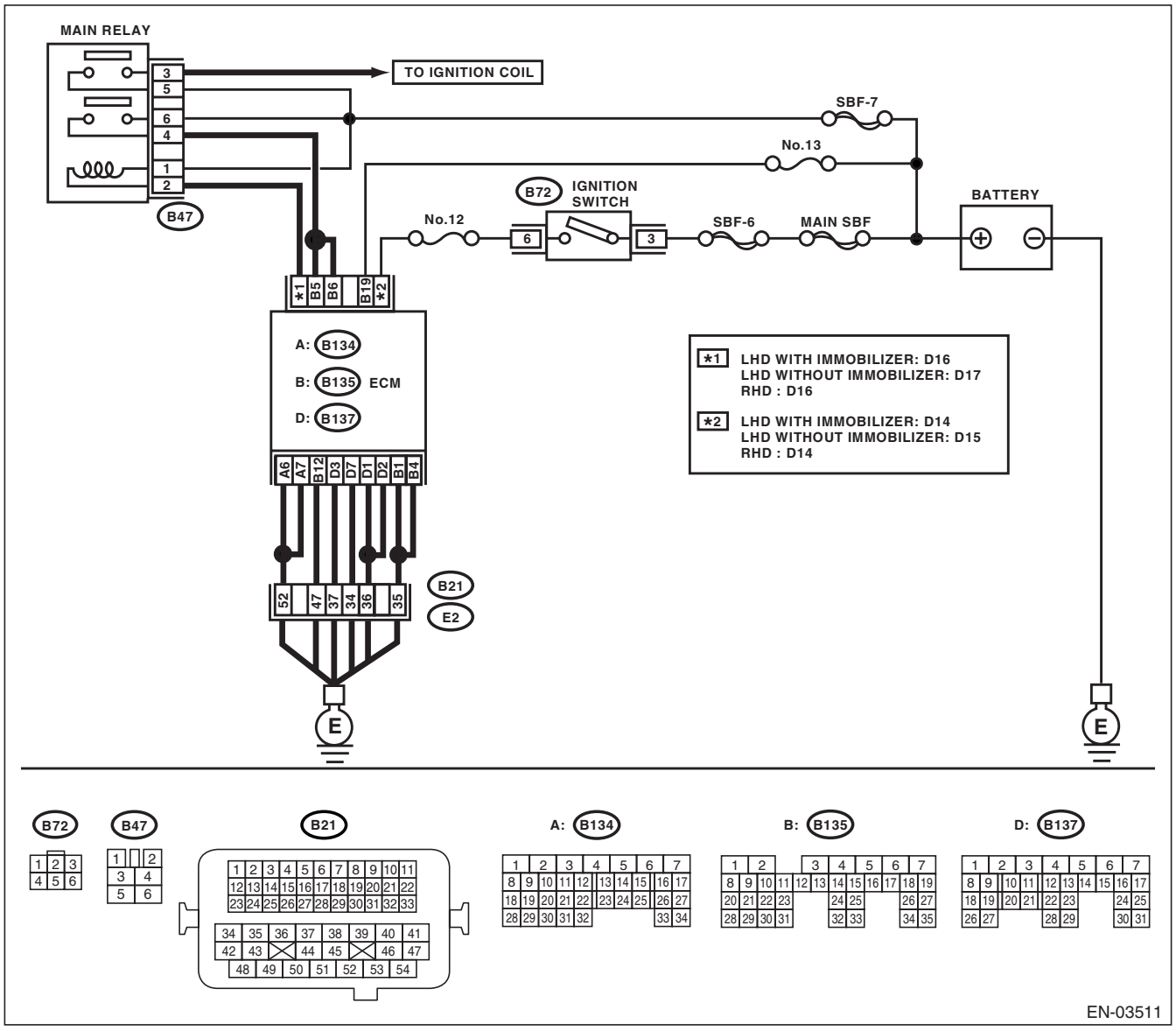
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between ECM connector and battery terminal.	Go to step **4.**
4	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

BP:DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt, no foreign material clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean tumble generator valve.

BQ:DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt, no foreign material clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BR:DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt, no foreign material clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BS:DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt, no foreign material clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BT:DTC P2008 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 1)

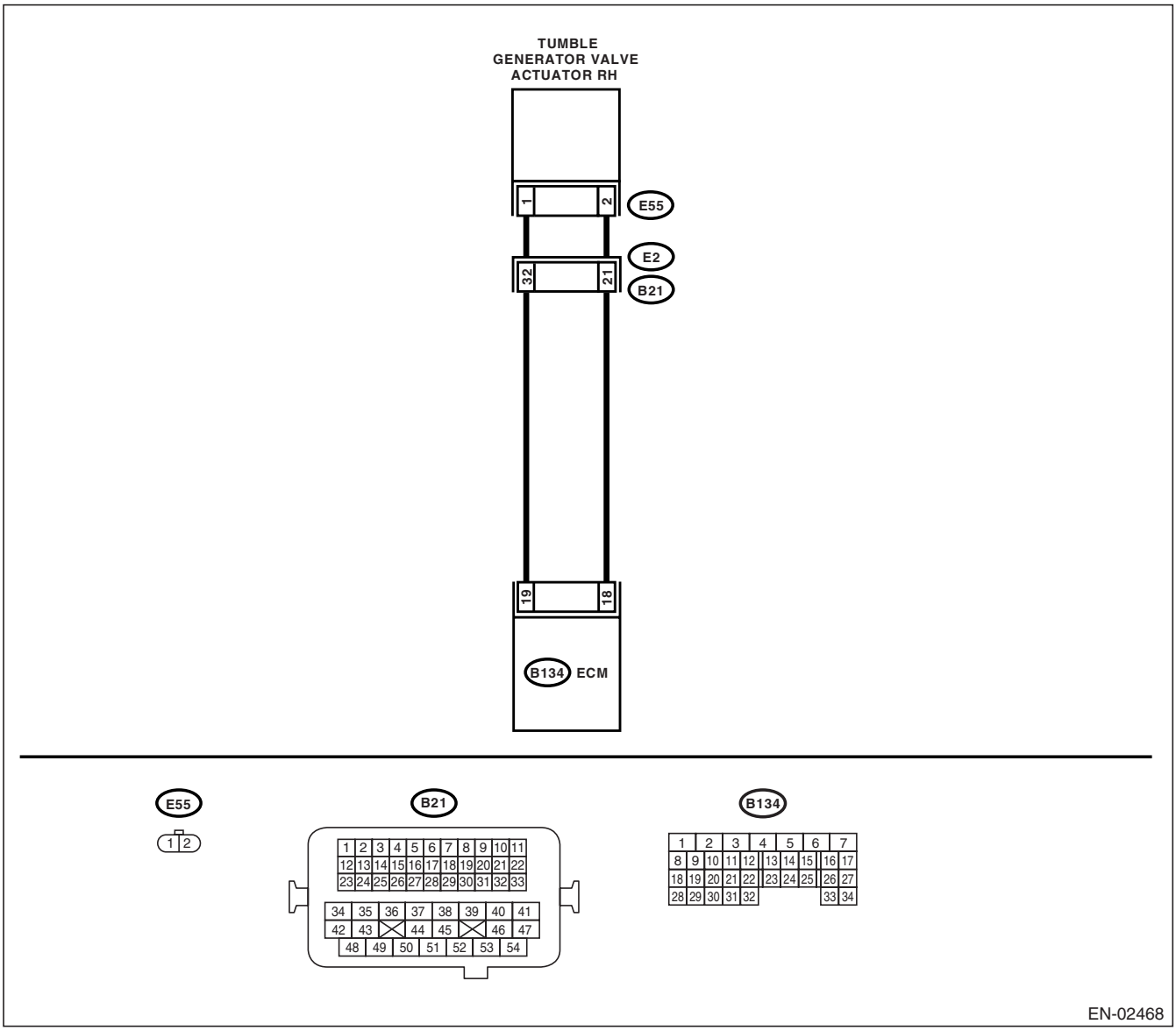
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E55) No. 1 — (B134) No. 19:*** ***(E55) No. 2 — (B134) No. 18:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4SO 2.5)-29, Tumble Generator Valve Actuator.>

BU:DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1)

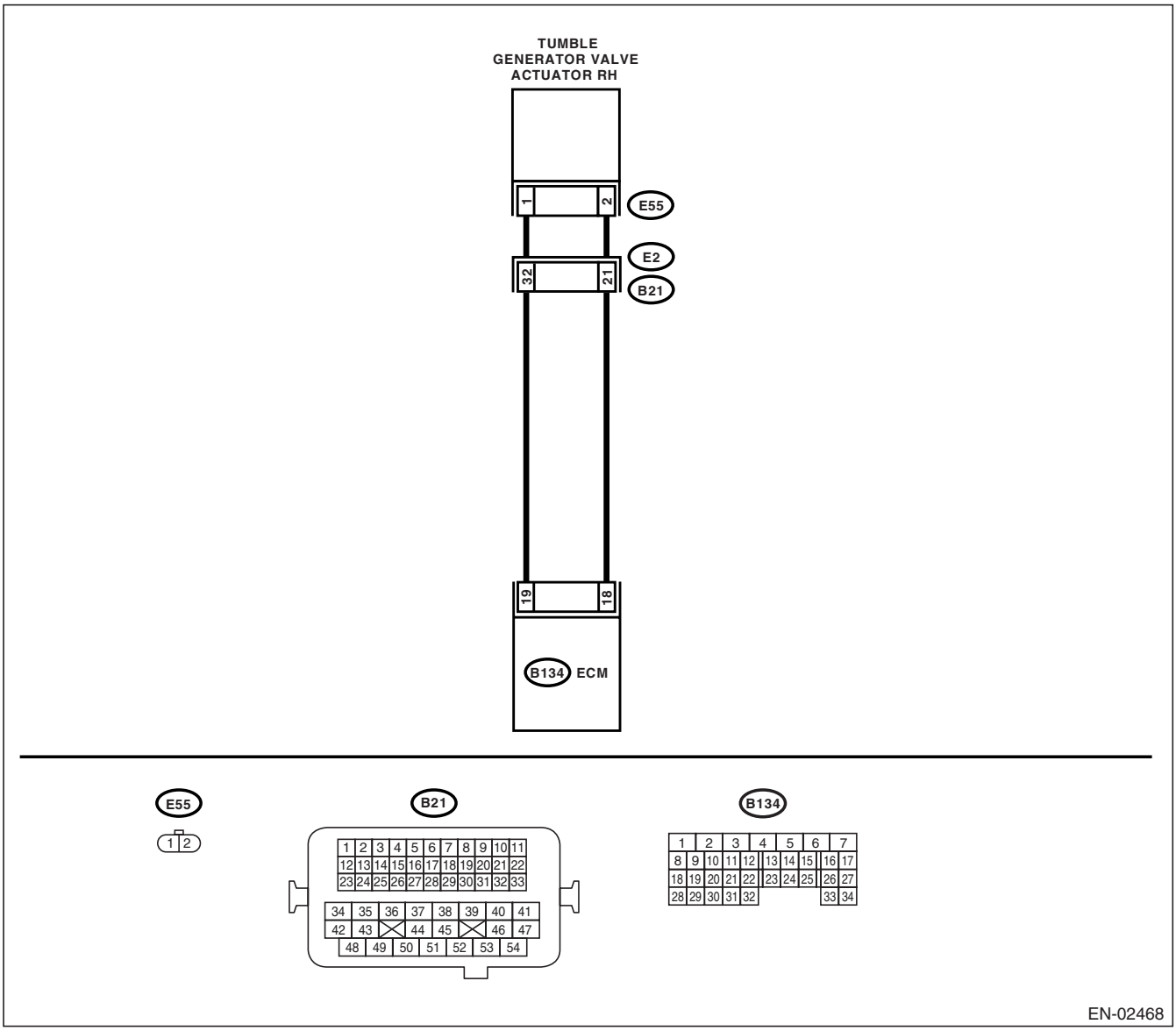
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E55) No. 1 (+) — Chassis ground (−):*** ***(E55) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve actuator. <Ref. to FU(H4SO 2.5)-29, Tumble Generator Valve Actuator.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

BV:DTC P2011 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 2)

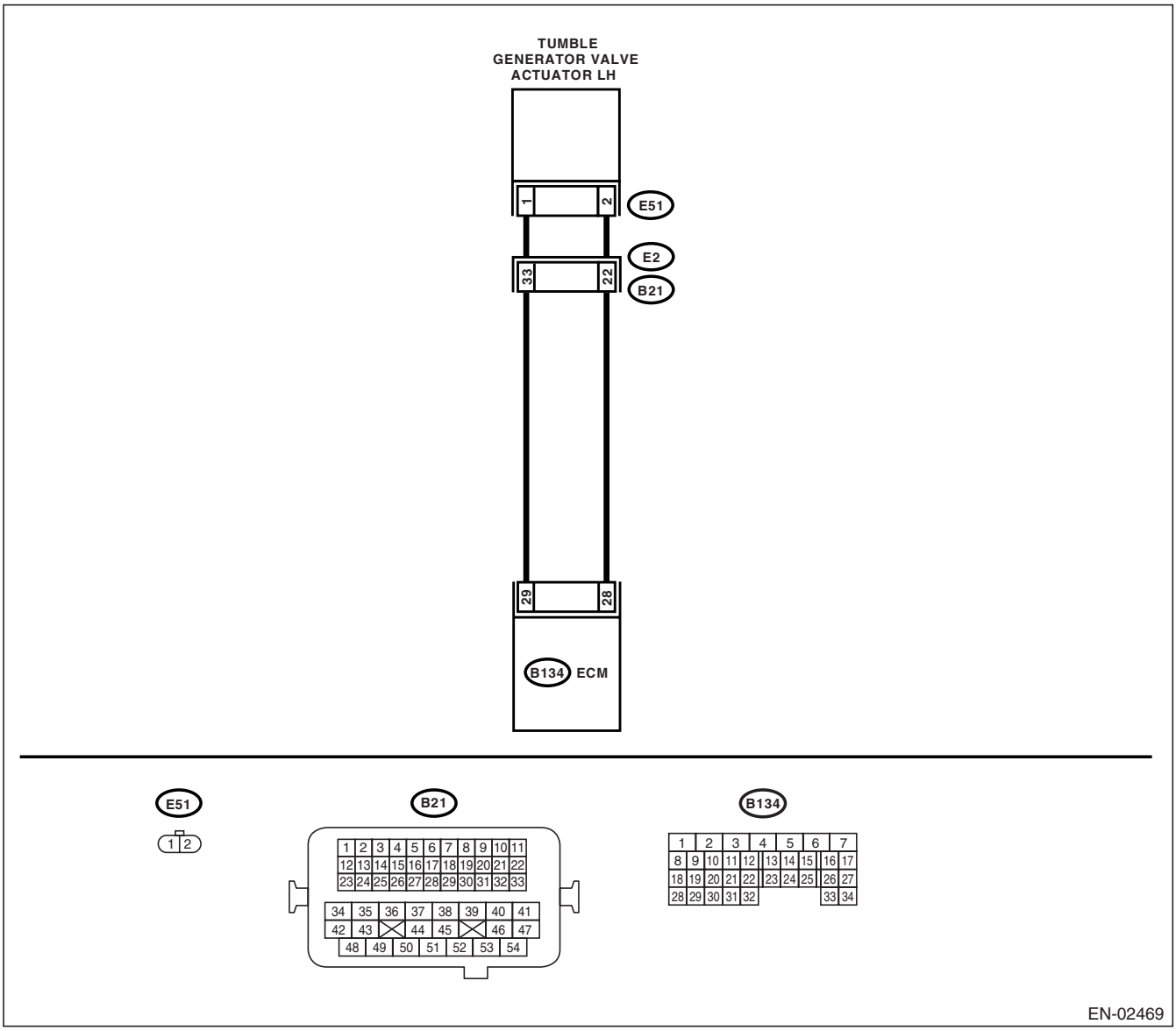
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E51) No. 1 — (B134) No. 29:*** ***(E51) No. 2 — (B134) No. 28:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4SO 2.5)-29, Tumble Generator Valve Actuator.>

BW:DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2)

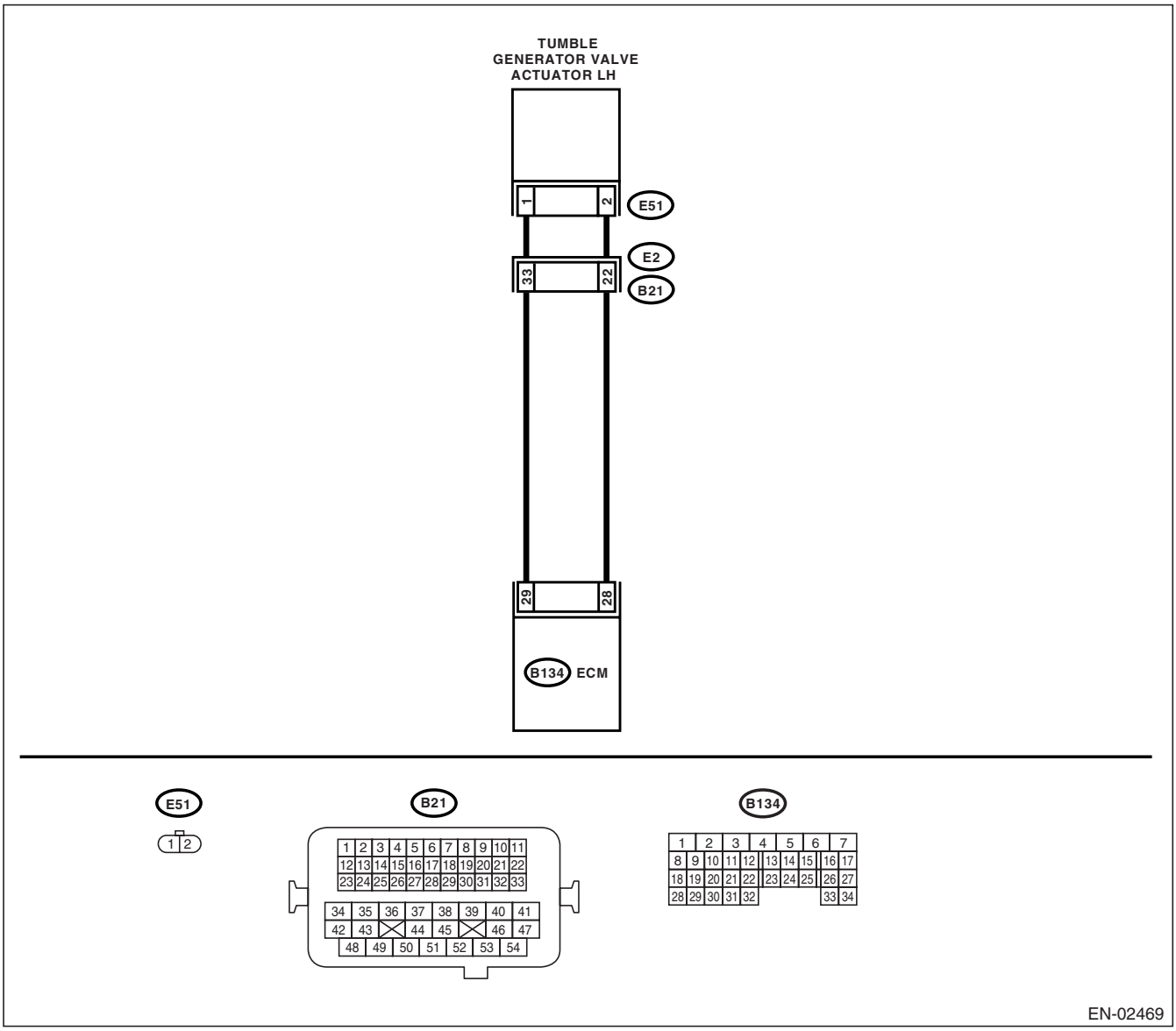
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E51) No. 1 (+) — Chassis ground (−):*** ***(E51) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve actuator. <Ref. to FU(H4SO 2.5)-29, Tumble Generator Valve Actuator.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

BX:DTC P2016 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

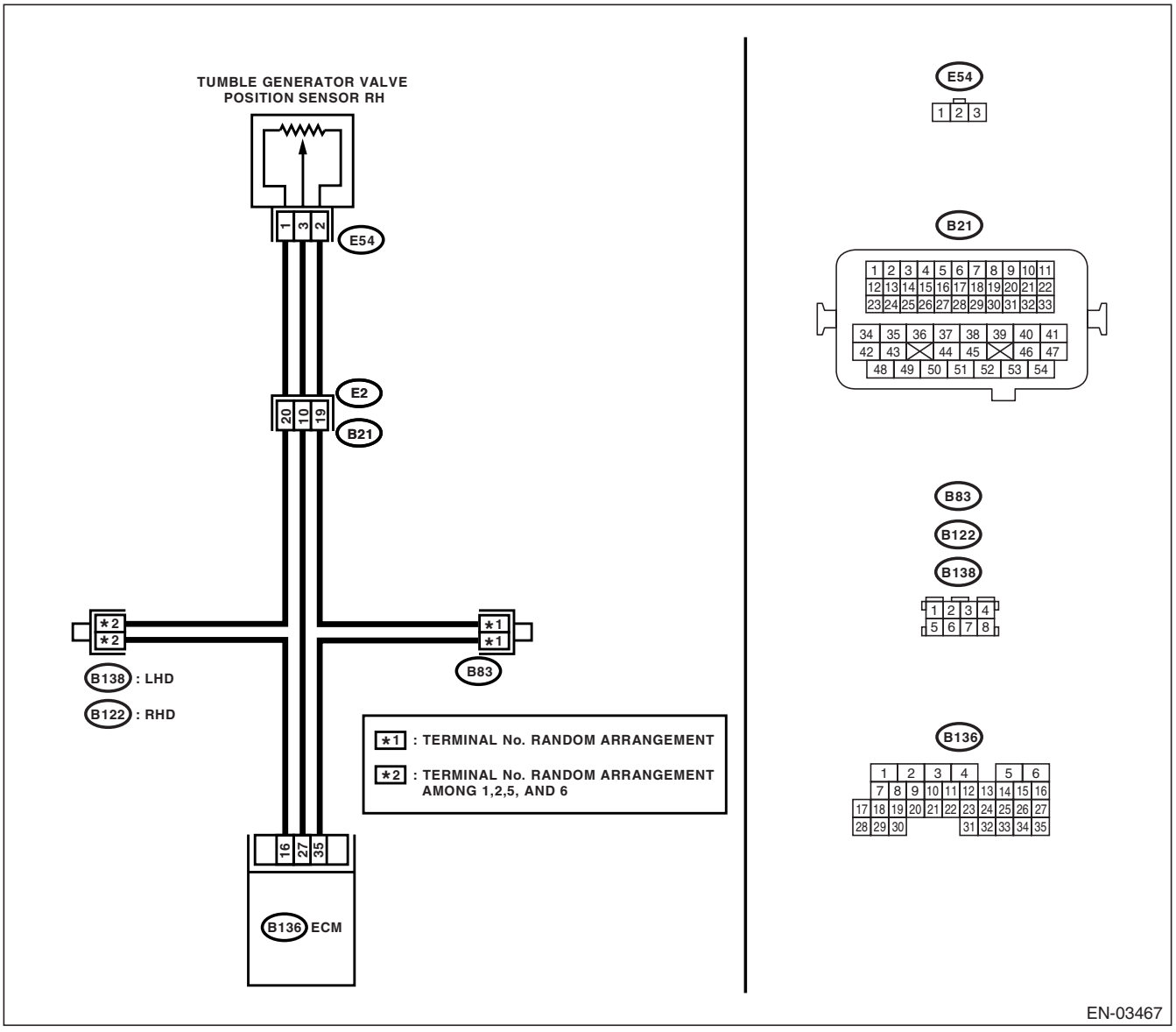
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with voltage meter?	Repair the poor contact in ECM connector.	Contact the SUBARU dealer.
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — Chassis ground (−):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B136) No. 27 — (E54) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit of harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Repair the poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4SO 2.5)-30, Tumble Generator Valve Position Sensor.>

BY:DTC P2017 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

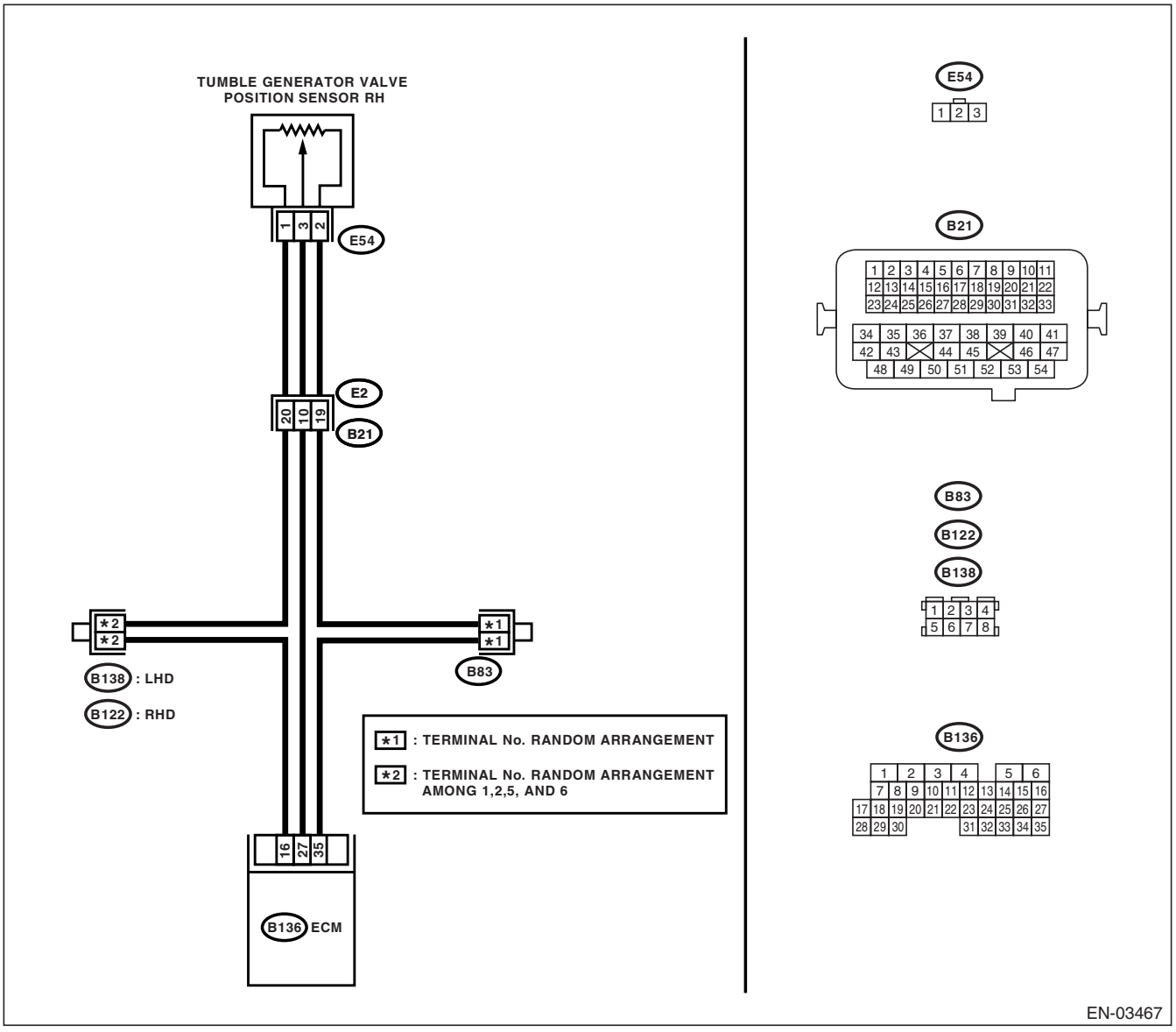
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 2 — 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: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit of harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the tumble generator valve position sensor. <Ref. to FU(H4SO 2.5)-30, Tumble Generator Valve Position Sensor.>

BZ:DTC P2021 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

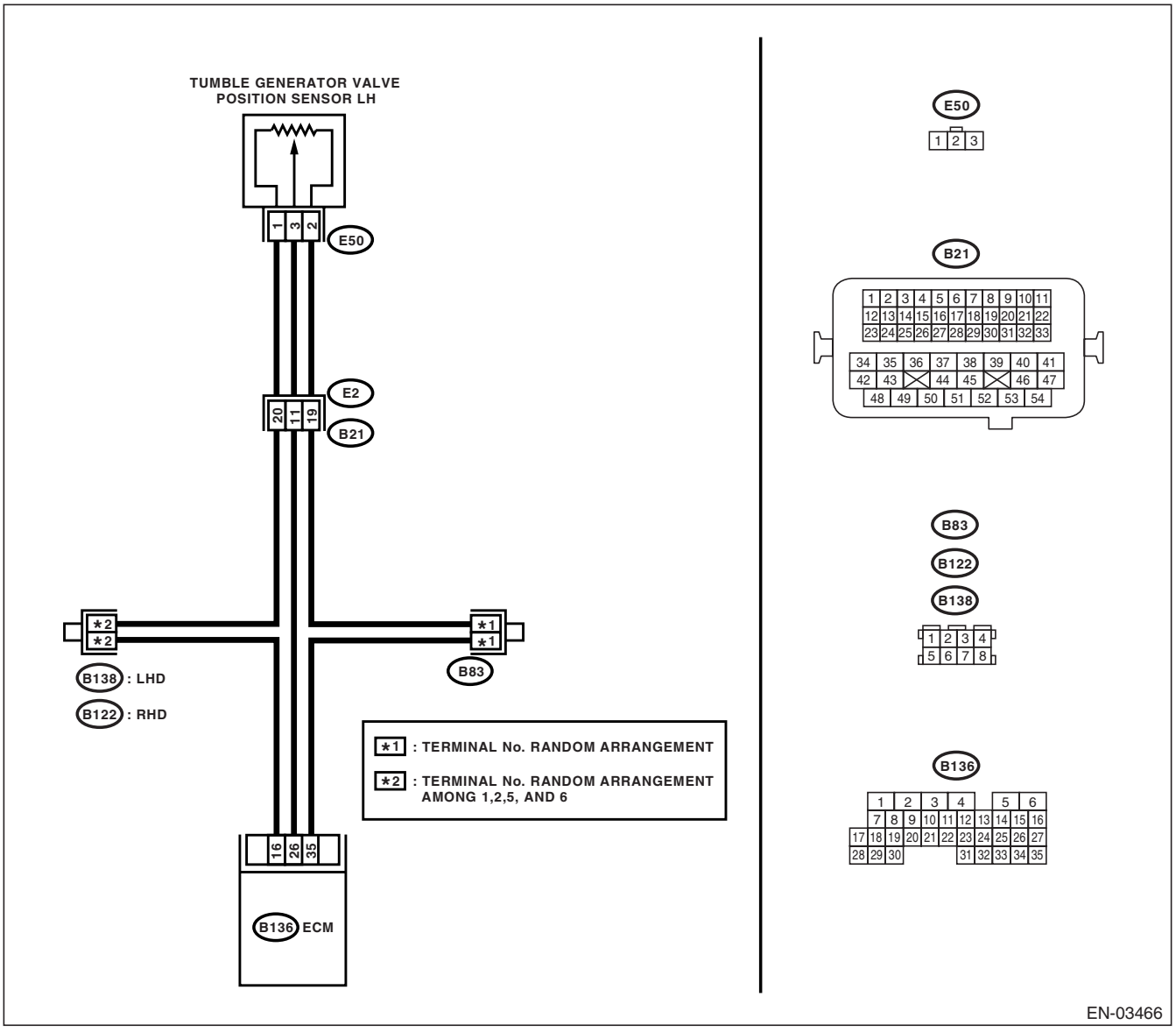
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with voltage meter?	Repair the poor contact in ECM connector.	Contact the SUBARU dealer.
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 26 (+) — Chassis ground (−):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL OF ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B136) No. 26 — (E50) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit of harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Repair the poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4SO 2.5)-30, Tumble Generator Valve Position Sensor.>

CA:DTC P2022 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

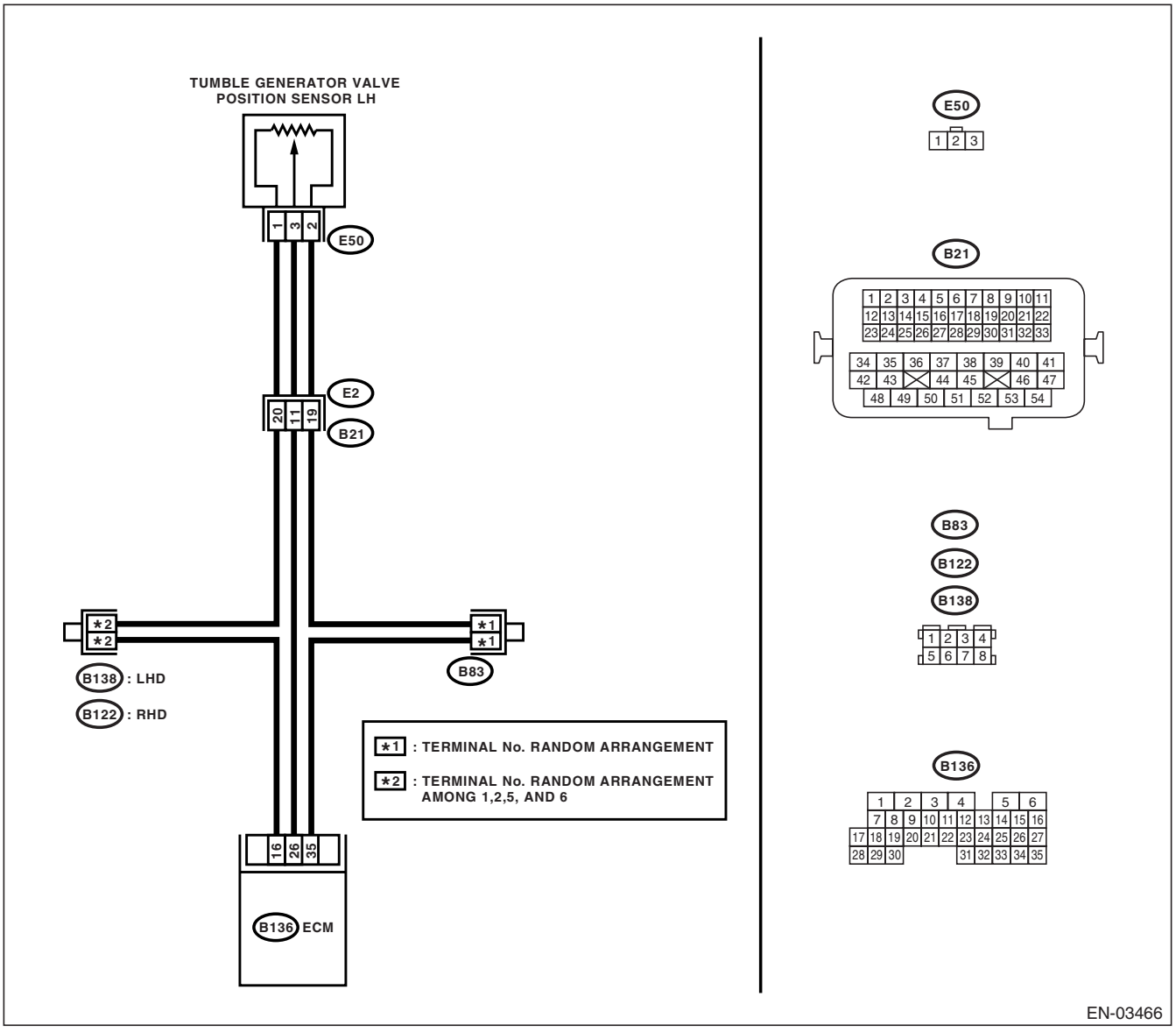
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 2 — 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: • Open circuit of harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit of harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the tumble generator valve position sensor. <Ref. to FU(H4SO 2.5)-30, Tumble Generator Valve Position Sensor.>

CB:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

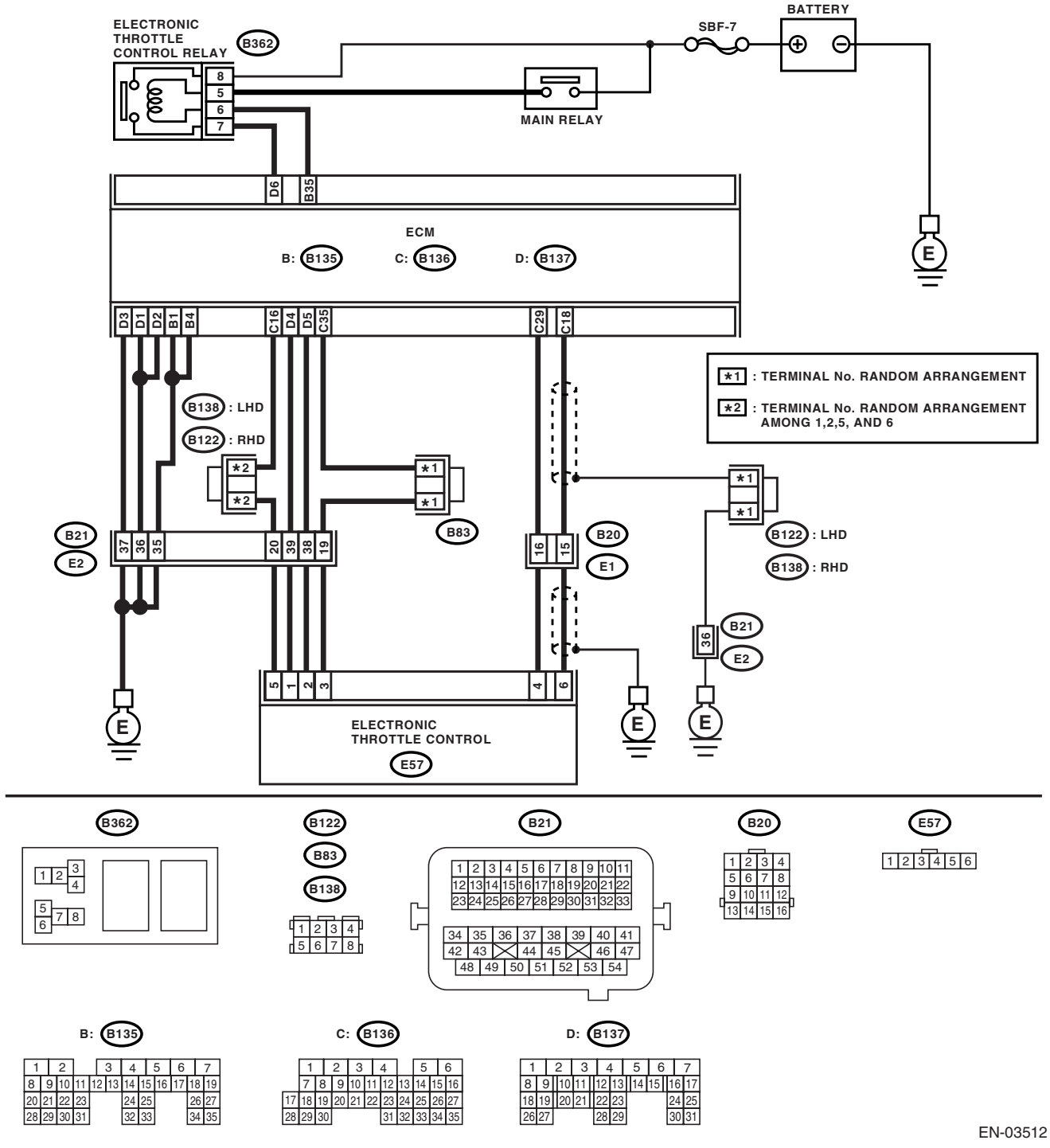
DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**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. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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 electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the power supply short circuit of harness between ECM and electronic throttle control.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 7:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between ECM and electronic throttle control relay.

	Step	Check	Yes	No
7	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **8.**	Go to step **10.**
8	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **9.**	Go to step **10.**
9	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit of harness connector.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Repair the ground short circuit of harness.
12	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
13	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 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 more than 10 Ω?	Go to step **14.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

	Step	Check	Yes	No
14	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **15.**	Go to step **17.**
15	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **16.**	Go to step **17.**
16	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **22.**
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **18.**	Repair the open circuit of harness connector.
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 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 **19.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **20.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 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 less than 10 V?	Go to step **21.**	Repair the short circuit of harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
21	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **22.**	Repair the short circuit to sensor power supply.
22	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except for electric throttle control relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.81 — 0.87 V?	Go to step **23.**	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
23	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage 1.64 — 1.70 V?	Go to step **24.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 5 — (E57) No. 2:*** ***(B137) No. 4 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit of harness connector.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 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 less than 5 V?	Go to step **26.**	Repair the power supply short circuit of harness between ECM and electronic throttle control.

	Step	Check	Yes	No
26	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 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 more than 1 MΩ?	Go to step **27.**	Repair the short circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance more than 1 MΩ?	Go to step **28.**	Repair the short circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **29.**	Repair the open circuit of harness.
29	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **30.**	Replace the electronic throttle control.
30	**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? Specification: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the electronic throttle control.

CC:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

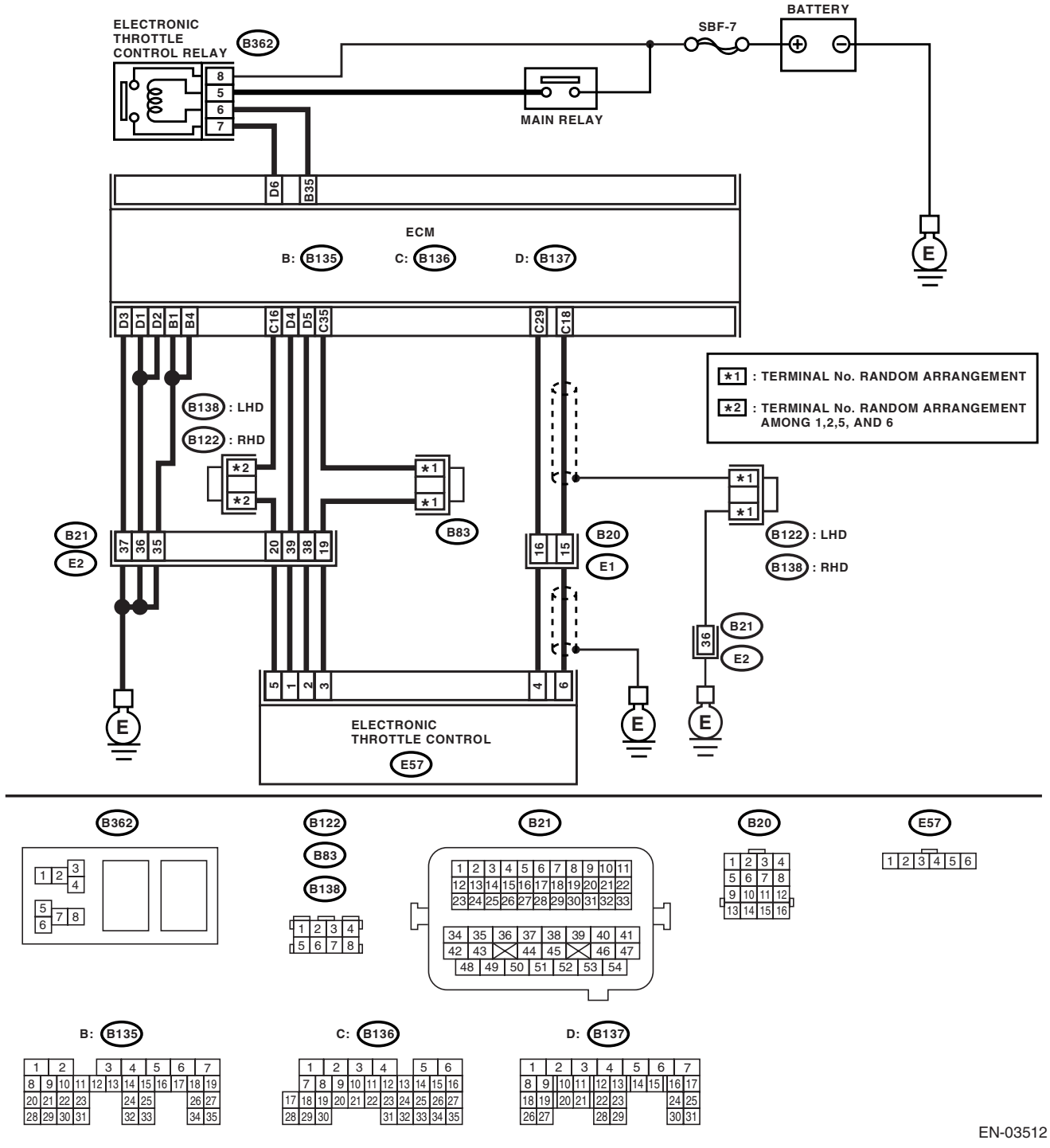
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**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. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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 electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 7:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the open circuit of harness between ECM and electronic throttle control relay.

CD:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

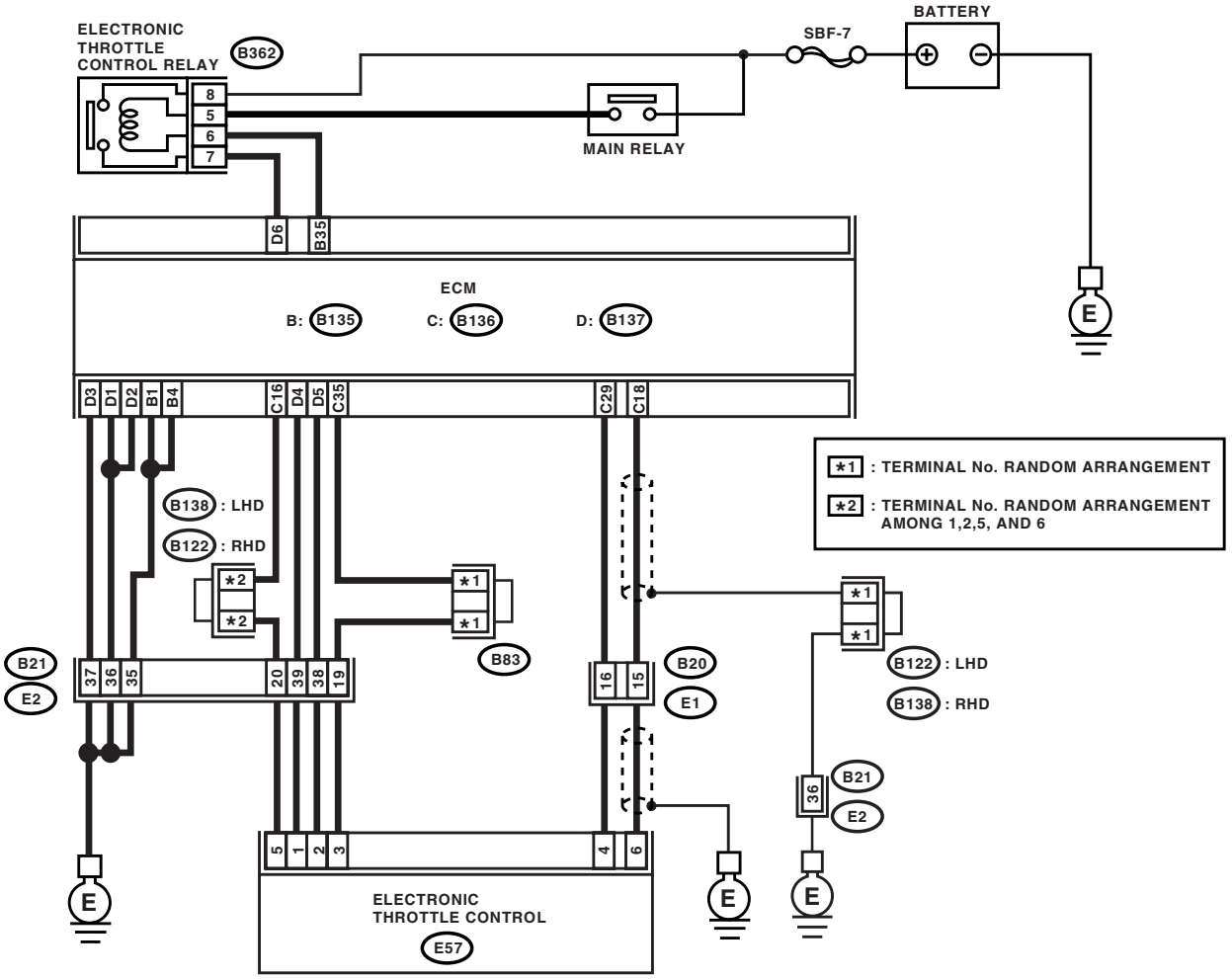
Immediately at fault recognition

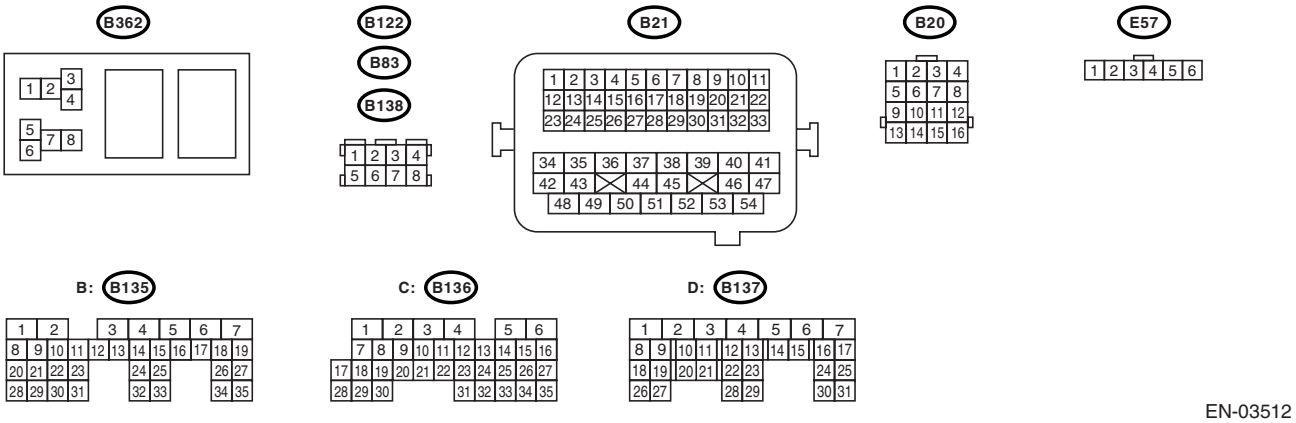
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model





EN-03512

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**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. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **4.**	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the ground short circuit of harness between ECM and electronic throttle control relay.

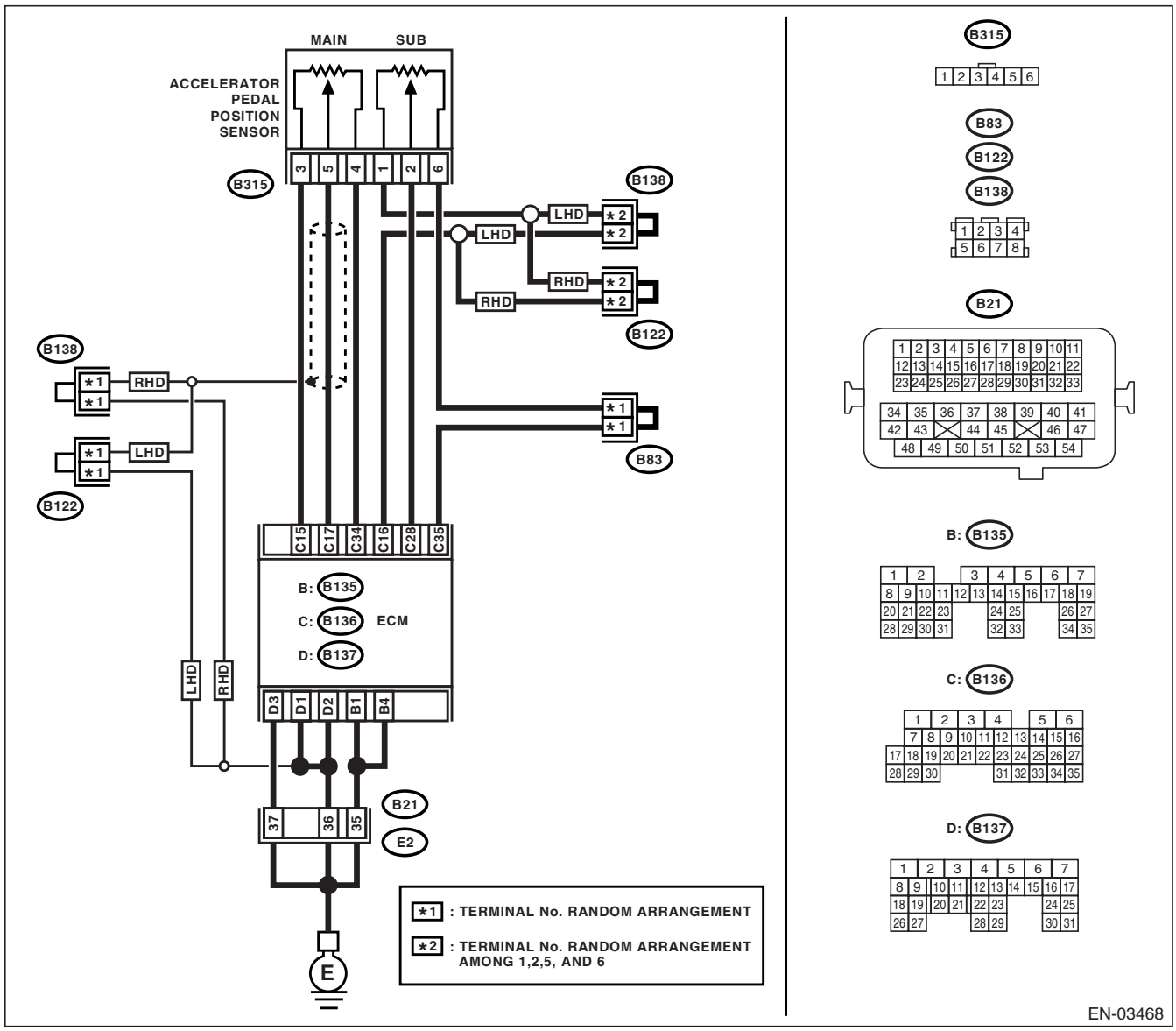
CE:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CF:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

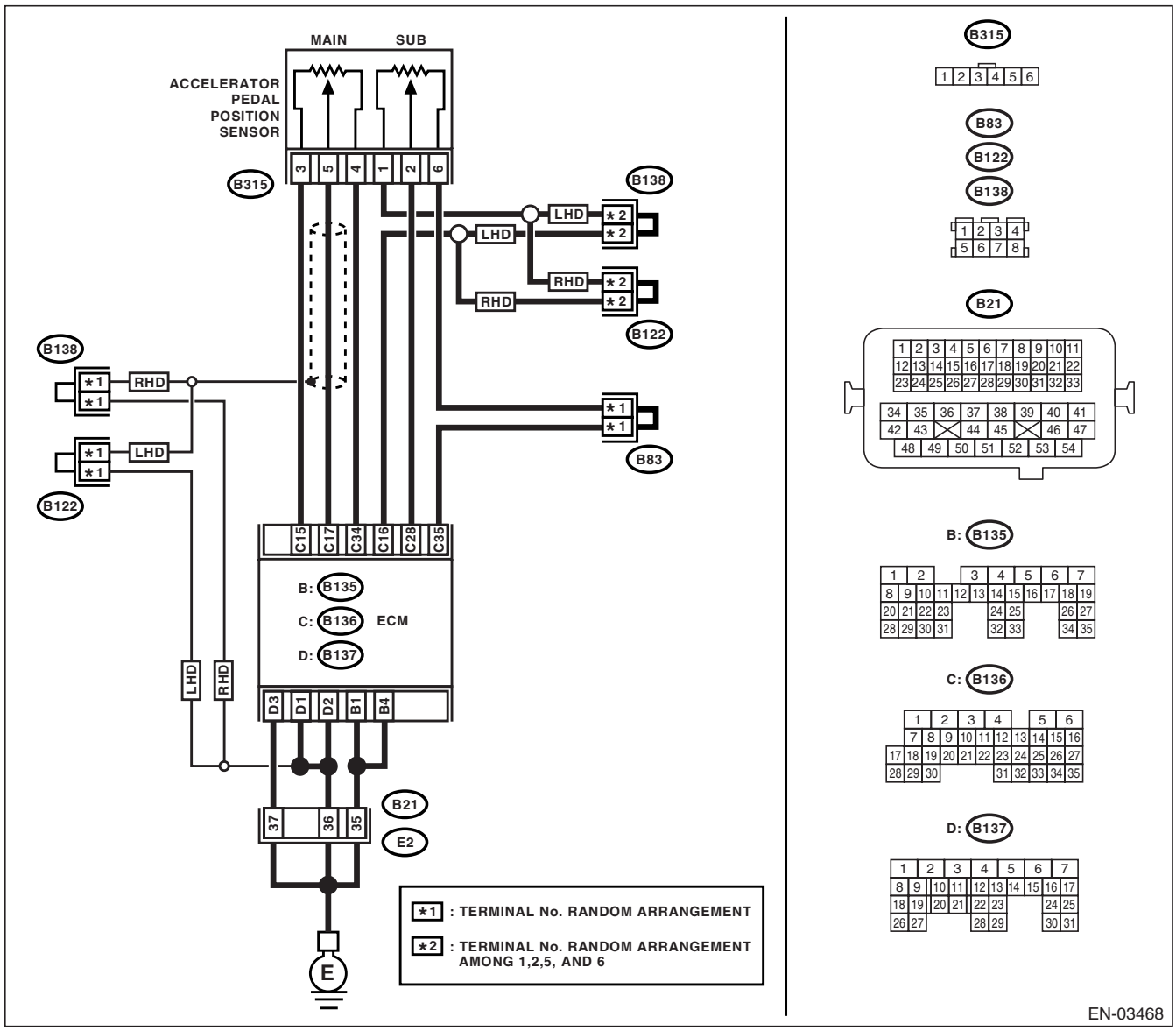
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **9.**	Replace the accelerator pedal position sensor.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

CG:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

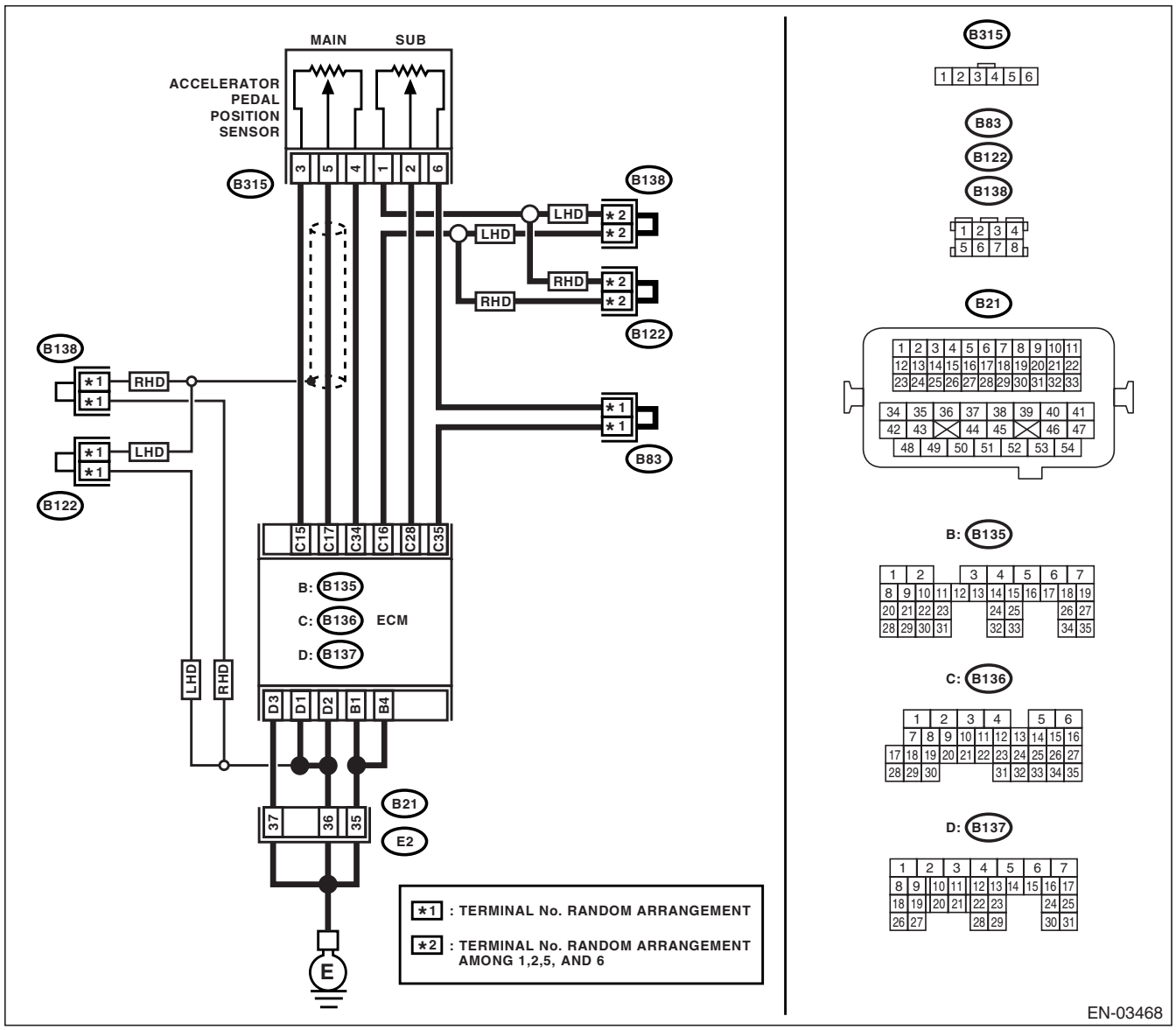
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **7.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

CH:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

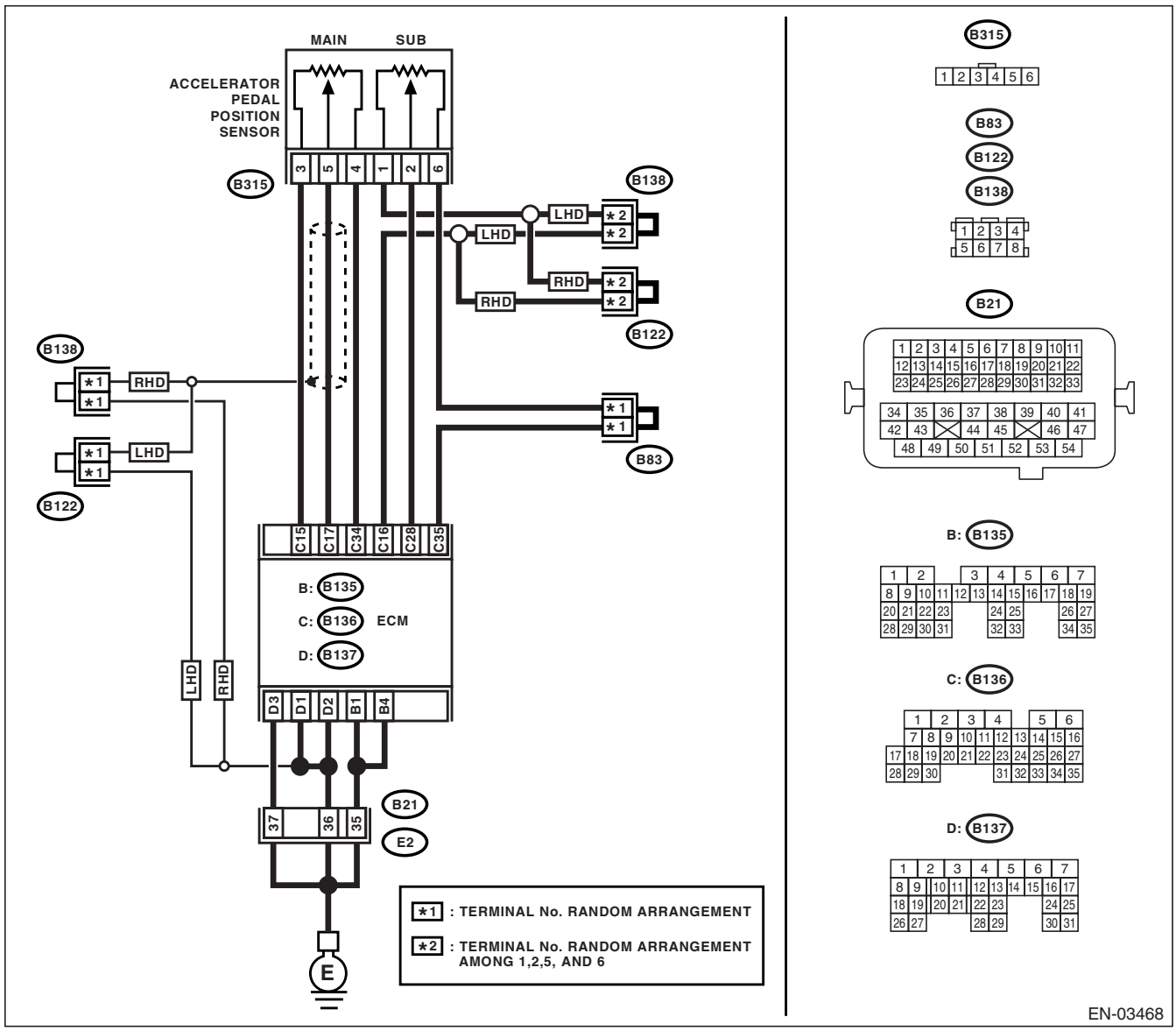
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **9.**	Replace the accelerator pedal position sensor.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

CI: DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Erroneous idling
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.
WIRING DIAGRAM:
- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **7.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 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 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

CJ:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE CORRELATION

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

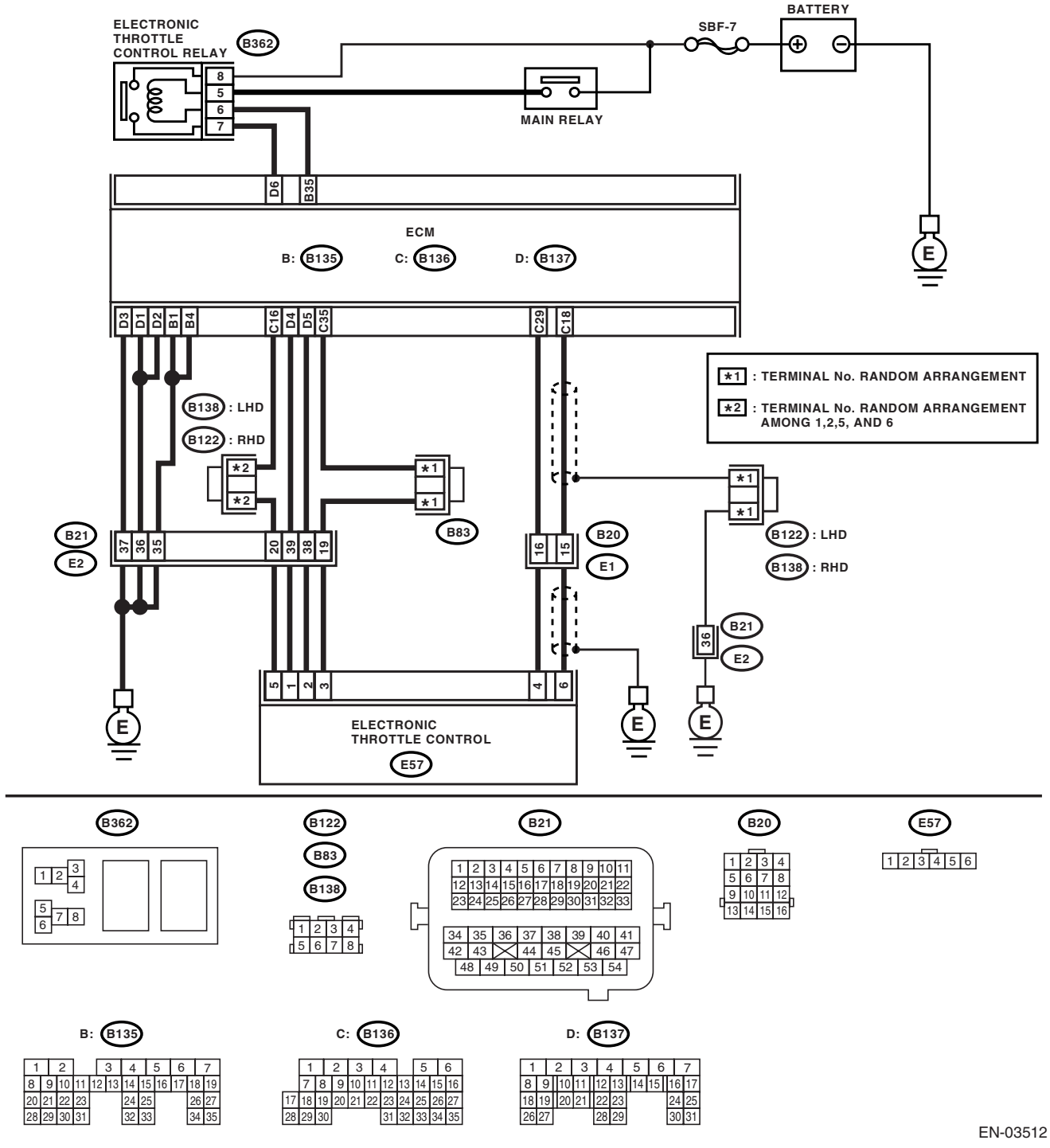
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **5.**
3	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **15.**
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit of harness.

	Step	Check	Yes	No
7	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
8	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 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 more than 10 Ω?	Go to step **9.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
9	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **10.**	Go to step **12.**
10	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **11.**	Go to step **12.**
11	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 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 **14.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 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 less than 10 V?	Go to step **16.**	Repair the short circuit of harness between ECM connector and electronic throttle control connector.
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **17.**	Repair the short circuit to sensor power supply.
17	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 6 — (E57) No. 4:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the short circuit of harness.

CK:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" / "E" VOLTAGE CORRELATION

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

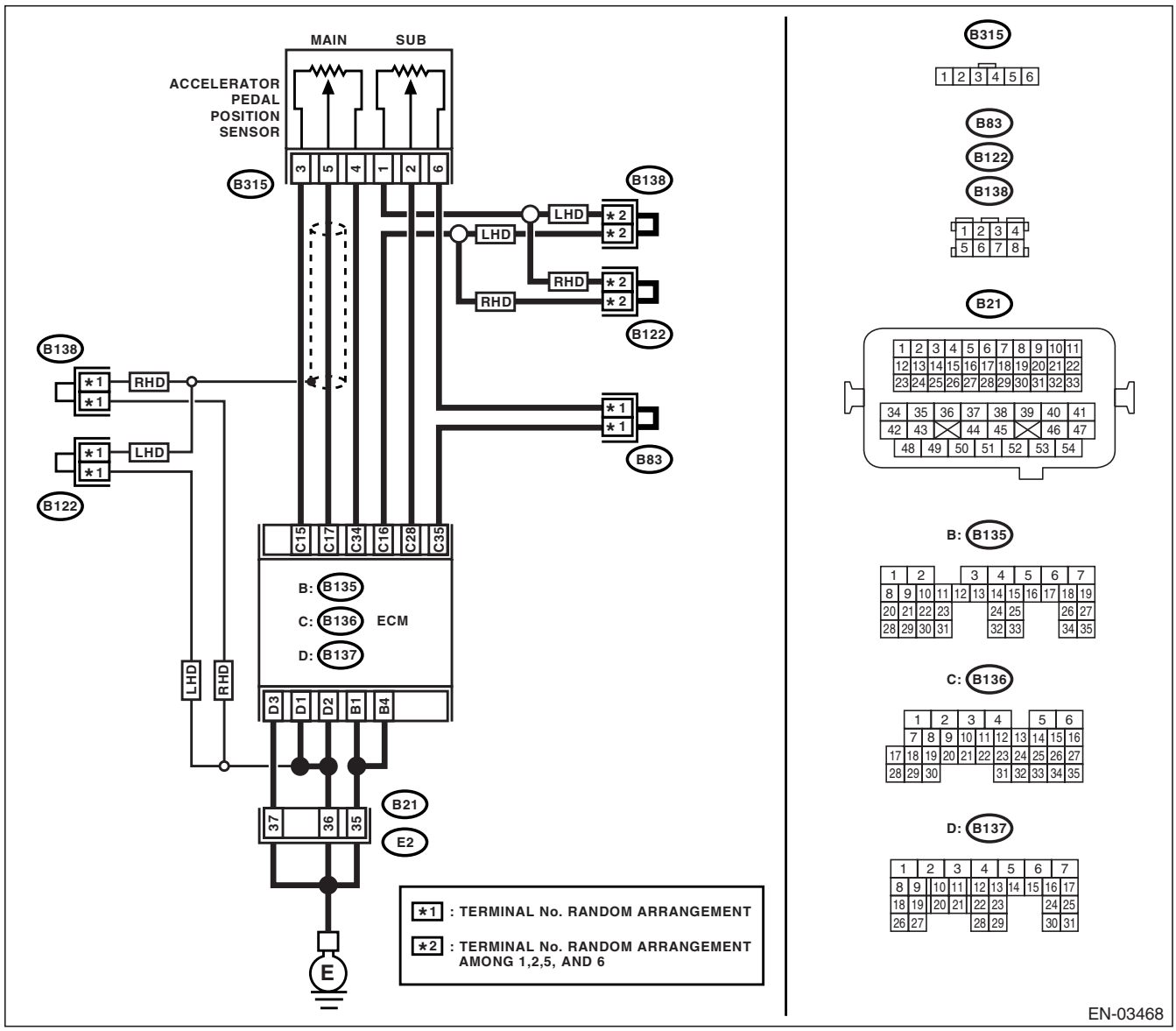
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal and sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **13.**
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>

	Step	Check	Yes	No
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **8.**	Replace the accelerator pedal position sensor.
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **9.**	Replace the accelerator pedal position sensor.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **10.**	Replace the accelerator pedal position sensor.
10	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **11.**	Replace the accelerator pedal position sensor.
11	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **12.**	Replace the accelerator pedal position sensor.
12	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **13.**	Replace the accelerator pedal position sensor.
13	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-25, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **14.**	Go to step **15.**
14	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **19.**

	Step	Check	Yes	No
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the open circuit of harness connector.
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **17.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **18.**	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the short circuit to sensor power supply.
19	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between connector terminals of accelerator pedal position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-37, Engine Control Module (ECM).>	Repair the short circuit of harness between ECM connector and accelerator pedal position sensor connector.

CL:DTC P2503 CHARGING SYSTEM VOLTAGE LOW

NOTE:
For the diagnostic procedure, refer to DTC P2504. <Ref. to EN(H4SO 2.5)(diag)-255, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CM:DTC P2504 CHARGING SYSTEM VOLTAGE HIGH

DTC DETECTING CONDITION:

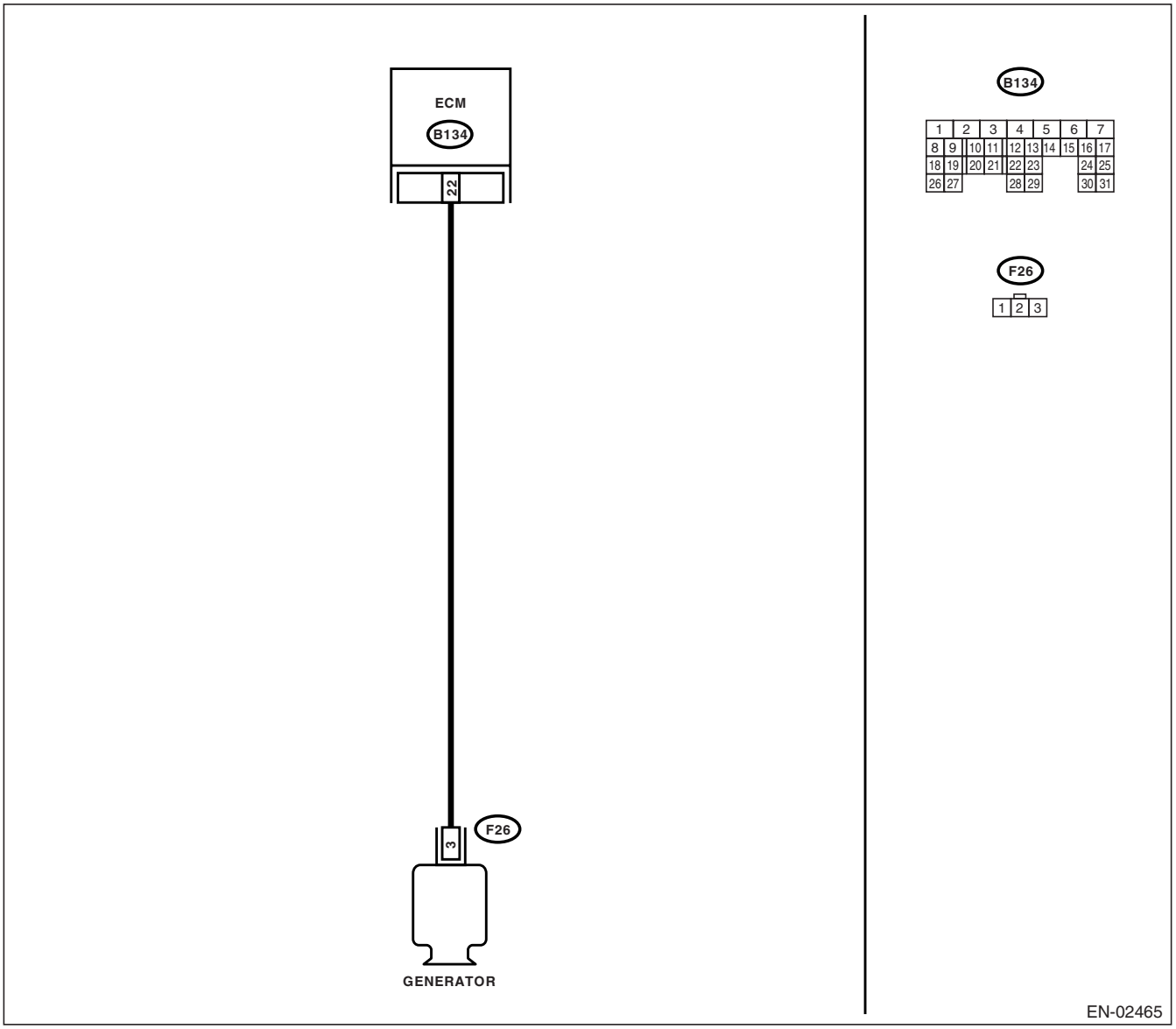
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-40, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK, EH, ER and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK, EH, ER or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-64, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator. ***Connector & terminal*** ***(B134) No. 22 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair the poor contact in connector.	Repair the open circuit of harness between ECM and generator connector. NOTE: In this case, repair the following: • Open circuit of harness between ECM and generator connector • Poor contact in coupling connector

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO 2.0)-89, Engine Trouble in General.>

Symptom	Problem 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)
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 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 valve
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) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) EGR valve 13) Tumble generator valve
5. Engine stalls, engine sags or hesitates 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 valve 11) Tumble generator valve

General Diagnostic Table

Symptom	Problem 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 valve 10) Tumble generator 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 valve 8) Tumble generator 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 ignitor assembly and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.