# ENGINE (DIAGNOSTICS)

# EN(SOHC)

# 1. Basic Diagnostic Procedure

## A: PROCEDURE

### 1. ENGINE

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK ENGINE START FAILURE.**<br>1)Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(SOHC)-4, CHECK, Check List for Interview.><br>2)Start the engine.<br>Does the engine start? | Engine starts. | Go to step **2.** | Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(SOHC)-60, Diagnostics for Engine Starting Failure.> |
| 2 | **CHECK ILLUMINATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).**<br>Does CHECK ENGINE malfunction indicator lamp illuminate? | CHECK ENGINE malfunction indicator light illuminates. | Go to step **3.** | Inspection using "General Diagnostics Table". <Ref. to EN(SOHC)-261, INSPECTION, General Diagnostic Table.> |
| 3 | **CHECK INDICATION OF DTC ON DISPLAY.**<br>1)Turn the ignition switch to OFF.<br>2)Connect the Subaru Select Monitor or the OBD-II general scan tool to data link connector.<br>3)Turn the ignition switch to ON and the Subaru Select Monitor or OBD-II general scan tool switch to ON.<br>4)Read the DTC on the Subaru Select Monitor or OBD-II general scan tool.<br>Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC? | DTC is indicated. | Record the diagnostic trouble code. Repair the trouble cause. <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).> Go to step **4.** | Repair the related parts.<br>NOTE:<br>If DTC is not shown on display although the MIL illuminates, perform diagnostics of MIL (CHECK ENGINE malfunction indicator lamp) circuit or combination meter. <Ref. to EN(SOHC)-50, Engine Malfunction Indicator Lamp (MIL).> |
| 4 | **PERFORM THE DIAGNOSIS.**<br>1)Perform the clear memory mode. <Ref. to EN(SOHC)-47, Clear Memory Mode.><br>2)Perform the inspection mode. <Ref. to EN(SOHC)-40, Inspection Mode.><br>Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC? | DTC is indicated. | Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(SOHC)-81, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> | Complete the diagnosis. |

## 2. AUTOMATIC TRANSMISSION

When the trouble code about automatic transmission is shown on display, carry out the following basic check. After that, carry out the replacement or repair work.

1) ATF level check <Ref. to AT-29, Automatic Transmission Fluid.>
2) Differential gear oil level check <Ref. to AT-30, Differential Gear Oil.>
3) ATF leak check <Ref. to AT-29, Automatic Transmission Fluid.>
4) Differential gear oil leak check <Ref. to AT-30, Differential Gear Oil.>
5) Stall test <Ref. to AT-32, Stall Test.>
6) Line pressure test <Ref. to AT-35, Line Pressure Test.>
7) Transfer clutch pressure test <Ref. to AT-37, Transfer Clutch Pressure Test.>
8) Time lag test <Ref. to AT-34, Time Lag Test.>
9) Road test <Ref. to AT-31, Road Test.>
10) Shift characteristics <Ref. to AT-37, Transfer Clutch Pressure Test.>

# 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 |
| Vin no. | | | miles |
| Weather | ❑ Fine<br>❑ Cloudy<br>❑ Rainy<br>❑ Snowy<br>❑ Various/Others: | | |
| Outdoor temperature | °C (°F) | | |
| | ❑ Hot<br>❑ Warm<br>❑ Cool<br>❑ Cold | | |
| Place | ❑ Highway<br>❑ Suburbs<br>❑ Inner city<br>❑ Uphill<br>❑ Downhill<br>❑ Rough road<br>❑ Others: | | |
| Engine temperature | ❑ Cold<br>❑ Warming-up<br>❑ After warming-up<br>❑ Any temperature<br>❑ Others: | | |
| Engine speed | rpm | | |
| Vehicle speed | MPH | | |
| Driving conditions | ❑ Not affected<br>❑ At starting<br>❑ While idling<br>❑ At racing<br>❑ While accelerating<br>❑ While cruising<br>❑ While decelerating<br>❑ While turning (RH/LH) | | |
| Headlight | ❑ ON/❑ OFF | Rear defogger | ❑ ON/❑ OFF |
| Blower | ❑ ON/❑ OFF | Radio | ❑ ON/❑ OFF |
| A/C compressor | ❑ ON/❑ OFF | CD/Cassette | ❑ ON/❑ OFF |
| Cooling fan | ❑ ON/❑ OFF | Car phone | ❑ ON/❑ OFF |
| Front wiper | ❑ ON/❑ OFF | CB | ❑ ON/❑ OFF |
| Rear wiper | ❑ ON/❑ OFF | | |

## 2. CHECK LIST NO. 2

Check the following items about the vehicle's state when MIL 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<br>❑ Charge indicator light<br>❑ AT diagnostics indicator light<br>❑ ABS warning light<br>❑ Engine oil pressure warning light |
| b) Fuel level |
| • Lack of gasoline: ❑ Yes/❑ No<br>• Indicator position of fuel gauge: |
| 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 parts other than genuine parts: ❑ Yes/❑ No |
| • What:<br>• Where: |
| f) Occurrence of noise: ❑ Yes/❑ No |
| • From where:<br>• What kind: |
| g) Occurrence of smell: ❑ Yes/❑ No |
| • From where:<br>• What kind: |
| h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes/❑ No |
| i) Troubles occurred |
| ❑ Engine does not start.<br>❑ Engine stalls during idling.<br>❑ Engine stalls while driving.<br>❑ Engine speed decreases.<br>❑ Engine speed does not decrease.<br>❑ Rough idling<br>❑ Poor acceleration<br>❑ Back fire<br>❑ After fire<br>❑ No shift<br>❑ Excessive shift shock |

# 3. General Description

## A: CAUTION

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

**CAUTION:**

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage the Airbag system wiring harness when servicing the engine control module (ECM), transmission control module (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 part will be damaged in just a few minutes more.

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, etc.

4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.

5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use 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.

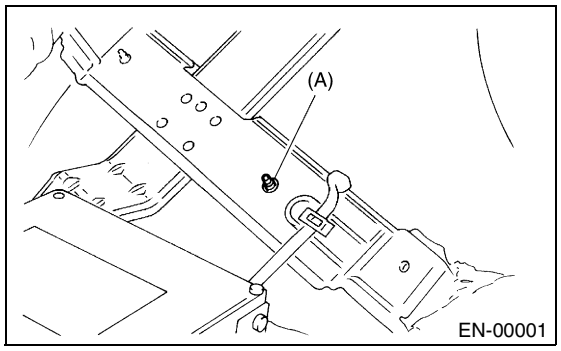
6) Before removing the ECM from the located position, disconnect two cables on battery.

- Otherwise, the ECM may be damaged.

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

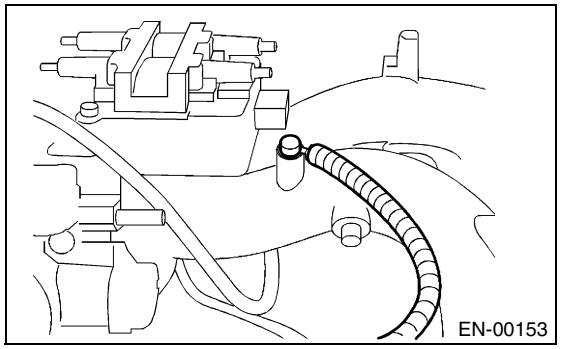
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

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

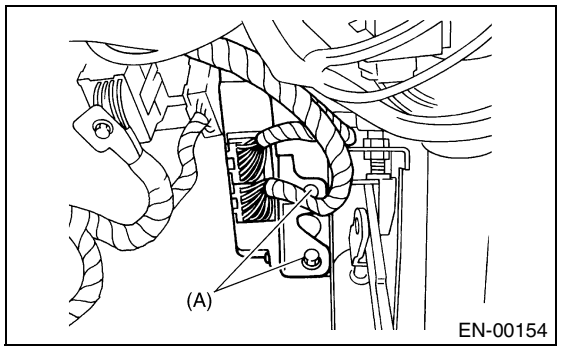



(A) Stud bolt

9) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.




10) Use TCM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.




(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.

12) 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 unit.**
**(The ECM is located under the steering column, inside of the instrument panel lower trim panel.)**
**• 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 above mentioned.**
**• Incorrect installation of the radio may affect the operation of the ECM.**

13) 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 it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) In AT vehicles, do not continue the stall for more than five seconds at a time (from closed throttle, fully open throttle to stall engine speed).
17) On ABS vehicle, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

## B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

### 1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

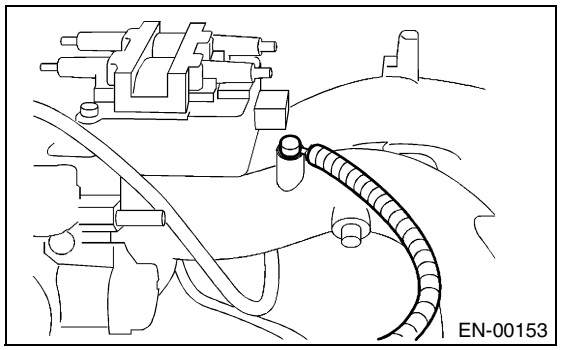
***Standard voltage: 12 V***

***Specific gravity: Above 1.260***

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

### 2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.




## C: NOTE

### 1. DESCRIPTION

• The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) 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 Section 1968.1, California Code of Regulations (OBD-II regulation). 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, MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (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, MIL is turned off, but DTC remains at on-board computer.
• The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.

• The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru Select Monitor or the OBD-II general scan tool to the vehicle.

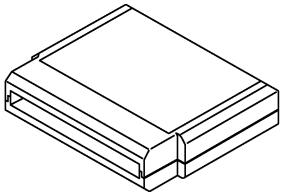
### 2. ENGINE AND EMISSION CONTROL SYSTEM

• 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.

### 3. AUTOMATIC TRANSMISSION AND ELECTRONIC-HYDRAULIC CONTROL SYSTEM

The electronic-hydraulic control system consists of various sensors and switches, a transmission control module (TCM) and the hydraulic controller including solenoid valves. The system controls the transmission proper including shift control, lock-up control, overrunning clutch control, line pressure control and shift timing control. It also controls the AWD transfer clutch. In other words, the system detects various operating conditions from various input signals and sends output signals to shift solenoids 1, 2 and low clutch timing solenoid and 2-4 brake timing solenoid, line pressure duty solenoid, lock-up duty solenoid, transfer duty solenoid and 2-4 brake duty solenoid (a total of eight solenoids).

## D: PREPARATION TOOL

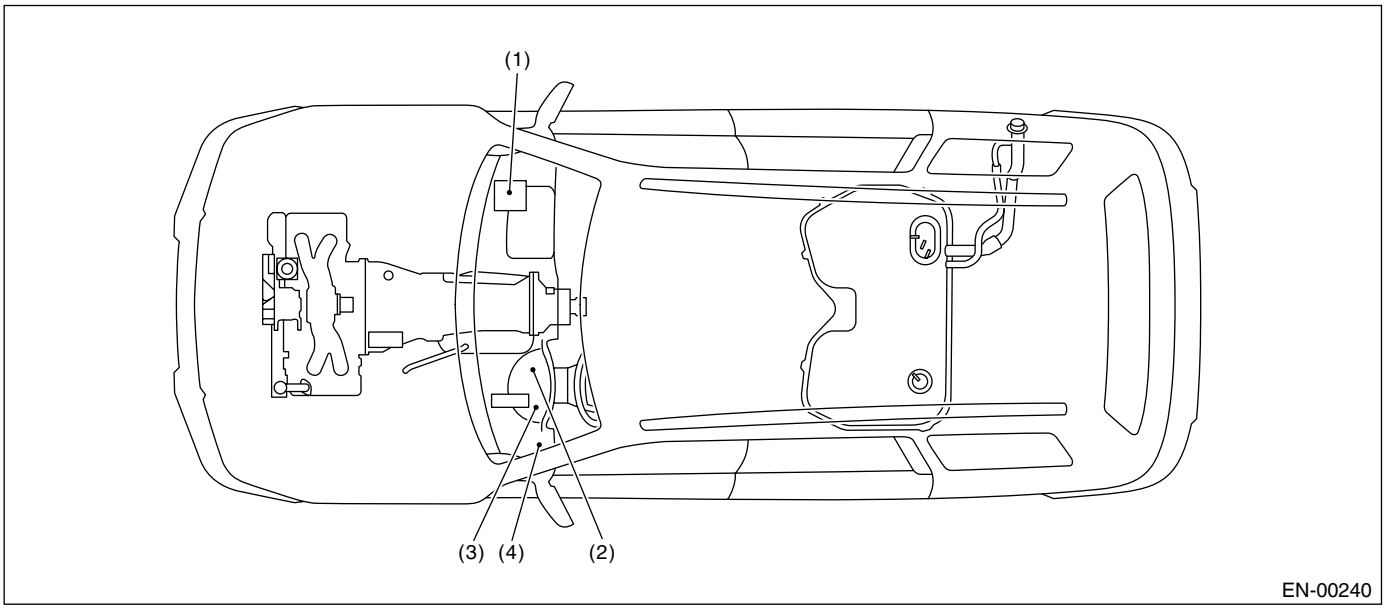
| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|---|---|---|
|  ST24082AA210 | 24082AA210 (New adopted tool) | CARTRIDGE | Troubleshooting for electrical systems. |
|  ST22771AA030 | 22771AA030 | SUBARU SELECT MONITOR KIT | Troubleshooting for electrical systems.<br>• English: 22771AA030 (Without printer)<br>• German: 22771AA070 (Without printer)<br>• French: 22771AA080 (Without printer)<br>• Spanish: 22771AA090 (Without printer) |

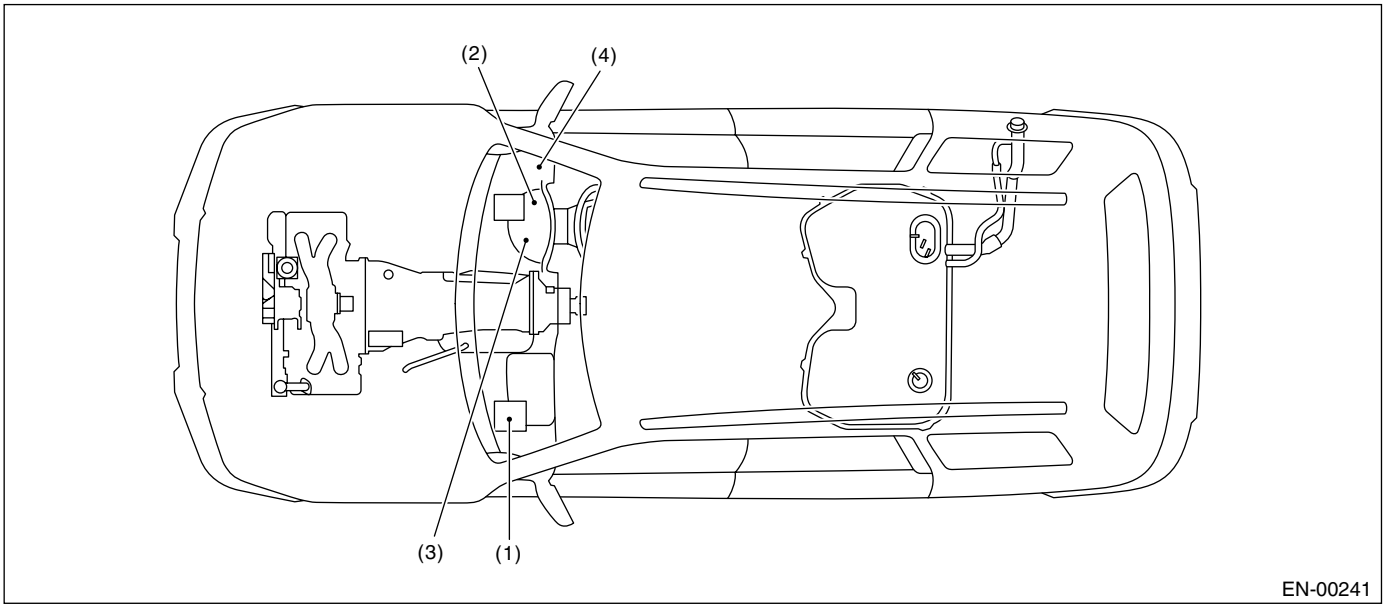
# 4. Electrical Components Location

## A: LOCATION

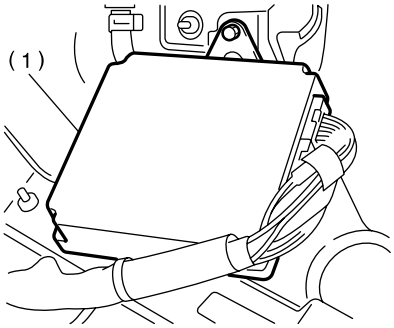
### 1. ENGINE

**• MODULE**




(1) Engine control module (ECM)
(2) CHECK ENGINE malfunction indicator lamp (MIL)
(3) Test mode connector
(4) Data link connector



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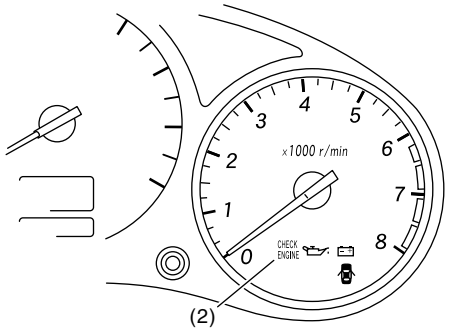

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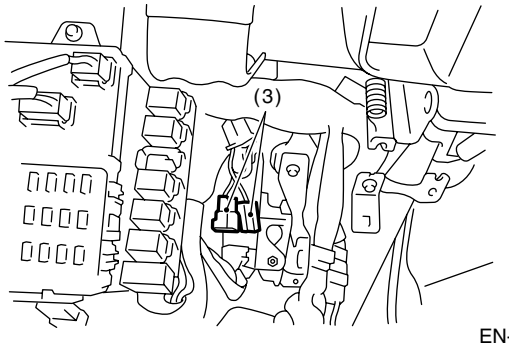

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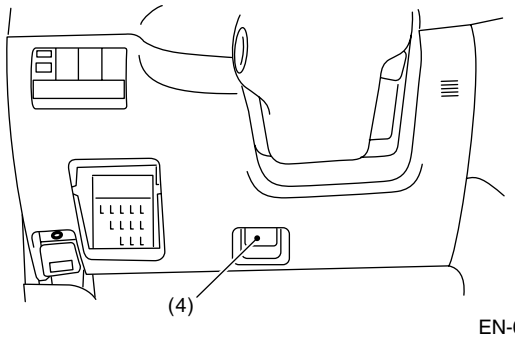

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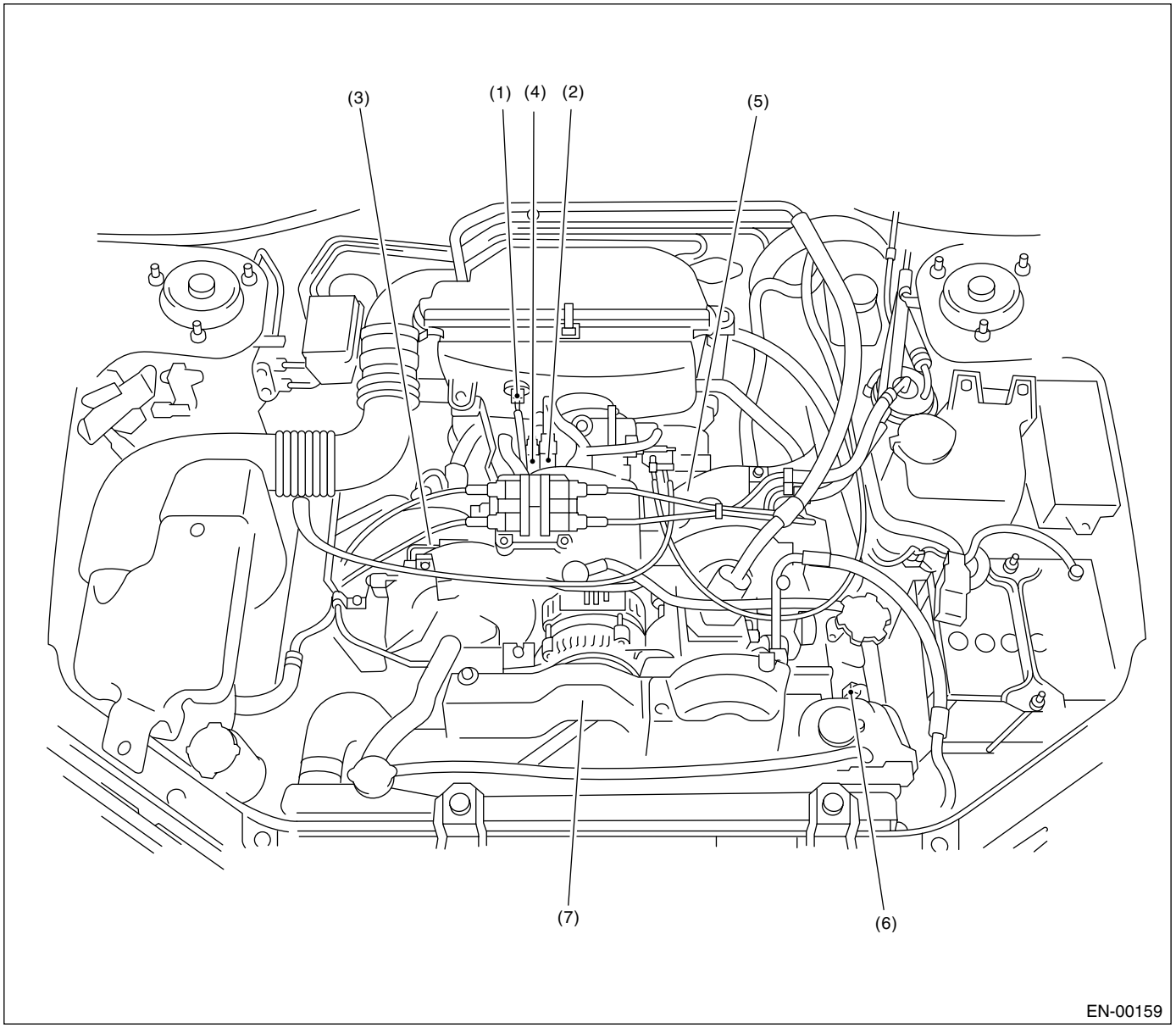
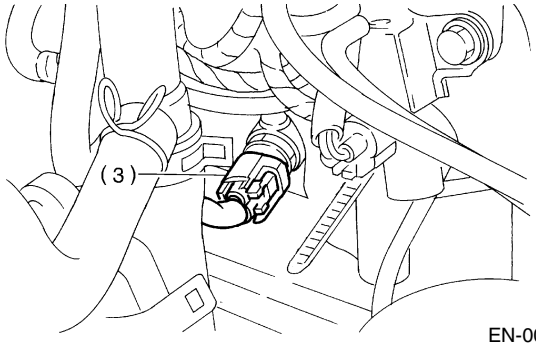
**• SENSOR**




(1) Intake air temperature sensor
(2) Pressure sensor
(3) Engine coolant temperature sensor
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor

EN-00006

EN-00160



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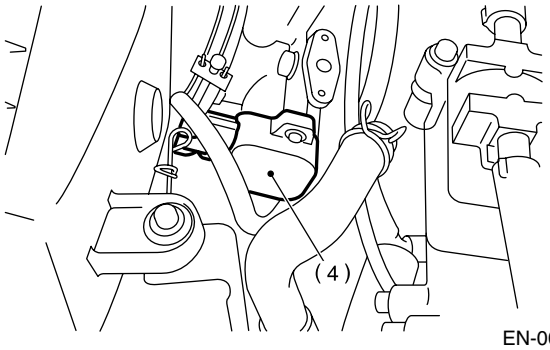

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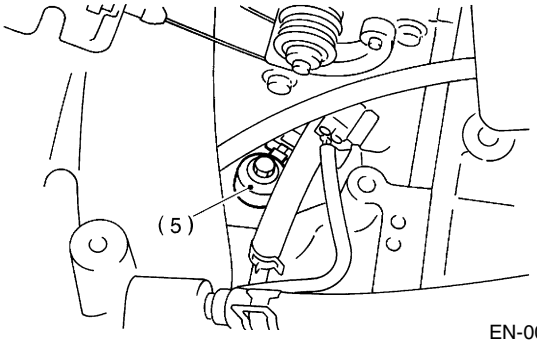

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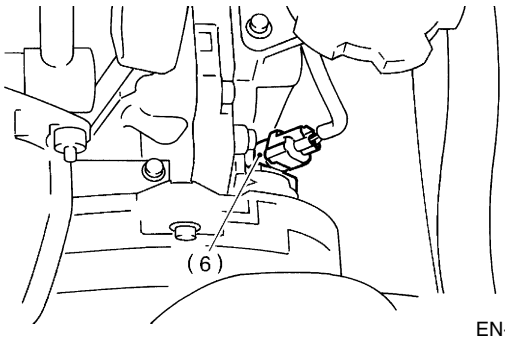

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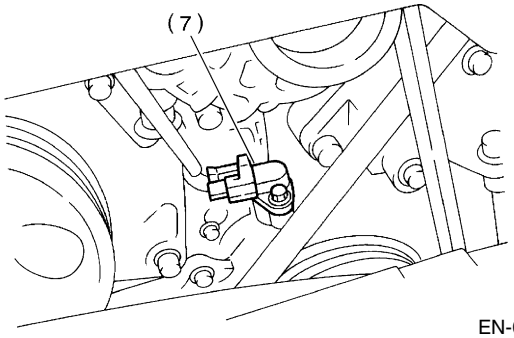

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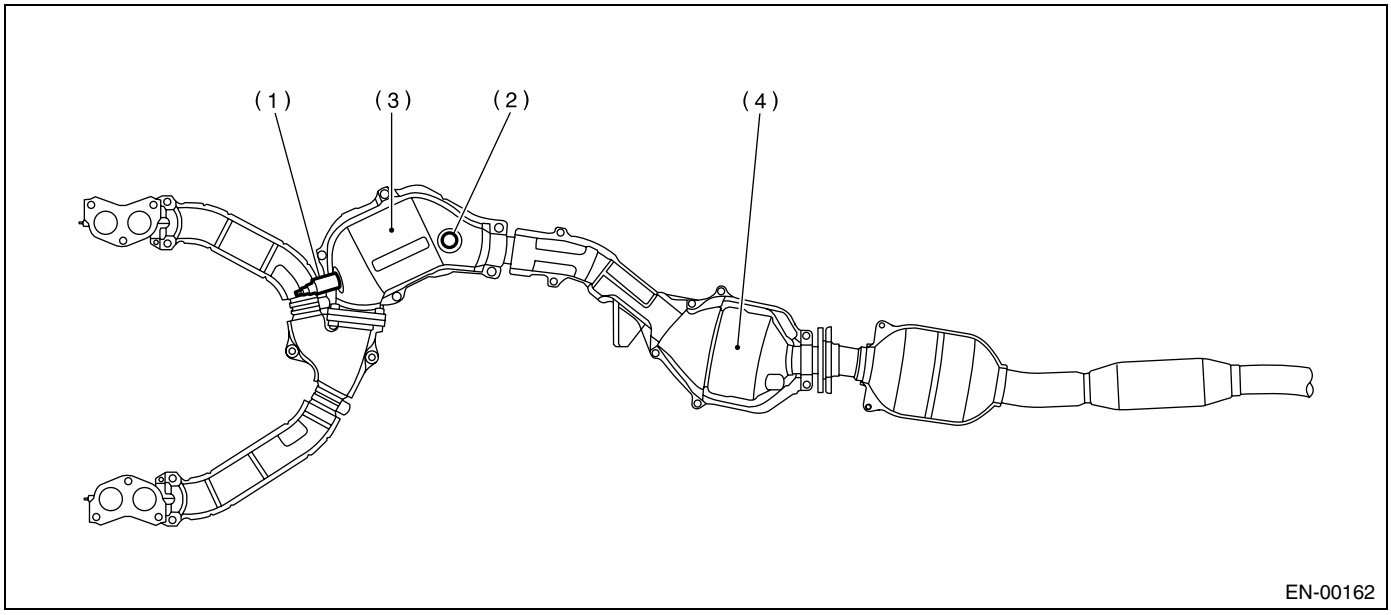
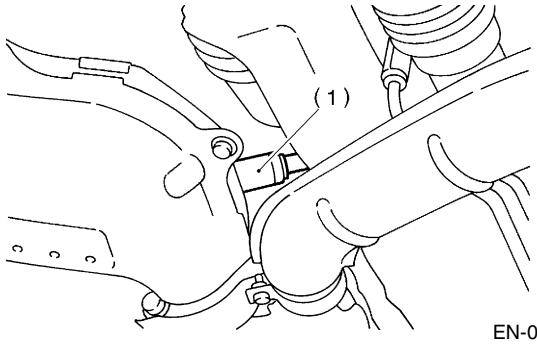
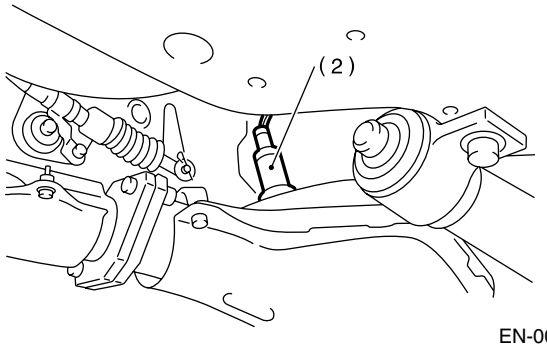
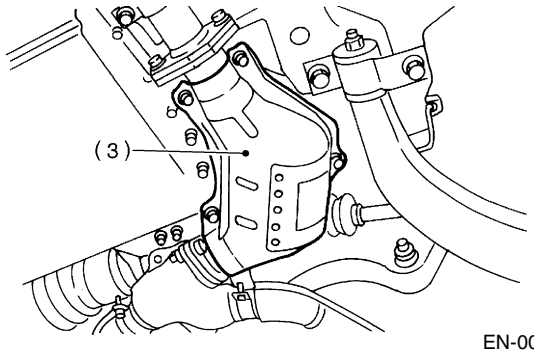
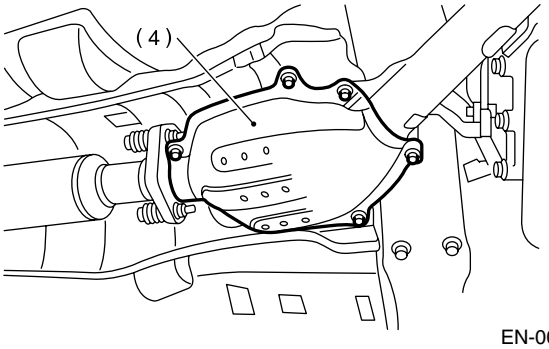


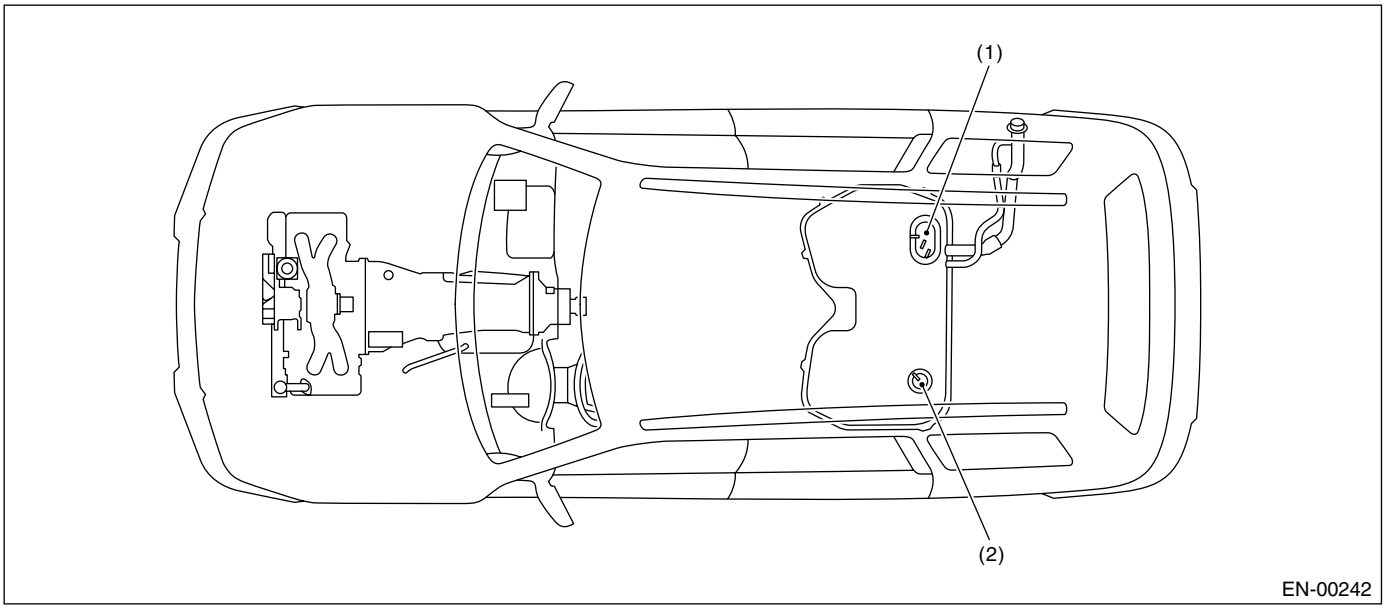

(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter

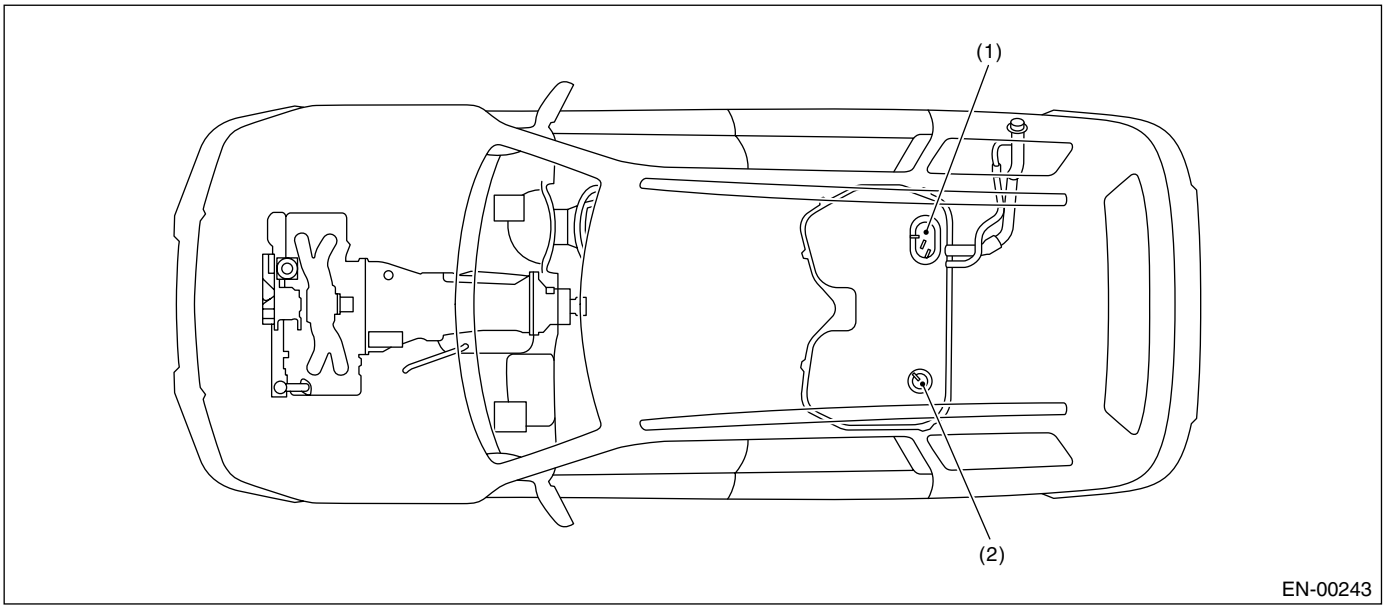


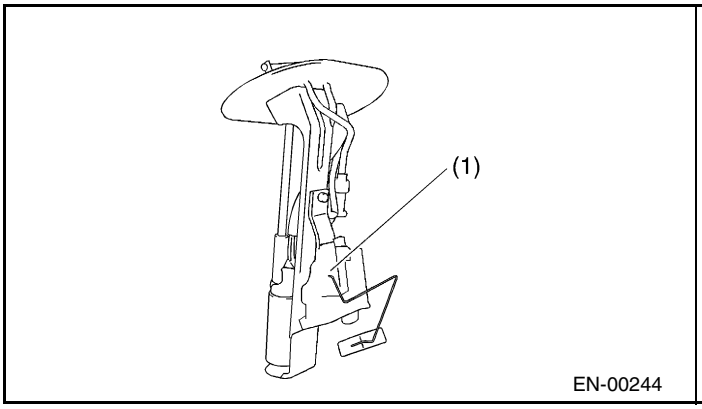



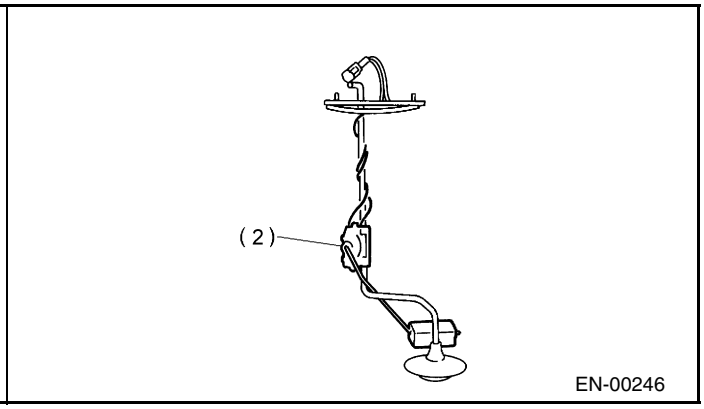





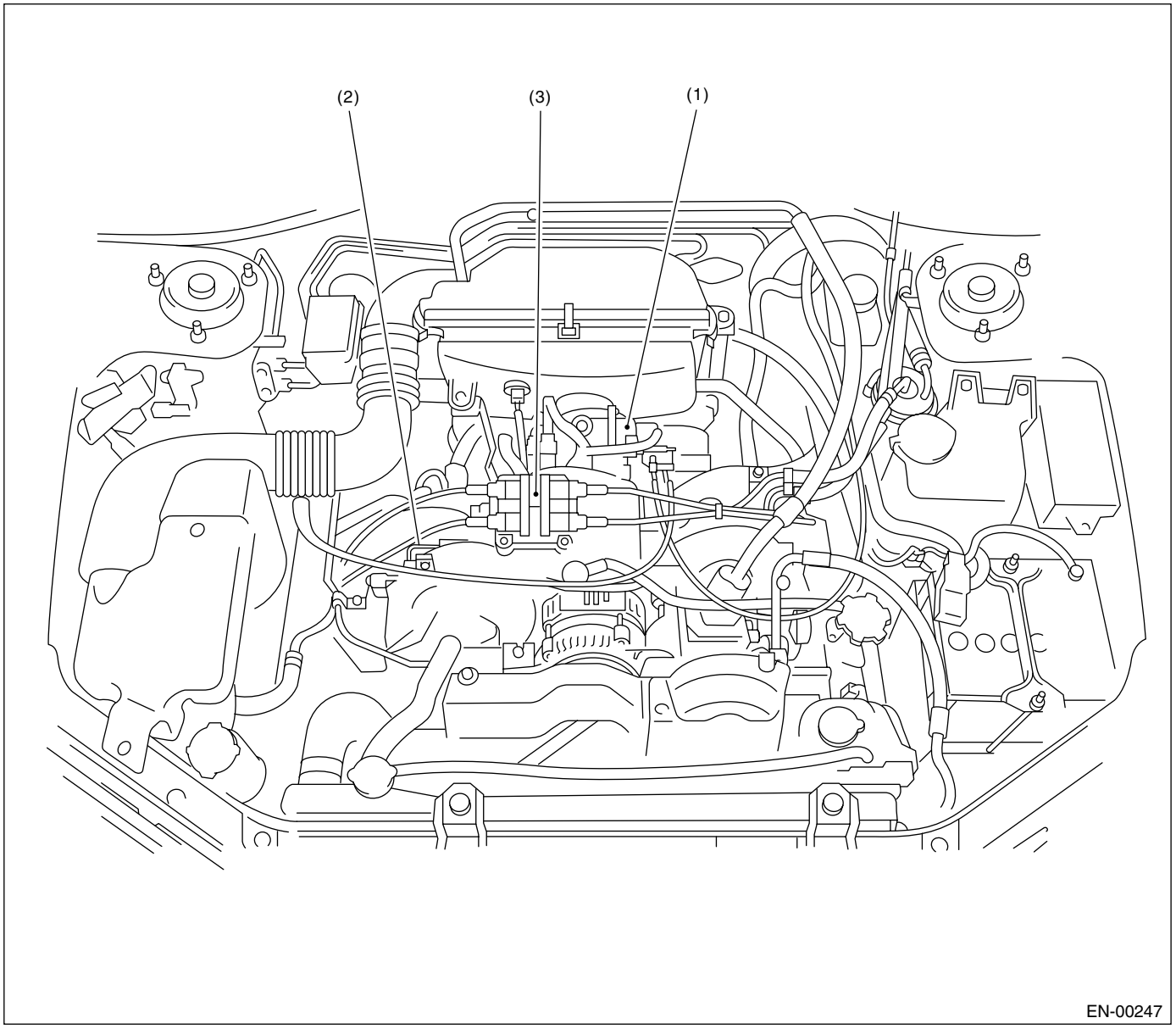




(1) Fuel level sensor (2) Fuel sub level sensor

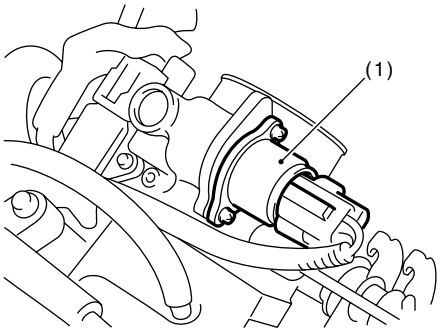


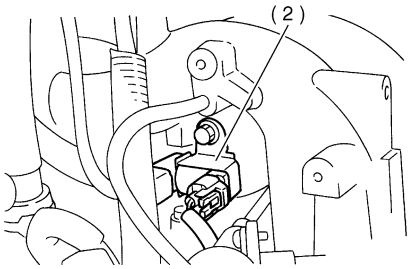
**• SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS**



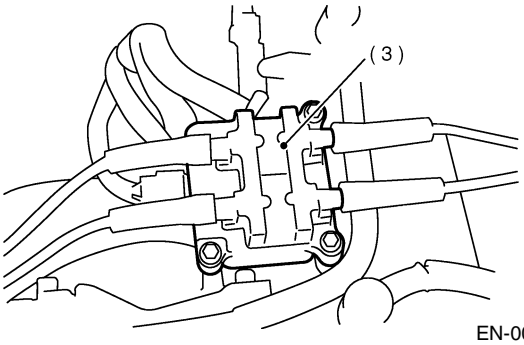

(1) Idle air control solenoid valve (2) Purge control solenoid valve (3) Ignition coil / ignitor ASSY



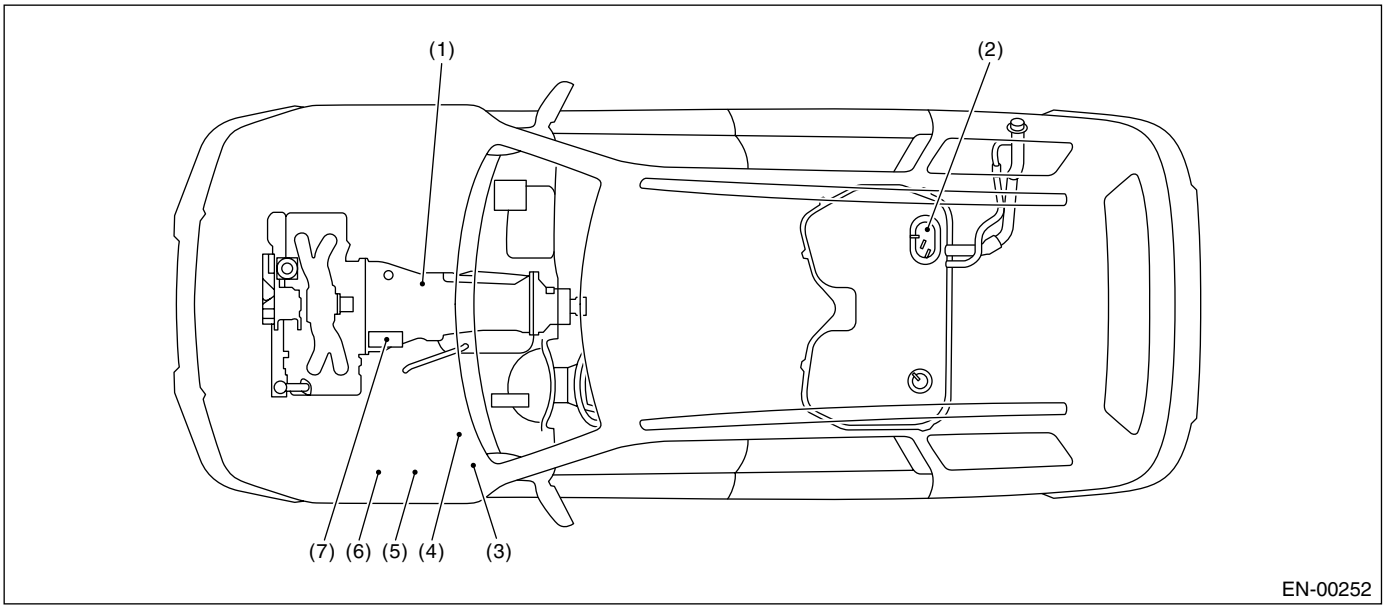
EN-00249

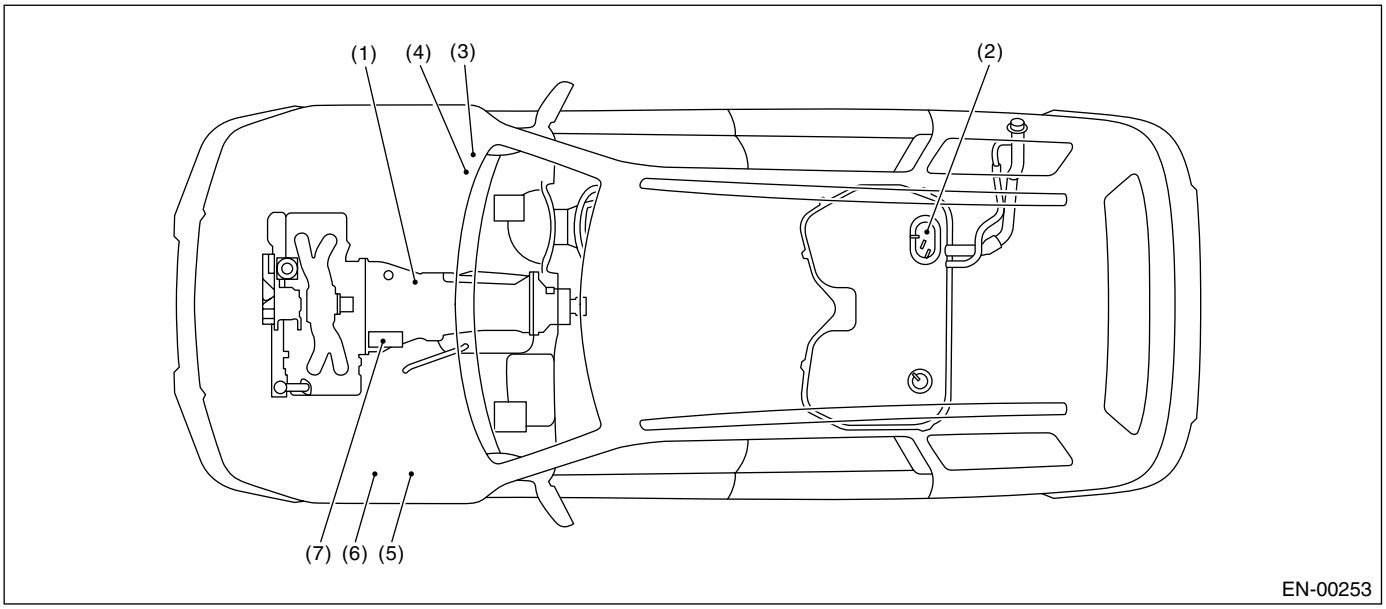


EN-00250

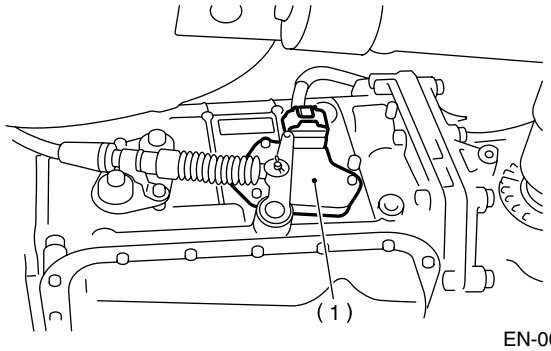


EN-00251

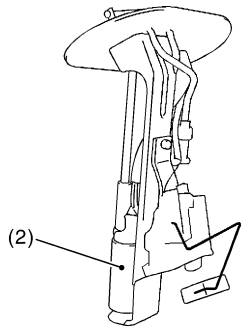


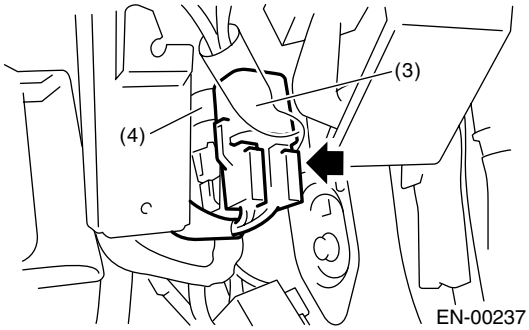

(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay
(6) Radiator sub fan relay
(7) Starter



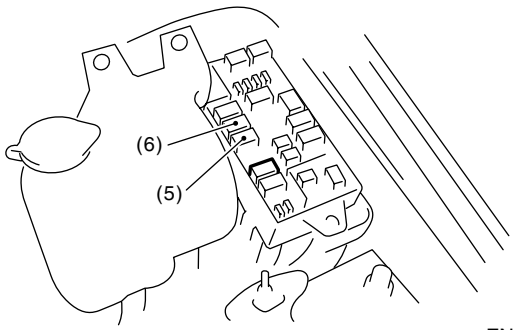
EN-00178



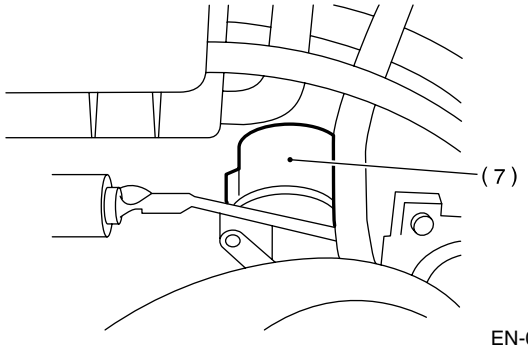
EN-00254



EN-00237



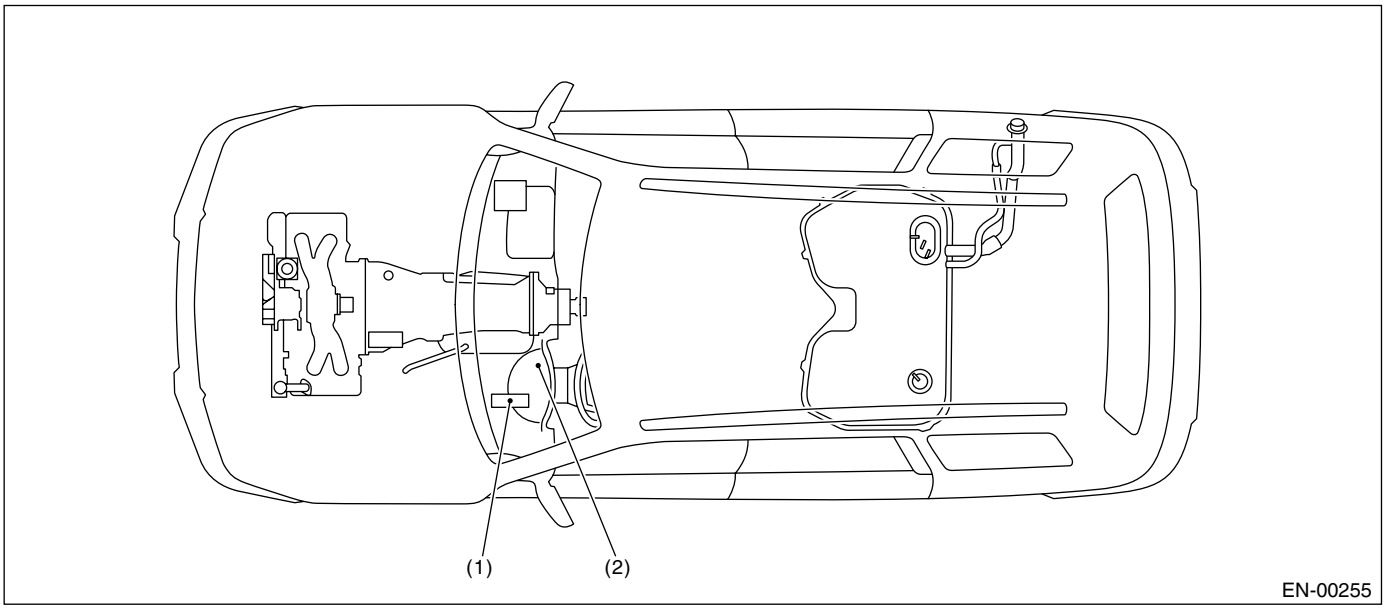
EN-00180

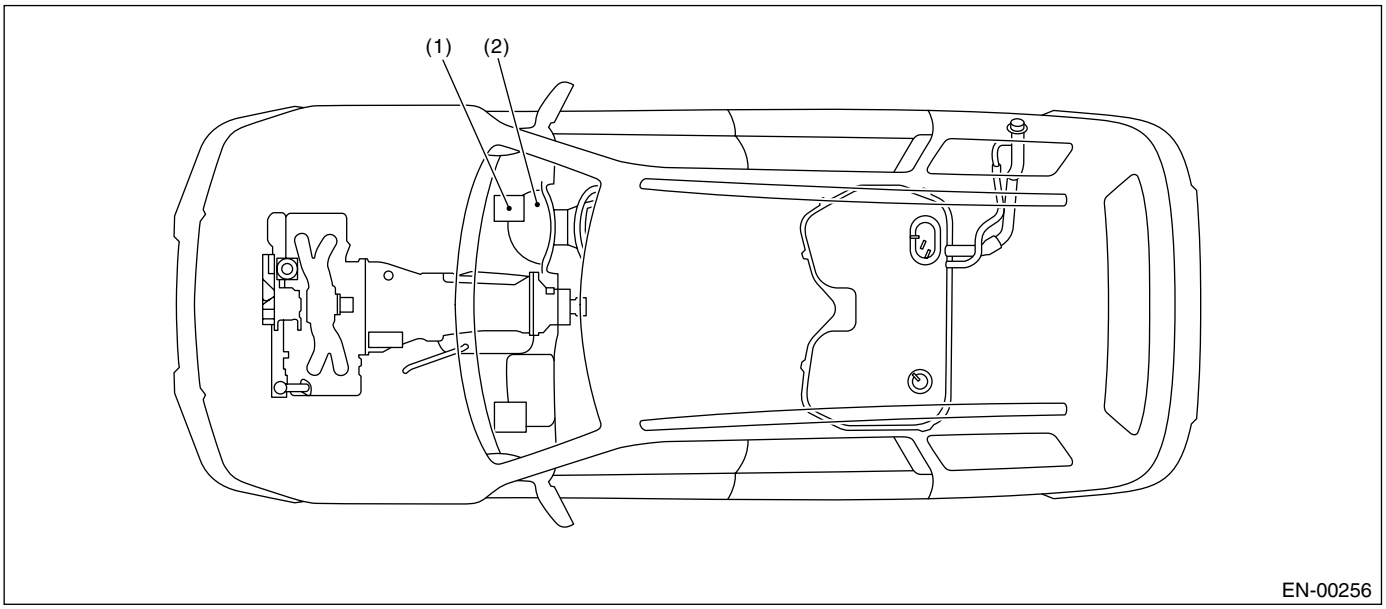


EN-00181

## 2. TRANSMISSION

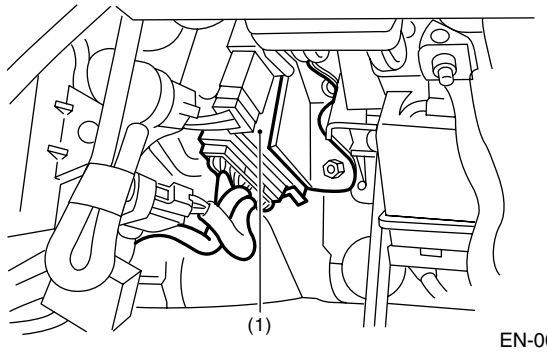
**• MODULE**



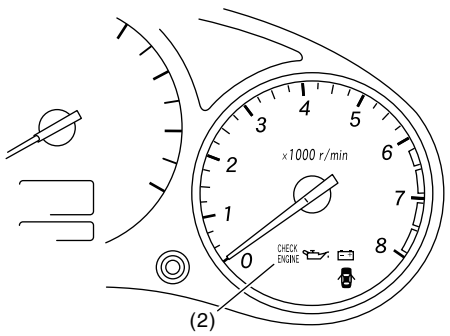




(1) Transmission Control Module (TCM) (for AT vehicles)

(2) AT diagnostic indicator light (for AT vehicles)

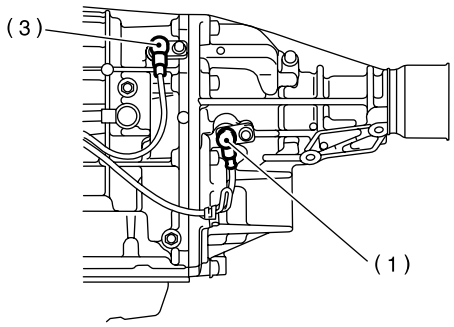


EN-00183

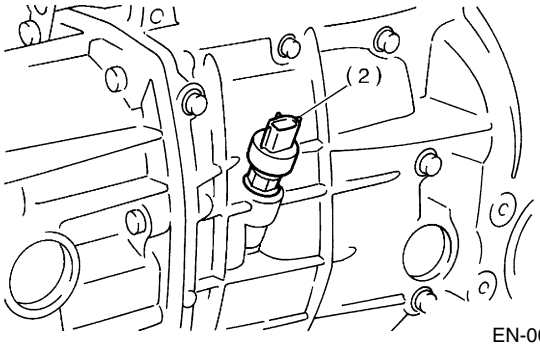


EN-00157

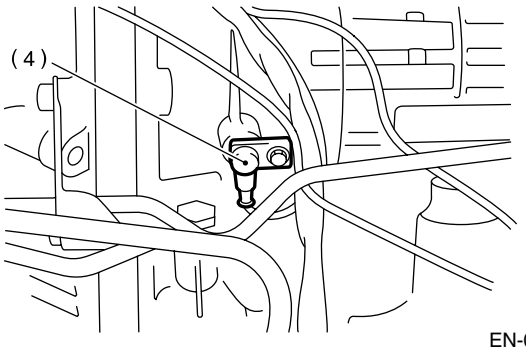
**• SENSOR**



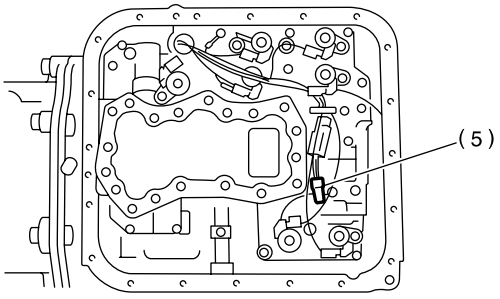
EN-00184



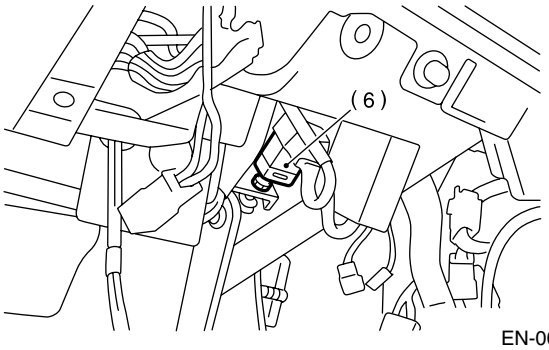
EN-00107



EN-00186



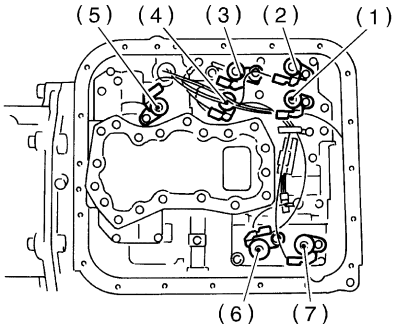
EN-00187



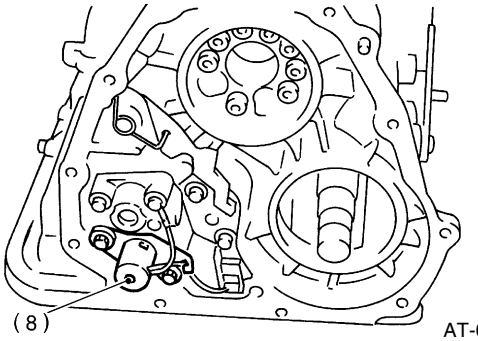
EN-00188

(1) Rear vehicle speed sensor (for AT vehicles)
(2) Front vehicle speed sensor (for MT vehicles)
(3) Front vehicle speed sensor (for AT vehicles)
(4) Torque converter turbine speed sensor
(5) ATF temperature sensor (for AT vehicles)
(6) Brake light switch

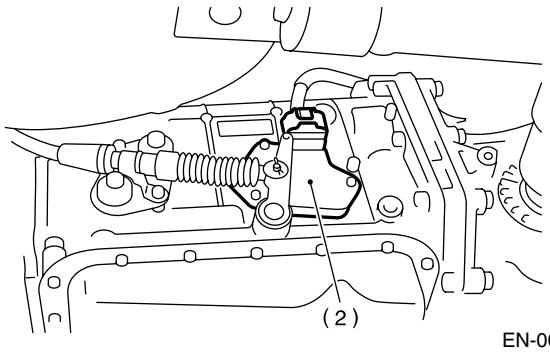
**• SOLENOID VALVE AND SWITCH (AT VEHICLES)**



AT-00334



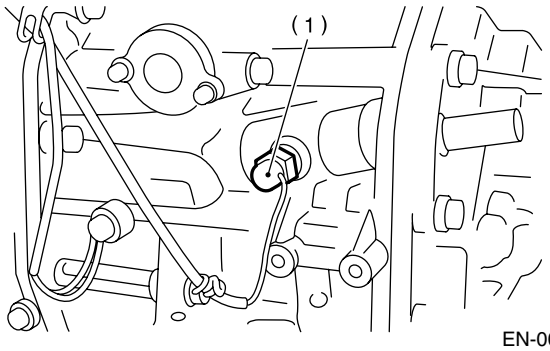
AT-00335



EN-00189

(1) Shift solenoid valve 1
(2) Shift solenoid valve 2
(3) Line pressure duty solenoid
(4) Low clutch timing solenoid
(5) Lock up duty solenoid
(6) 2-4 brake duty solenoid
(7) 2-4 brake timing solenoid
(8) Transfer duty solenoid
(9) Inhibitor switch

**• SOLENOID VALVE AND SWITCH (MT VEHICLES)**

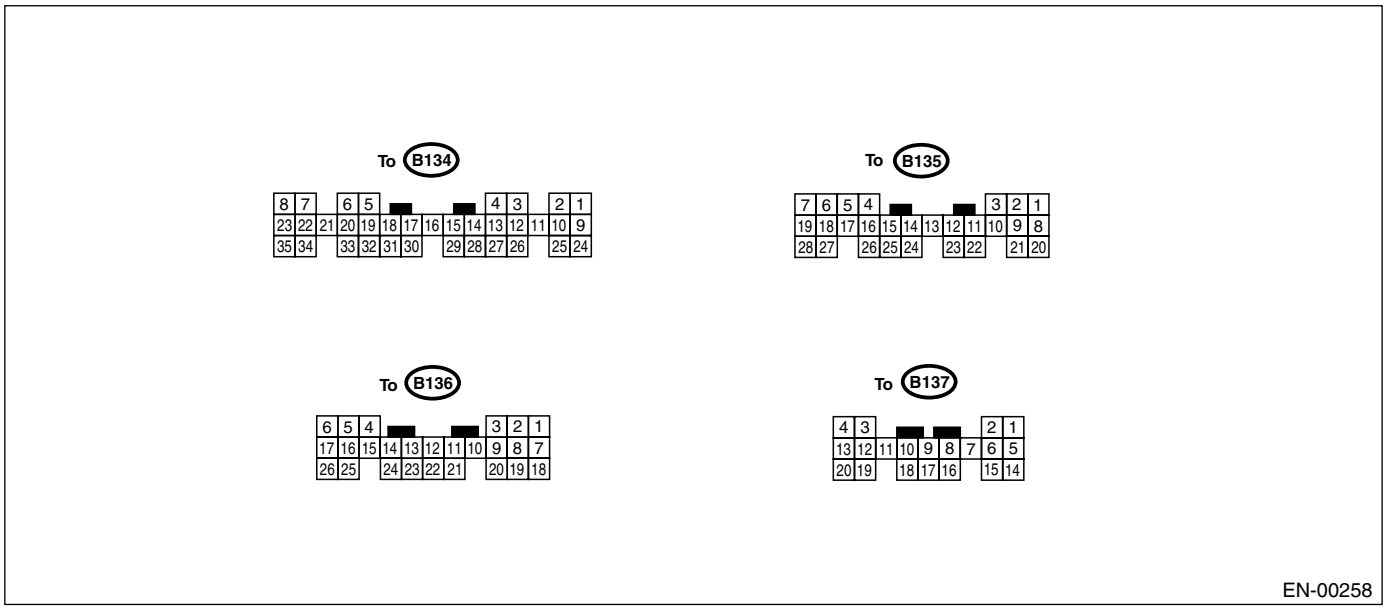


EN-00192

(1) Neutral position switch

# 5. Engine Control Module (ECM) I/O Signal

## A: ELECTRICAL SPECIFICATION




| Content | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON (Engine OFF) | Engine ON (Idling) | |
| Crankshaft position sensor | Signal (+) | B135 | 6 | 0 | −7 to +7 | Sensor output waveform |
| | Signal (−) | B135 | 17 | 0 | 0 | — |
| | Shield | B135 | 28 | 0 | 0 | — |
| Camshaft position sensor | Signal (+) | B135 | 7 | 0 | −7 to +7 | Sensor output waveform |
| | Signal (−) | B135 | 18 | 0 | 0 | — |
| | Shield | B135 | 28 | 0 | 0 | — |
| Throttle position sensor | Signal | B135 | 13 | Fully closed: 0.2 — 1.0<br>Fully opened: 4.2 — 4.7 | | — |
| | Power supply | B135 | 3 | 5 | 5 | — |
| | GND (sensor) | B135 | 19 | 0 | 0 | — |
| Rear oxygen sensor | Signal | B135 | 14 | 0 | 0 — 0.9 | — |
| | Shield | B137 | 15 | 0 | 0 | — |
| | GND (sensor) | B135 | 19 | 0 | 0 | — |
| Front oxygen (A/F) sensor heater | Signal 1 | B136 | 13 | 0 — 1.0 | 0 — 1.0 | — |
| | Signal 2 | B136 | 22 | 0 — 1.0 | 0 — 1.0 | — |
| Rear oxygen sensor heater signal | | B136 | 4 | 0 — 1.0 | 0 — 1.0 | — |
| Engine coolant temperature sensor | Signal | B135 | 12 | 1.0 — 1.4 | 1.0 — 1.4 | After warm-up the engine. |
| | GND (sensor) | B135 | 19 | 0 | 0 | After warm-up the engine. |
| Vehicle speed signal | | B137 | 10 | 0 or 5 | 0 or 5 | "5" and "0" are repeatedly displayed when vehicle is driven. |
| Starter switch | | B136 | 20 | 0 | 0 | Cranking: 8 — 14 |

| Content | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON (Engine OFF) | Engine ON (Idling) | |
| A/C switch | | B136 | 11 | ON: 10 — 13<br>OFF: 0 | ON: 13 — 14<br>OFF: 0 | — |
| Ignition switch | | B136 | 10 | 10 — 13 | 13 — 14 | — |
| Neutral position switch | MT | B136 | 21 | ON: 12±0.5<br>OFF: 0 | | Switch is ON when gear is in neutral position. |
| | AT | B136 | 21 | ON: 0<br>OFF: 12±0.5 | | Switch is ON when shift is in “N” or “P” position. |
| Test mode connector | | B136 | 3 | 5 | 5 | When connected: 0 |
| Knock sensor | Signal | B135 | 16 | 2.8 | 2.8 | — |
| | Shield | B135 | 27 | 0 | 0 | — |
| Back-up power supply | | B135 | 9 | 10 — 13 | 13 — 14 | Ignition switch “OFF”: 10 — 13 |
| Control unit power supply | | B135 | 1 | 10 — 13 | 13 — 14 | — |
| | | B135 | 2 | 10 — 13 | 13 — 14 | — |
| Sensor power supply | | B135 | 3 | 5 | 5 | — |
| Ignition control | #1, #2 | B134 | 33 | 0 | 1 — 3.4 | Waveform |
| | #3, #4 | B134 | 32 | 0 | 1 — 3.4 | Waveform |
| Fuel injector | #1 | B134 | 34 | 10 — 13 | 1 — 14 | Waveform |
| | #2 | B134 | 23 | 10 — 13 | 1 — 14 | Waveform |
| | #3 | B134 | 22 | 10 — 13 | 1 — 14 | Waveform |
| | #4 | B134 | 8 | 10 — 13 | 1 — 14 | Waveform |
| Idle air control solenoid valve | Signal 1 | B134 | 20 | — | 1 — 13 | Waveform |
| | Signal 2 | B134 | 6 | — | 1 — 13 | Waveform |
| | Signal 3 | B134 | 5 | — | 1 — 13 | Waveform |
| | Signal 4 | B134 | 19 | — | 1 — 13 | Waveform |
| | Power supply | B135 | 2 | 10 — 13 | 13 — 14 | — |
| Fuel pump relay control | | B134 | 2 | ON: 0.5, or less<br>OFF: 10 — 13 | 0.5, or less | — |
| A/C relay control | | B134 | 9 | ON: 0.5, or less<br>OFF: 10 — 13 | ON: 0.5, or less<br>OFF: 13 — 14 | — |
| Radiator fan relay 1 control | | B134 | 14 | ON: 0.5, or less<br>OFF: 10 — 13 | ON: 0.5, or less<br>OFF: 13 — 14 | — |
| Radiator fan relay 2 control | | B134 | 13 | ON: 0.5, or less<br>OFF: 10 — 13 | ON: 0.5, or less<br>OFF: 13 — 14 | With A/C vehicles only |
| Self-shutoff control | | B136 | 12 | 10 — 13 | 13 — 14 | — |
| Malfunction indicator lamp | | B134 | 28 | — | — | Light “ON”: 1, or less<br>Light “OFF”: 10 — 14 |
| Engine speed output | | B134 | 10 | — | 0 — 13, or more | Waveform |
| Torque control 1 signal | | B136 | 1 | 5 | 5 | — |
| Torque control 2 signal | | B136 | 18 | 5 | 5 | — |
| Torque control cut signal | | B136 | 15 | 8 | 8 | — |
| Purge control solenoid valve | | B134 | 29 | ON: 1, or less<br>OFF: 10 — 13 | ON: 1, or less<br>OFF: 13 — 14 | — |
| Fuel level sensor | | B135 | 25 | 0.12 — 4.75 | 0.12 — 4.75 | — |
| EGR solenoid valve | Signal 1 | B134 | 18 | 0 or 10 — 13 | 0 or 10 — 13 | — |
| | Signal 2 | B134 | 17 | 0 or 10 — 13 | 0 or 10 — 13 | — |
| | Signal 3 | B134 | 16 | 0 or 10 — 13 | 0 or 10 — 13 | — |
| | Signal 4 | B134 | 15 | 0 or 10 — 13 | 0 or 10 — 13 | — |
| AT diagnosis input signal | | B137 | 19 | Less than 1 ←→ More than 4 | Less than 1 ←→ More than 4 | Waveform |

| Content | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|
| | | | Ignition SW ON (Engine OFF) | Engine ON (Idling) | |
| Small light switch | B137 | 20 | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Blower fan switch | B137 | 13 | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Rear defogger switch | B137 | 4 | ON: 0<br>OFF: 10 — 13 | ON: 0<br>OFF: 13 — 14 | — |
| Front oxygen (A/F) sensor signal 1 | B136 | 13 | — | 2.05 — 2.25 | — |
| Front oxygen (A/F) sensor signal 2 | B136 | 22 | — | 1.75 — 1.95 | — |
| Pressure sensor | B135 | 15 | 4.0 — 4.8 | 1.1 — 1.9 | — |
| Intake air temperature sensor | B137 | 6 | 3.15 — 3.33 | 3.15 — 3.33 | Intake air temperature: 25°C (75°F) |
| SSM/GST communication line | B137 | 16 | Less than 1 ←→ More than 4 | Less than 1 ←→ More than 4 | — |
| GND (sensors) | B136 | 19 | 0 | 0 | — |
| GND (injectors) | B134 | 35 | 0 | 0 | — |
| GND (ignition system) | B136 | 26 | 0 | 0 | — |
| GND (power supply) | B134 | 7 | 0 | 0 | — |
| GND (control systems) | B137 | 14 | 0 | 0 | — |
| | B135 | 21 | 0 | 0 | — |
| GND (oxygen sensor heater 1) | B136 | 5 | 0 | 0 | — |
| GND (oxygen sensor heater 2) | B136 | 16 | 0 | 0 | — |

# 6. Engine Condition Data

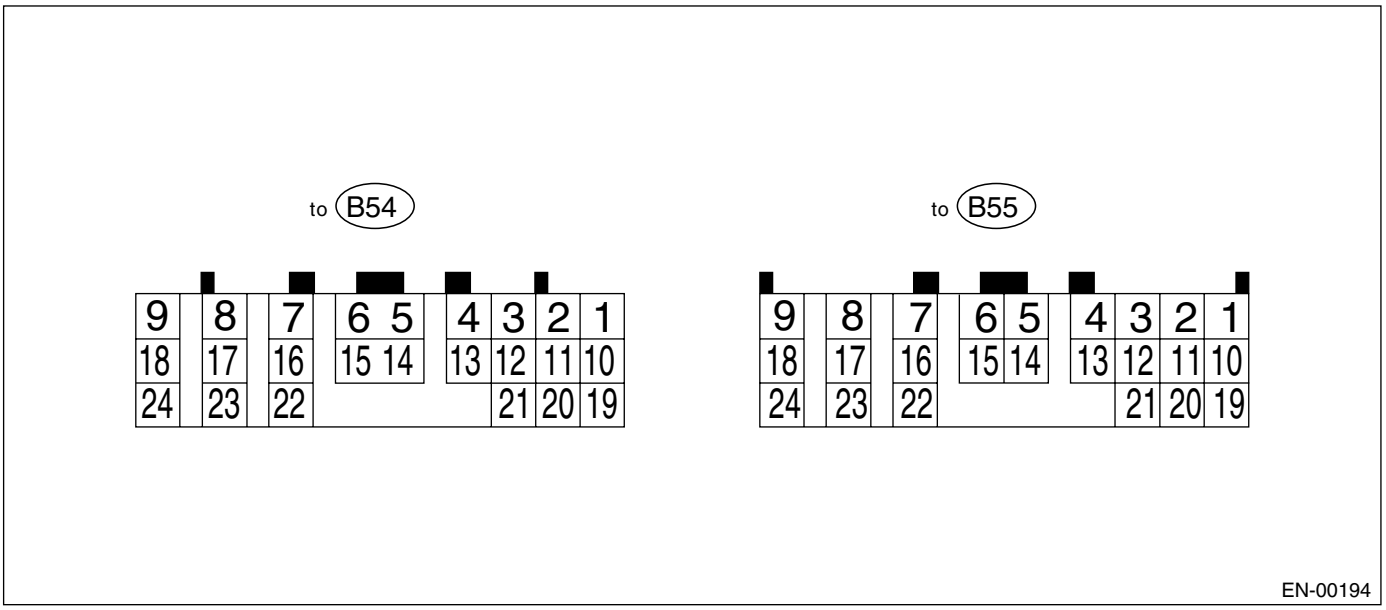
## A: ELECTRICAL SPECIFICATION

| Content | Specified data |
|---|---|
| Engine load | 1.6 — 2.9 (%): Idling |
| | 6.4 — 12.8 (%): 2,500 rpm racing |

Measuring condition:
- After warm-up the engine.
- Gear position is in “N” or “P” position.
- A/C is turned OFF.
- All accessory switches are turned OFF.

# 7. Transmission Control Module (TCM) I/O Signal

## A: ELECTRICAL SPECIFICATION




NOTE:
Check with ignition switch ON.

| Content | | Connector No. | Terminal No. | Measuring conditions | Voltage (V) | Resistance to body (ohms) |
|---|---|---|---|---|---|---|
| Back-up power supply | | B55 | 6 | Ignition switch OFF | 10 — 13 | — |
| Ignition power supply | | B54 | 23 | Ignition switch ON (with engine OFF) | 10 — 13 | — |
| | | B54 | 24 | | | |
| Inhibitor switch | "P" range switch | B55 | 23 | Selector lever in "P" range | Less than 1 | — |
| | | | | Selector lever in any other than "P" range | More than 8 | |
| | "N" range switch | B55 | 22 | Selector lever in "N" range | Less than 1 | — |
| | | | | Selector lever in any other than "N" range | More than 8 | |
| | "R" range switch | B55 | 17 | Selector lever in "R" range | Less than 1 | — |
| | | | | Selector lever in any other than "R" range | More than 8 | |
| | "D" range switch | B55 | 8 | Selector lever in "D" range | Less than 1 | — |
| | | | | Selector lever in any other than "D" range | More than 8 | |
| | "3" range switch | B55 | 18 | Selector lever in "3" range | Less than 1 | — |
| | | | | Selector lever in any other than "3" range | More than 8 | |
| | "2" range switch | B54 | 10 | Selector lever in "2" range | Less than 1 | — |
| | | | | Selector lever in any other than "2" range | More than 8 | |
| | "1" range switch | B54 | 1 | Selector lever in "1" range | Less than 1 | — |
| | | | | Selector lever in any other than "1" range | More than 8 | |
| Brake switch | | B55 | 24 | Brake pedal depressed. | More than 10.5 | — |
| | | | | Brake pedal released. | Less than 1 | |

| Content | Connector No. | Terminal No. | Measuring conditions | Voltage (V) | Resistance to body (ohms) |
|---|---|---|---|---|---|
| ABS signal | B54 | 19 | ABS switch ON | Less than 1 | — |
| | | | ABS switch OFF | More than 6.5 | |
| AT OIL TEMP light | B54 | 3 | Light ON | Less than 1 | — |
| | | | Light OFF | More than 9 | |
| Throttle position sensor | B55 | 2 | Throttle fully closed. | Approx. 0.5 | — |
| | | | Throttle fully open. | Approx. 4.3 | |
| Throttle position sensor power supply | B55 | 1 | Ignition switch ON (With engine OFF) | 4.8 — 5.3 | — |
| ATF temperature sensor | B55 | 11 | ATF temperature 20°C (68°F) | 1.6 — 2.0 | 2.1 — 2.9 k |
| | | | ATF temperature 80°C (176°F) | 0.4 — 0.9 | 275 — 375 |
| Rear vehicle speed sensor | B55 | 3 | Vehicle stopped. | 0 | 450 — 650 |
| | | | Vehicle speed at least 20 km/h (12 MPH) | More than 1 (AC range) | |
| Front vehicle speed sensor | B55 | 5 | Vehicle stopped. | 0 | 450 — 650 |
| | | | Vehicle speed at least 20 km/h (12 MPH) | More than 1 (AC range) | |
| Torque converter turbine speed sensor | B55 | 12 | Engine idling after warm-up (D range). | 0 | 450 — 650 |
| | | | Engine idling after warm-up (N range). | More than 1 (AC range) | |
| Vehicle speed output signal | B55 | 13 | Vehicle speed at most 10 km/h (6 MPH) | Less than 1← →More than 5 | — |
| Engine speed signal | B55 | 4 | Ignition switch ON (with engine OFF) | 0 | — |
| | | | Ignition switch ON (with engine ON) | 0 — 13 or more | |
| Cruise set signal | B54 | 11 | When cruise control is set (SET lamp ON) | Less than 1 | — |
| | | | When cruise control is not set (SET lamp OFF) | More than 6.5 | |
| Torque control 1 signal | B54 | 13 | Ignition switch ON (with engine ON) | More than 4.8 | — |
| Torque control 2 signal | B54 | 21 | Ignition switch ON (with engine ON) | More than 4.8 | — |
| Torque control cut signal | B54 | 2 | Ignition switch ON | 8 | — |
| Intake manifold pressure signal | B55 | 20 | Engine idling after warm-up. | 0.4 — 1.8 | — |
| AT load signal | B55 | 20 | Engine idling after warm-up. | 1.2 — 1.8 | — |
| Shift solenoid 1 | B54 | 7 | 1st gear | More than 9 | 10 — 16 |
| | | | 3rd gear | Less than 1 | |
| Shift solenoid 2 | B54 | 6 | 2nd gear | More than 9 | 10 — 16 |
| | | | 4th gear | Less than 1 | |
| Line pressure duty solenoid | B54 | 9 | Throttle fully closed (with engine OFF) after warm-up. | 1.5 — 5.0 | 2.0 — 4.5 |
| | | | Throttle fully open (with engine OFF) after warm-up. | Less than 1 | |
| Dropping resistor | B54 | 18 | Throttle fully closed (with engine OFF) after warm-up. | More than 8.5 | 9 — 15 |
| | | | Throttle fully open (with engine OFF) after warm-up. | Less than 0.5 | |

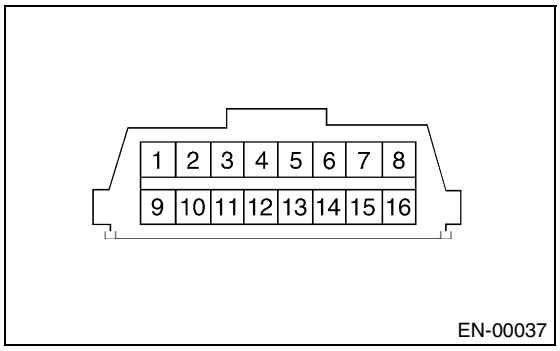
| Content | Connector No. | Terminal No. | Measuring conditions | Voltage (V) | Resistance to body (ohms) |
|---|---|---|---|---|---|
| Lock-up duty solenoid | B54 | 16 | When lock up occurs. | More than 8.5 | 10 — 17 |
| | | | When lock up is released. | Less than 0.5 | |
| Transfer duty solenoid | B54 | 15 | Fuse on FWD switch | More than 8.5 | 10 — 17 |
| | | | Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear). | Less than 0.5 | |
| 2-4 brake duty solenoid | B54 | 8 | Throttle fully closed (with engine OFF) after warm-up. | 1.5 — 5.0 | 2.0 — 4.5 |
| | | | Throttle fully open (with engine OFF) after warm-up. | Less than 1 | |
| 2-4 brake dropping resistor | B54 | 17 | Throttle fully closed (with engine OFF) after warm-up. | More than 8.5 | 9 — 15 |
| | | | Throttle fully open (with engine OFF) after warm-up. | Less than 0.5 | |
| 2-4 brake timing solenoid | B54 | 5 | 1st gear | Less than 1 | 10 — 16 |
| | | | 3rd gear | More than 9 | |
| Low clutch timing solenoid | B54 | 14 | 2nd gear | Less than 1 | 10 — 16 |
| | | | 4th gear | More than 9 | |
| Sensor ground line | B55 | 21 | — | 0 | Less than 1 |
| System ground line | B55 | 9 | — | 0 | Less than 1 |
| | | 19 | | | |
| FWD switch | B55 | 14 | Fuse removed. | More than 9 | — |
| | | | Fuse installed. | Less than 1 | |
| FWD indicator light | B54 | 12 | Fuse on FWD switch | Less than 1 | — |
| | | | Fuse removed from FWD switch | More than 9 | |
| Data link signal (Subaru Select Monitor) | B55 | 7 | — | — | — |
| | | 16 | — | — | |
| AT diagnosis signal | B54 | 4 | Ignition switch ON | Less than 1 ← → More than 4 | — |

# 8. Data Link Connector

## A: NOTE

1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
2) Terminal No. 4 to No. 6 of the data link connector is used for the Subaru Select Monitor signal.

**CAUTION:**
**Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.**



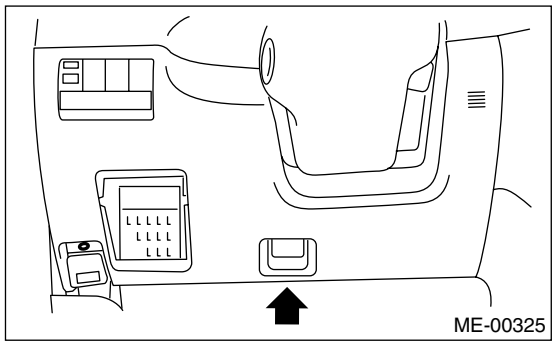

| Terminal No. | Contents | Terminal No. | Contents |
|---|---|---|---|
| 1 | Power supply | 9 | Blank |
| 2 | Blank | 10 | K line of ISO 9141 CARB |
| 3 | Blank | 11 | Blank |
| 4 | Blank | 12 | Ground |
| 5 | Blank | 13 | Ground |
| 6 | Line end check signal | 14 | Blank |
| 7 | Blank | 15 | Blank |
| 8 | Blank | 16 | Blank |

# 9. OBD-II General Scan Tool

## A: OPERATION

### 1. HOW TO USE OBD-II GENERAL SCAN TOOL

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




3) Using the OBD-II general scan tool, call up diagnostic trouble code(s) and freeze frame data.
OBD-II 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 diagnostic trouble codes
(4) MODE $04: Clear/Reset emission-related diagnostic information
Read out data according to repair procedures. (For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.)

NOTE:
For details concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>

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

Refers to data denoting the current operating condition of analog input/output, digital input/output and/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 trouble codes and MIL status | ON/OFF |
| 03 | Fuel system control status | — |
| 04 | Calculated engine load value | % |
| 05 | Engine coolant temperature | °C |
| 06 | Short term fuel trim | % |
| 07 | Long term fuel trim | % |
| 0B | Intake manifold absolute pressure | kPa |
| 0C | Engine revolution | rpm |
| 0D | Vehicle speed | km/h |
| 0E | Ignition timing advance | ° |
| 10 | Air flow rate from pressure sensor | g/sec |
| 11 | Throttle valve opening angle | % |
| 13 | Check whether oxygen sensor is installed. | — |
| 14 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1 | V and % |
| 15 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 2 | V and % |
| 1C | On-board diagnosis system | — |

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE $01).

## 3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refers to data denoting the operating condition when trouble is sensed by the 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 | Trouble code that caused CARB required freeze frame data storage | — |
| 03 | Fuel system control status | — |
| 04 | Calculated engine load value | % |
| 05 | Engine coolant temperature | °C |
| 06 | Short term fuel trim | % |
| 07 | Long term fuel trim | % |
| 0B | Intake manifold absolute pressure | kPa |
| 0C | Engine revolution | rpm |
| 0D | Vehicle speed | km/h |

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

## 4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE)

Refer to Read Diagnostic Trouble Code for information about data denoting emission-related powertrain diagnostic trouble codes. <Ref. to EN(SOHC)-39, Read Diagnostic Trouble Code.>

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

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

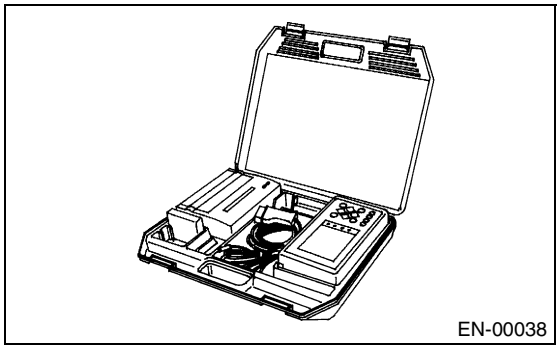
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

# 10.Subaru Select Monitor

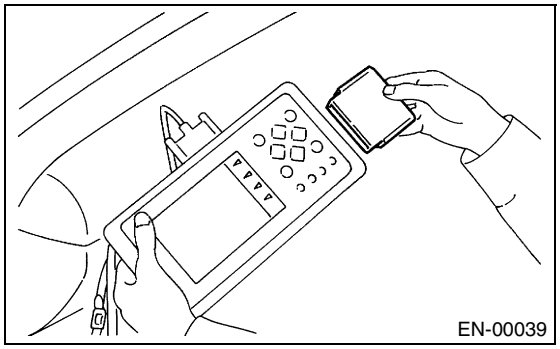
## A: OPERATION

### 1. HOW TO USE SUBARU SELECT MONITOR

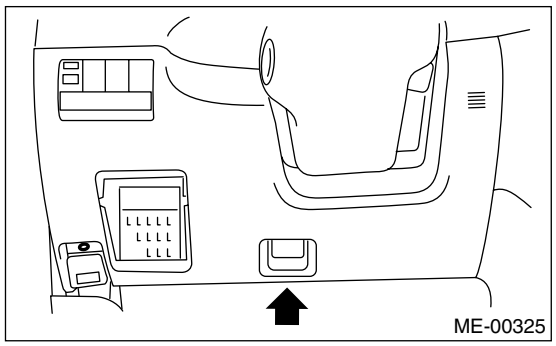
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>




2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>



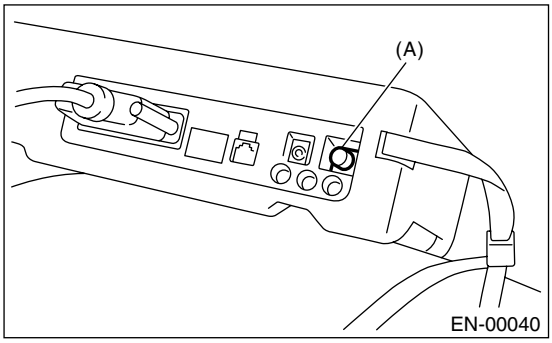

4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).




(2) Connect the diagnosis cable to data link connector.

**CAUTION:**
**Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.**

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.




(A) Power switch

6) Using the Subaru Select Monitor, call up diagnostic trouble code(s) and various data, then record them.

### 2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (NORMAL MODE)

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(SOHC)-39, Read Diagnostic Trouble Code.>

### 3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE)

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to EN(SOHC)-39, Read Diagnostic Trouble Code.>

## 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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display 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.

| Contents | Display | Unit of measure |
|---|---|---|
| Battery voltage | Battery Voltage | V |
| Vehicle speed signal | Vehicle Speed | km/h or MPH |
| Engine speed signal | Engine Speed | rpm |
| Engine coolant temperature signal | Coolant Temp. | °C or °F |
| Ignition timing signal | Ignition Timing | deg |
| Throttle position signal | Throttle Opening Angle | % |
| Throttle position signal | Throttle Sensor Voltage | V |
| Injection pulse width | Fuel Injection #1 Pulse | ms |
| Idle air control signal | ISC Valve Step | STEP |
| Engine load data | Engine Load | % |
| Front oxygen (A/F) sensor resistance | A/F Sensor #1 Resistance | Ohm |
| Front oxygen (A/F) sensor output signal | A/F Sensor #1 | — |
| Rear oxygen sensor output signal | Rear $O_2$ Sensor | V |
| Short term fuel trim | A/F Correction #1 | % |
| Knock sensor signal | Knocking Correction | deg |
| Atmospheric absolute pressure signal | Atmosphere Pressure | mmHg or kPa or inHg or psi |
| Intake manifold relative pressure signal | Mani. Relative Pressure | mmHg or kPa or inHg or psi |
| Intake manifold absolute pressure signal | Mani. Absolute Pressure | mmHg or kPa or inHg or psi |
| A/F correction (short term fuel trim) by rear oxygen sensor | A/F Correction #3 | % |
| Long term whole fuel trim | A/F Learning #1 | % |
| Front oxygen (A/F) sensor heater current | Front $O_2$ Heater #1 | A |
| Rear oxygen sensor heater current | Rear $O_2$ Heater Current | A |
| Canister purge control solenoid valve duty ratio | CPC Valve Duty Ratio | % |
| Fuel level signal | Fuel Level | V |
| Intake air temperature signal | Intake Air Temp. | °C or °F |
| Learned ignition timing | Learned Ignition Timing | deg |
| EGR signal | EGR step | STEP |
| Ignition switch signal | Ignition Switch | ON or OFF |
| Test mode connector signal | Test Mode Signal | ON or OFF |
| Neutral position switch signal | Neutral Position Switch | ON or OFF |
| Air conditioning switch signal | A/C Switch | ON or OFF |
| Air conditioning signal | A/C Compressor Signal | ON or OFF |
| Radiator main fan relay signal | Radiator Fan Relay #1 | ON or OFF |
| Fuel pump relay signal | Fuel Pump Relay | ON or OFF |
| Knocking signal | Knocking Signal | ON or OFF |
| Radiator sub fan relay signal | Radiator Fan Relay #2 | ON or OFF |
| Power steering switch signal | P/S Switch | ON or OFF |
| Engine torque control signal #1 | Torque Control Signal #1 | ON or OFF |

| Contents | Display | Unit of measure |
|---|---|---|
| Engine torque control signal #2 | Torque Control Signal #2 | ON or OFF |
| Engine torque control permission signal | Torque Permission Signal | ON or OFF |
| Rear oxygen sensor rich signal | Rear $O_2$ Rich Signal | ON or OFF |
| Starter switch signal | Starter Switch Signal | ON or OFF |
| Idle switch signal | Idle Switch Signal | ON or OFF |
| Crankshaft position sensor signal | Crankshaft Position Sig. | ON or OFF |
| Camshaft position sensor signal | Camshaft Position Sig. | ON or OFF |
| Rear defogger switch signal | Rear Defogger Switch | ON or OFF |
| Blower fan switch signal | Blower Fan Switch | ON or OFF |
| Small light switch signal | Light Switch | ON or OFF |
| AT vehicle ID signal | AT Vehicle ID Signal | ON or OFF |
| A/C middle pressure switch signal | A/C Mid Pressure Switch | ON or 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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
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 press the [YES] key.
6) On the «Data Display Menu» display 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.

| Contents | Display | Unit of measure |
|---|---|---|
| Number of diagnosis code | Number of Diagnosis Code | — |
| Malfunction indicator lamp status | MI (MIL) | ON or OFF |
| Monitoring test of misfire | Misfire monitoring | Complete or incomplete |
| Monitoring test of fuel system | Fuel system monitoring | Complete or incomplete |
| Monitoring test of comprehensive component | Component monitoring | Complete or incomplete |
| Test of catalyst | Catalyst Diagnosis | Complete or incomplete |
| Test of heated catalyst | Heated catalyst | No support |
| Test of evaporative emission purge control system | Evaporative purge system | Complete or incomplete |
| 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 or incomplete |
| Test of oxygen sensor heater | $O_2$ Heater Diagnosis | Complete or incomplete |
| Test of EGR system | EGR system | — |
| Air fuel ratio control system for bank 1 | Fuel System for Bank 1 | — |
| Engine load data | Calculated load value | % |
| 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 or kPa or inHg or psi |
| Engine speed signal | Engine Speed | rpm |
| Vehicle speed signal | Vehicle Speed | km/h or MPH |
| Ignition timing advance for #1 cylinder | Ignition timing adv. #1 | ° |
| Intake air temperature signal | Intake Air Temp. | °C or °F |
| Intake air amount | Mass Air Flow | g/s |
| Throttle position signal | Throttle Opening Angle | % |
| Rear oxygen sensor output signal | Oxygen Sensor #12 | V |
| Air fuel ratio correction by rear oxygen sensor | Short term fuel trim #12 | % |
| On-board diagnostic system | OBD System | — |
| Oxygen sensor #11 | Oxygen sensor #11 | Support |
| Oxygen sensor #12 | Oxygen sensor #12 | Support |
| A/F sensor #11 | A/F sensor #11 | — |

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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
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.

| Contents | Display | Unit of measure |
|---|---|---|
| Diagnostic trouble code (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 or kPa or inHg or psi |
| Engine speed signal | Engine Speed | rpm |
| Vehicle speed signal | Vehicle Speed | km/h or MPH |

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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» 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.

| Contents | Display | Message | LED “ON” requirements |
|---|---|---|---|
| Ignition switch signal | Ignition Switch | ON or OFF | When ignition switch is turned ON. |
| Test mode connector signal | Test Mode Signal | ON or OFF | When test mode connector is connected. |
| Neutral position switch signal | Neutral Position Switch | ON or OFF | When neutral position signal is entered. |
| Air conditioning switch signal | A/C Switch | ON or OFF | When air conditioning switch is turned ON. |
| Air conditioning relay signal | A/C Relay | ON or OFF | When air conditioning relay is in function. |
| Radiator main fan relay signal | Radiator Fan Relay #1 | ON or OFF | When radiator main fan relay is in function. |
| Fuel pump relay signal | Fuel Pump Relay | ON or OFF | When fuel pump relay is in function. |
| Knocking signal | Knocking Signal | ON or OFF | When knocking signal is entered. |
| Radiator sub fan relay signal | Radiator Fan Relay #2 | ON or OFF | When radiator sub fan relay is in function. |
| Engine torque control signal #1 | Torque Control Signal #1 | ON or OFF | When engine torque control signal 1 is entered. |
| Engine torque control signal #2 | Torque Control Signal #2 | ON or OFF | When engine torque control signal 2 is entered. |
| Engine torque control permission signal | Torque Control Permit | ON or OFF | When engine torque control permission signal is entered. |
| Front oxygen (A/F) sensor rich signal | Front $O_2$ Rich Signal #1 | ON or OFF | When front oxygen (A/F) sensor mixture ratio is rich. |
| Rear oxygen sensor rich signal | Rear $O_2$ Rich Signal | ON or OFF | When rear oxygen sensor mixture ratio is rich. |
| Starter switch signal | Starter Switch Signal | ON or OFF | When starter switch signal is entered. |
| Idle switch signal | Idle Switch Signal | ON or OFF | When idle switch signal is entered. |
| Crankshaft position sensor signal | Crankshaft Position Sig. | ON or OFF | When crankshaft position sensor signal is entered. |
| Camshaft position sensor signal | Camshaft Position Sig. | ON or OFF | When camshaft position sensor signal is entered. |

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

## 8. READ CURRENT DATA FOR AT.

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 {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of transmission type.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display 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.

| Contents | Display | Unit of measure |
|---|---|---|
| Battery voltage | Battery Voltage | V |
| Rear vehicle speed sensor signal | Vehicle Speed #1 | km/h or MPH |
| Front vehicle speed sensor signal | Vehicle Speed #2 | km/h or MPH |
| Engine speed signal | Engine Speed | rpm |
| Automatic transmission fluid temperature signal | ATF Temp. | °C or °F |
| Throttle position signal | Throttle Sensor Voltage | V |
| Gear position | Gear Position | — |
| Line pressure control duty ratio | Line Pressure Duty Ratio | % |
| Lock up clutch control duty ratio | Lock Up Duty Ratio | % |
| Transfer clutch control duty ratio | Transfer Duty Ratio | % |
| Power supply for throttle position sensor | Throttle Sensor Power | V |
| Torque converter turbine speed signal | AT Turbine Speed | rpm |
| 2-4 brake timing pressure control duty ratio | 2-4B Duty Ratio | % |
| Intake manifold pressure sensor voltage | Mani. Pressure Voltage | V |
| 2 wheel drive switch signal | 2WD Switch | ON or OFF |
| Kick down switch signal | Kick Down Switch | ON or OFF |
| Stop lamp switch signal | Stop Lamp Switch | ON or OFF |
| Anti lock brake system signal | ABS Signal | ON or OFF |
| Cruise control system signal | Cruise Control Signal | ON or OFF |
| Neutral/Parking range signal | N/P Range Signal | ON or OFF |
| Reverse range signal | R Range Signal | ON or OFF |
| Drive range signal | D Range Signal | ON or OFF |
| 3rd range signal | 3rd Range Signal | ON or OFF |
| 2nd range signal | 2nd Range Signal | ON or OFF |
| 1st range signal | 1st Range Signal | ON or OFF |
| Shift control solenoid A | Shift Solenoid #1 | ON or OFF |
| Shift control solenoid B | Shift Solenoid #2 | ON or OFF |
| Torque control output signal #1 | Torque Control Signal #1 | ON or OFF |
| Torque control output signal #2 | Torque Control Signal #2 | ON or OFF |
| Torque control cut signal | Torque Control Cut Sig. | ON or OFF |
| 2-4 brake timing control solenoid valve | 2-4 Brake Timing Sol. | ON or OFF |
| Low clutch timing control solenoid valve | Low Clutch Timing Sol. | ON or OFF |
| Automatic transmission diagnosis indicator lamp | AT Diagnosis Lamp | ON or OFF |

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

# 11. Read Diagnostic Trouble Code

## 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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
4) On the «Engine Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
5) On the «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>

### 2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
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 {Diagnosis Code(s) Display} and press the [YES] key.
6) Make sure that a diagnostic trouble code (DTC) is shown on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>

### 3. OBD-II GENERAL SCAN TOOL

Refers to data denoting emission-related powertrain diagnostic trouble codes.
For details concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related powertrain diagnostic trouble codes (MODE $03).

# 12.Inspection Mode

## A: OPERATION

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(SOHC)-45, Drive Cycle.>

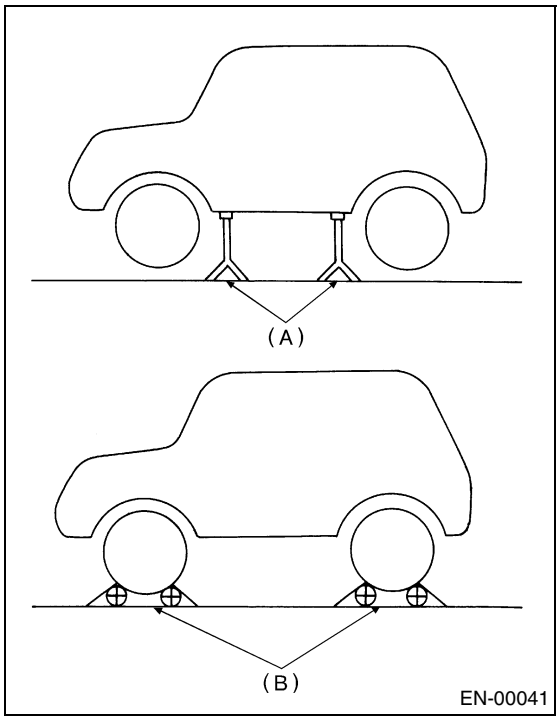
| DTC No. | Item |
|---|---|
| P0031 | HO2S Heater Control Circuit Low (Bank 1 Sensor 1) |
| P0032 | HO2S Heater Control Circuit High (Bank 1 Sensor 1) |
| P0037 | HO2S Heater Control Circuit Low (Bank 1 Sensor 2) |
| P0038 | HO2S Heater Control Circuit High (Bank 1 Sensor 2) |
| P0068 | Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance |
| P0107 | Manifold Absolute Pressure/Barometric Pressure Circuit Low Input |
| P0108 | Manifold Absolute Pressure/Barometric Pressure Circuit High Input |
| P0112 | Intake Air Temperature Circuit Low Input |
| P0113 | Intake Air Temperature Circuit High Input |
| P0117 | Engine Coolant Temperature Circuit Low Input |
| P0118 | Engine Coolant Temperature Circuit High Input |
| P0122 | Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input |
| P0123 | Throttle/Pedal Position Sensor/Switch “A” Circuit High Input |
| P0129 | Barometric Pressure Too Low |
| P0131 | $O_2$ Sensor Circuit Low Voltage (Bank 1 Sensor 1) |
| P0132 | $O_2$ Sensor Circuit High Voltage (Bank 1 Sensor 1) |
| P0134 | $O_2$ Sensor Circuit No Activity Detected (Bank 1 Sensor 1) |
| P0137 | $O_2$ Sensor Circuit Low Voltage (Bank 1 Sensor 2) |
| P0138 | $O_2$ Sensor Circuit High Voltage (Bank 1 Sensor 2) |
| P0327 | Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor) |
| P0328 | Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor) |
| P0335 | Crankshaft Position Sensor “A” Circuit |
| P0336 | Crankshaft Position Sensor “A” Circuit Range/Performance |
| P0340 | Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor) |
| P0341 | Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor) |
| P0458 | Evaporative Emission Control System Purge Control Valve Circuit Low |
| P0462 | Fuel Level Sensor Circuit Low Input |
| P0463 | Fuel Level Sensor Circuit High Input |
| P0502 | Vehicle Speed Sensor Circuit Low Input |
| P0503 | Vehicle Speed Sensor Circuit High Input |
| P0512 | Starter Request Circuit |
| P0513 | Incorrect immobilizer key |
| P0519 | Idle Control System Malfunction (Fail-safe) |
| P0565 | Cruise Control Set Signal Circuit Malfunction for AT |
| P0604 | Internal Control Module Random Access Memory (RAM) Error |
| P0703 | Torque Converter/Brake Switch “B” Circuit |
| P0705 | Transmission Range Sensor Circuit (PRNDL Input) |
| P0710 | Transmission Fluid Temperature Sensor Circuit |
| P0716 | Input/Turbine Speed Sensor Circuit |
| P0720 | Output Speed Sensor Circuit |
| P0726 | Engine Speed Input Circuit |
| P0731 | Gear 1 Incorrect Ratio |
| P0732 | Gear 2 Incorrect Ratio |
| P0733 | Gear 3 Incorrect Ratio |

| DTC No. | Item |
|---|---|
| P0734 | Gear 4 Incorrect Ratio |
| P0741 | Torque Converter Clutch Circuit Performance or Stuck Off |
| P0743 | Torque Converter Clutch Circuit Electrical |
| P0748 | Pressure Control Solenoid “A” Electrical |
| P0753 | Shift Solenoid “A” Electrical |
| P0758 | Shift Solenoid “B” Electrical |
| P0771 | AT Low Clutch Timing Solenoid Valve Circuit Malfunction |
| P0778 | Pressure Control Solenoid “B” Electrical |
| P0785 | Shift/Timing Solenoid |
| P0851 | Neutral Switch Input Circuit Low |
| P0852 | Neutral Switch Input Circuit High |
| P0864 | TCM Communication Circuit Range/Performance |
| P0865 | TCM Communication Circuit Low |
| P0866 | TCM Communication Circuit High |
| P1110 | Atmospheric Pressure Sensor Circuit Malfunction (Low Input) |
| P1111 | Atmospheric Pressure Sensor Circuit Malfunction (High Input) |
| P1492 | EGR Signal Line 1 Circuit (Low) |
| P1493 | EGR Signal Line 1 Circuit (High) |
| P1494 | EGR Signal Line 2 Circuit (Low) |
| P1495 | EGR Signal Line 2 Circuit (High) |
| P1496 | EGR Signal Line 3 Circuit (Low) |
| P1497 | EGR Signal Line 3 Circuit (High) |
| P1498 | EGR Signal Line 4 Circuit (Low) |
| P1499 | EGR Signal Line 4 Circuit (High) |
| P1510 | ISC Solenoid Valve Signal #1 Circuit Malfunction (Low Input) |
| P1511 | ISC Solenoid Valve Signal #1 Circuit Malfunction (High Input) |
| P1512 | ISC Solenoid Valve Signal #2 Circuit Malfunction (Low Input) |
| P1513 | ISC Solenoid Valve Signal #2 Circuit Malfunction (High Input) |
| P1514 | ISC Solenoid Valve Signal #3 Circuit Malfunction (Low Input) |
| P1515 | ISC Solenoid Valve Signal #3 Circuit Malfunction (High Input) |
| P1516 | ISC Solenoid Valve Signal #4 Circuit Malfunction (Low Input) |
| P1517 | ISC 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 (Except Antenna Circuit) |
| P1574 | Key Communication Failure |
| P1576 | EGI Control Module EEPROM |
| P1577 | IMM Control Module EEPROM |
| P1698 | Engine Torque Control Cut Signal Circuit Malfunction (Low Input) |
| P1699 | Engine Torque Control Cut Signal Circuit Malfunction (High Input) |
| P1700 | Throttle Position Sensor Circuit Malfunction for AT |
| P1711 | Engine Torque Control Signal #1 Circuit Malfunction |
| P1712 | Engine Torque Control Signal #2 Circuit Malfunction |

## 1. PREPARATION FOR THE INSPECTION MODE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)] and the battery voltage is 12 V or more.
2) Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

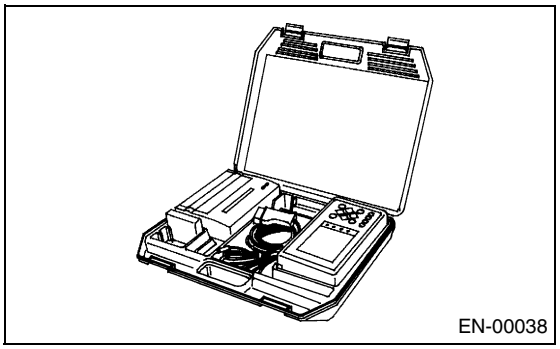
**WARNING:**
**• Before raising the vehicle, ensure the parking brake is applied.**
**• Do not use a pantograph jack in place of a safety stand.**
**• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.**
**• Do not abruptly depress/release the clutch pedal or accelerator pedal during works even when 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 safety stands and the 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.**



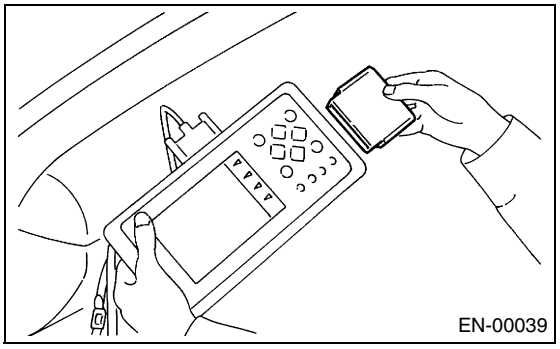

(A) Safety stand
(B) Free rollers

## 2. SUBARU SELECT MONITOR

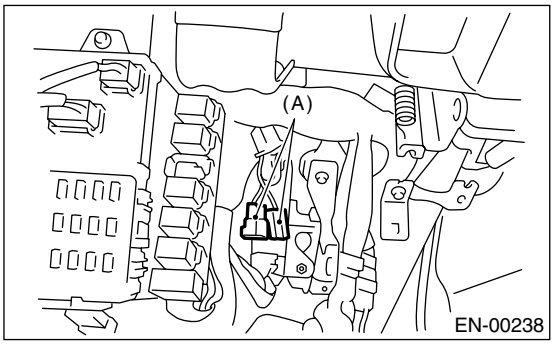
1) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(SOHC)-47, Clear Memory Mode.>
2) Warm up the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>




4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>

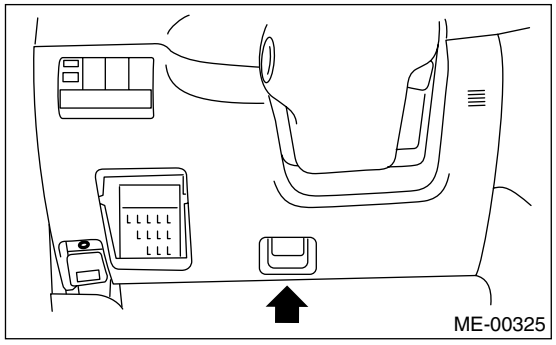



6) Connect the test mode connector (A) at the lower portion of instrument panel (on the driver's side).



7) Connect the Subaru Select Monitor to data link connector.

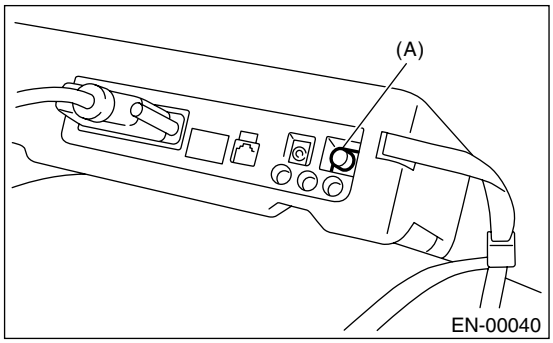
(1) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).




(2) Connect the diagnosis cable to data link connector.

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

8) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.




(A) Power switch

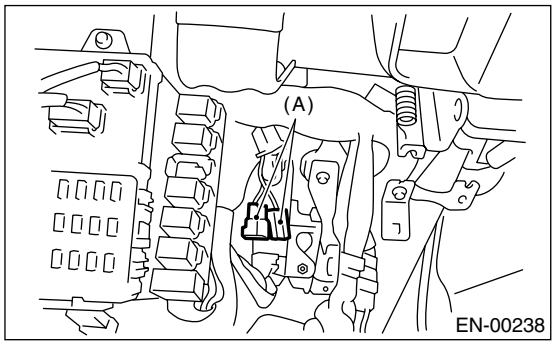
9) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
11) Press the [YES] key after displayed the information of engine type.
12) On the «Engine Diagnosis» display screen, select the {Dealer Check Mode Procedure} and press the [YES] key.
13) When the “Perform Inspection (Dealer Check) Mode?” is shown on the display screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.

• If trouble still remains in the memory, the corresponding diagnostic trouble code (DTC) appears on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning the diagnostic trouble codes (DTCs), refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light either 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.

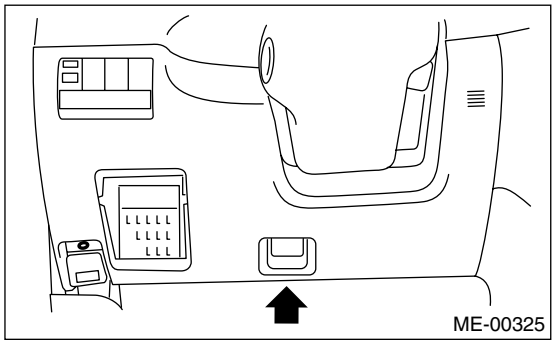
## 3. OBD-II GENERAL SCAN TOOL

1) After performing the diagnostics and clearing memory, check for any remaining unresolved trouble data: <Ref. to EN(SOHC)-47, Clear Memory Mode.>
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower side of instrument panel (on the driver's side).




4) Connect the OBD-II general scan tool to its data link connector in the lower portion of instrument panel (on the driver's side).

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




5) Start the engine.

NOTE:
• Ensure the selector lever is placed in “P” position before starting. (AT vehicles)
• Depress the clutch pedal when starting engine. (MT vehicles)

6) Using the selector 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 vehicles)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the selector lever or shift lever in “D” position (AT vehicles) or “1st” gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may light 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 OBD-II general scan tool, check for diagnostic trouble code(s) (DTC(s)) and record the result(s).

NOTE:
• For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.
• For detailed concerning diagnostic trouble codes, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(SOHC)-75, List of Diagnostic Trouble Code (DTC).>

# 13.Drive Cycle

## A: OPERATION

There are three 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 THE DRIVE CYCLE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) After performing the diagnostics and cleaning memory, check for any remaining unresolved trouble data. <Ref. to EN(SOHC)-47, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Except for the water temperature specified items at starting, the diagnosis is carried out after engine warm up.
• Carry out the diagnosis which is marked * on DTC twice, then, after finishing first diagnosis, stop the engine and do second time at the same condition.

### 2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

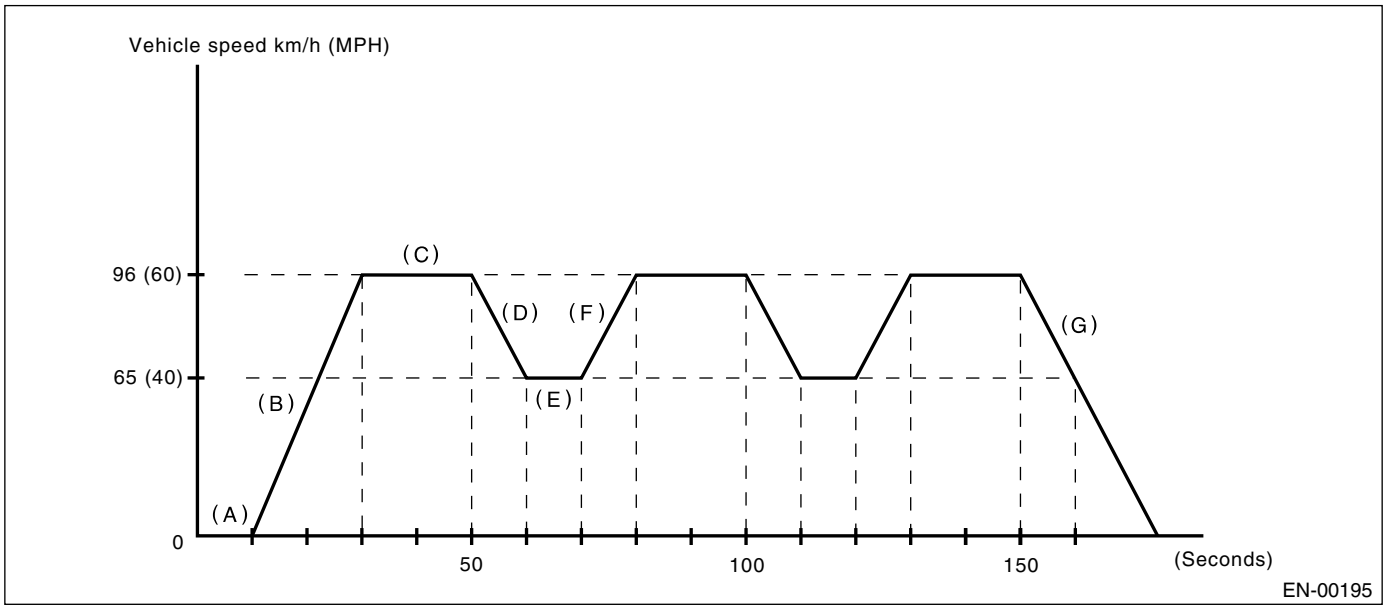
| DTC No. | Item | Condition |
|---|---|---|
| *P0030 | HO2S Heater Control Circuit Range/Performance (Bank 1 Sensor 1) | — |
| *P0111 | Intake Air Temperature Circuit Range/Performance | Coolant temperature at start is less than 30°C (86°F). |
| *P0125 | Insufficient Coolant Temperature for Closed Loop Fuel Control | Coolant temperature at start is less than 20°C (68°F). |
| *P0130 | $O_2$ Sensor Circuit (Bank 1 Sensor 1) | — |
| *P0133 | $O_2$ Sensor Circuit Slow Response (Bank 1 Sensor 1) | — |
| *P0420 | Catalyst System Efficiency Below Threshold (Bank 1) | — |
| P0459 | Evaporative Emission Control System Purge Control Valve Circuit High | — |
| *P0461 | Fuel Level Sensor Performance Problem (Travel Distance) | — |
| *P0464 | Fuel Level Sensor Circuit Intermittent | — |
| *P1137 | $O_2$ Sensor Circuit (Bank1 Sensor1) | — |

## 3. IDLE FOR 10 MINUTES

NOTE:
Before the diagnosis, drive the vehicle at 4 km/h (6 MPH) or more.

| DTC No. | Item | Condition |
|---|---|---|
| *P0483 | Cooling Fan Rationality Check | — |
| *P0506 | Idle Control System RPM Lower Than Expected | — |
| *P0507 | Idle Control System RPM Higher Than Expected | — |

## 4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN




(A) Idle engine for 1 minute.
(B) Accelerate to 97 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate with fully closed throttle to 64 km/h (40 MPH).
(E) Drive vehicle at 64 km/h (40 MPH) for 10 seconds.
(F) Accelerate to 97 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.Stop vehicle with throttle fully closed.Stop vehicle with throttle fully closed.

| DTC No. | Item | Condition |
|---|---|---|
| *P0121 | Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance | — |
| *P0139 | $O_2$ Sensor Circuit Slow Response (Bank 1 Sensor 2) | — |
| *P0171 | System too Lean (Bank 1) | — |
| *P0172 | System too Rich (Bank 1) | — |
| *P0301 | Cylinder 1 Misfire Detected | — |
| *P0302 | Cylinder 2 Misfire Detected | — |
| *P0303 | Cylinder 3 Misfire Detected | — |
| *P0304 | Cylinder 4 Misfire Detected | — |
| *P0400 | Exhaust gas recirculation flow | — |

# 14.Clear Memory Mode

## A: OPERATION

### 1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
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 Subaru Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.
• 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 {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of engine type.
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 {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
7) Turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

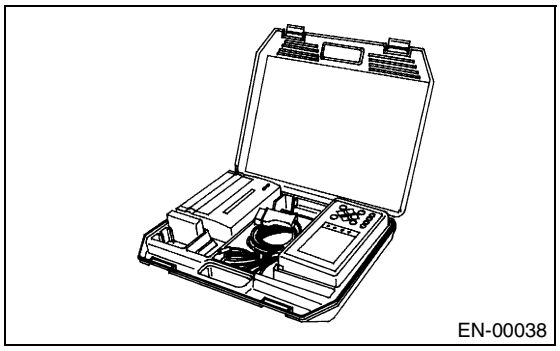
### 3. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.
After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.

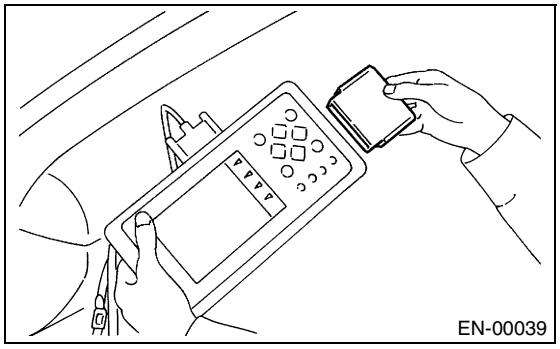
# 15.Compulsory Valve Operation Check Mode

## A: OPERATION

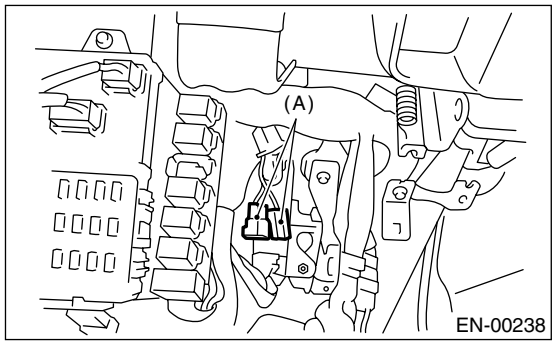
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>




2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(SOHC)-8, PREPARATION TOOL, General Description.>

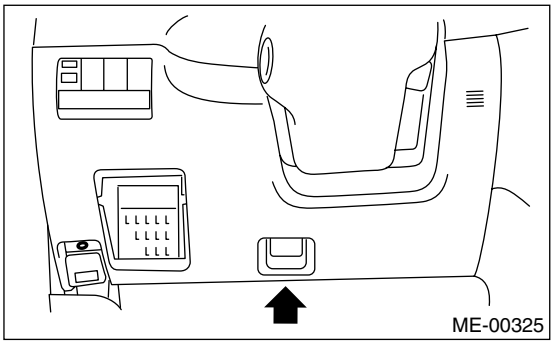



4) Connect the test mode connector (A) at the lower portion of instrument panel (on the driver's side).




5) Connect the Subaru Select Monitor to data link connector.

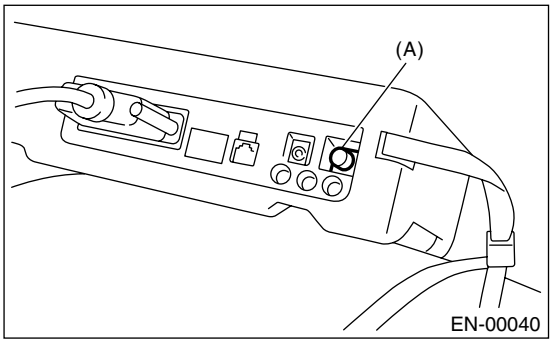
(1) Connect Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).




(2) Connect the diagnosis cable to data link connector.

**CAUTION:**
**Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.**

6) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.




(A) Power switch

7) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
9) Press the [YES] key after displayed the information of engine type.
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 compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.
13) Pressing the [NO] key completes the compulsory 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.

| Contents | Display |
|---|---|
| Compulsory fuel pump relay operation check | Fuel Pump Relay |
| 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 because they are not installed on the vehicle.

| Display |
|---|
| EGR Solenoid Valve |
| ASV Solenoid Valve |
| PCV Solenoid Valve |
| Vent Control Solenoid Valve |
| FICD Solenoid |
| Pressure Switching Sol. 1 |
| Pressure Switching Sol. 2 |
| Fuel Tank Sensor Control Valve |

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

# 16.Engine Malfunction Indicator Lamp (MIL)

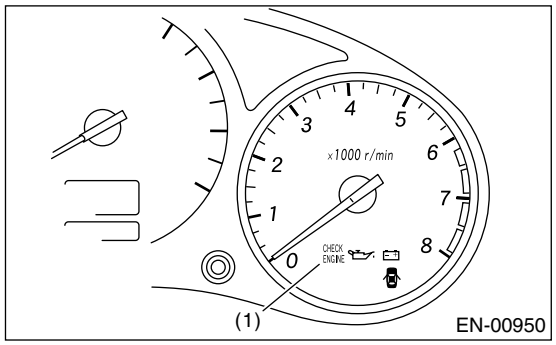
## A: PROCEDURE

| |
|---|
| 1. Activation of check engine malfunction indicator lamp (MIL). <Ref. to EN(SOHC)-51, ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL), Engine Malfunction Indicator Lamp (MIL).> |
| ↓ |
| 2. Check engine malfunction indicator lamp (MIL) does not come on. <Ref. to EN(SOHC)-52, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).> |
| ↓ |
| 3. Check engine malfunction indicator lamp (MIL) does not go off. <Ref. to EN(SOHC)-55, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF., Engine Malfunction Indicator Lamp (MIL).> |
| ↓ |
| 4. Check engine malfunction indicator lamp (MIL) does not blink at a cycle of 3 Hz. <Ref. to EN(SOHC)-56, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).> |
| ↓ |
| 5. Check engine malfunction indicator lamp (MIL) remains blinking at a cycle of 3 Hz. <Ref. to EN(SOHC)-58, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ., Engine Malfunction Indicator Lamp (MIL).> |

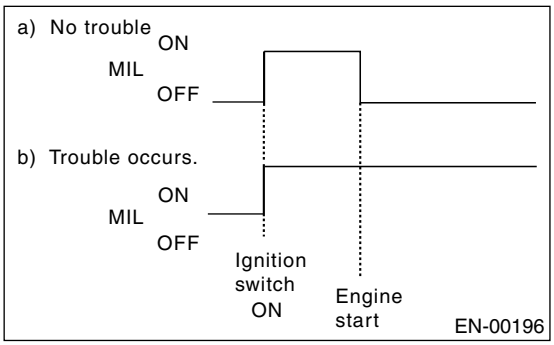
## B: ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

1) When the ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) (1) in the combination meter illuminates.

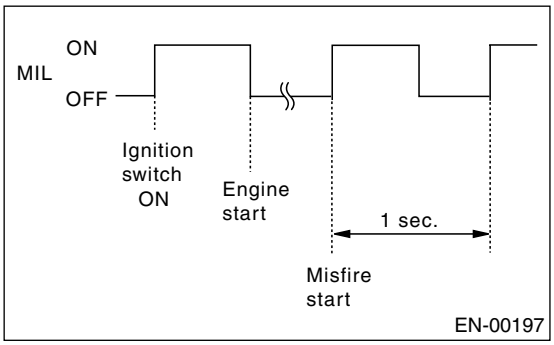
NOTE:
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to EN(SOHC)-52, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).>



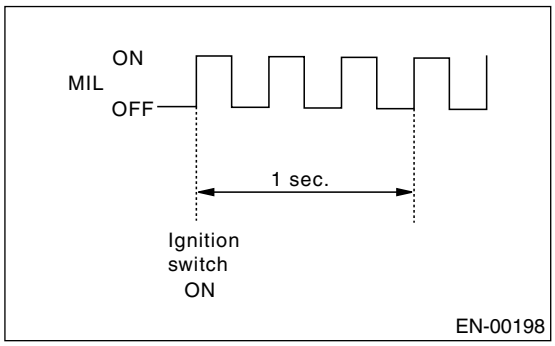

2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.




3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.

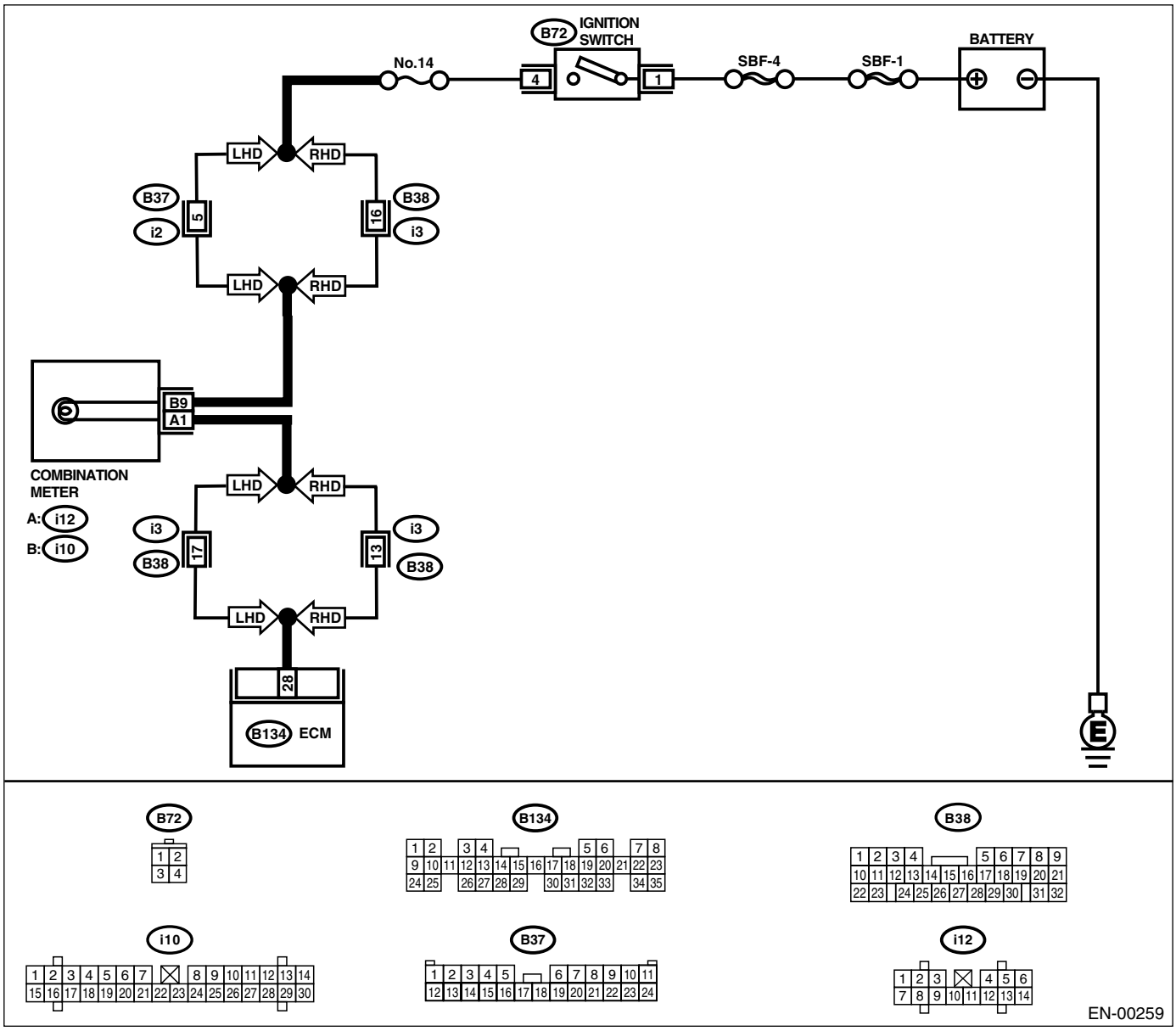



4) When the ignition switch is turned to ON (engine off) or to “START” with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



## C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- **TROUBLE SYMPTOM:**
  - When the ignition switch is turned ON (engine OFF), MIL does not come on.
- **WIRING DIAGRAM:**



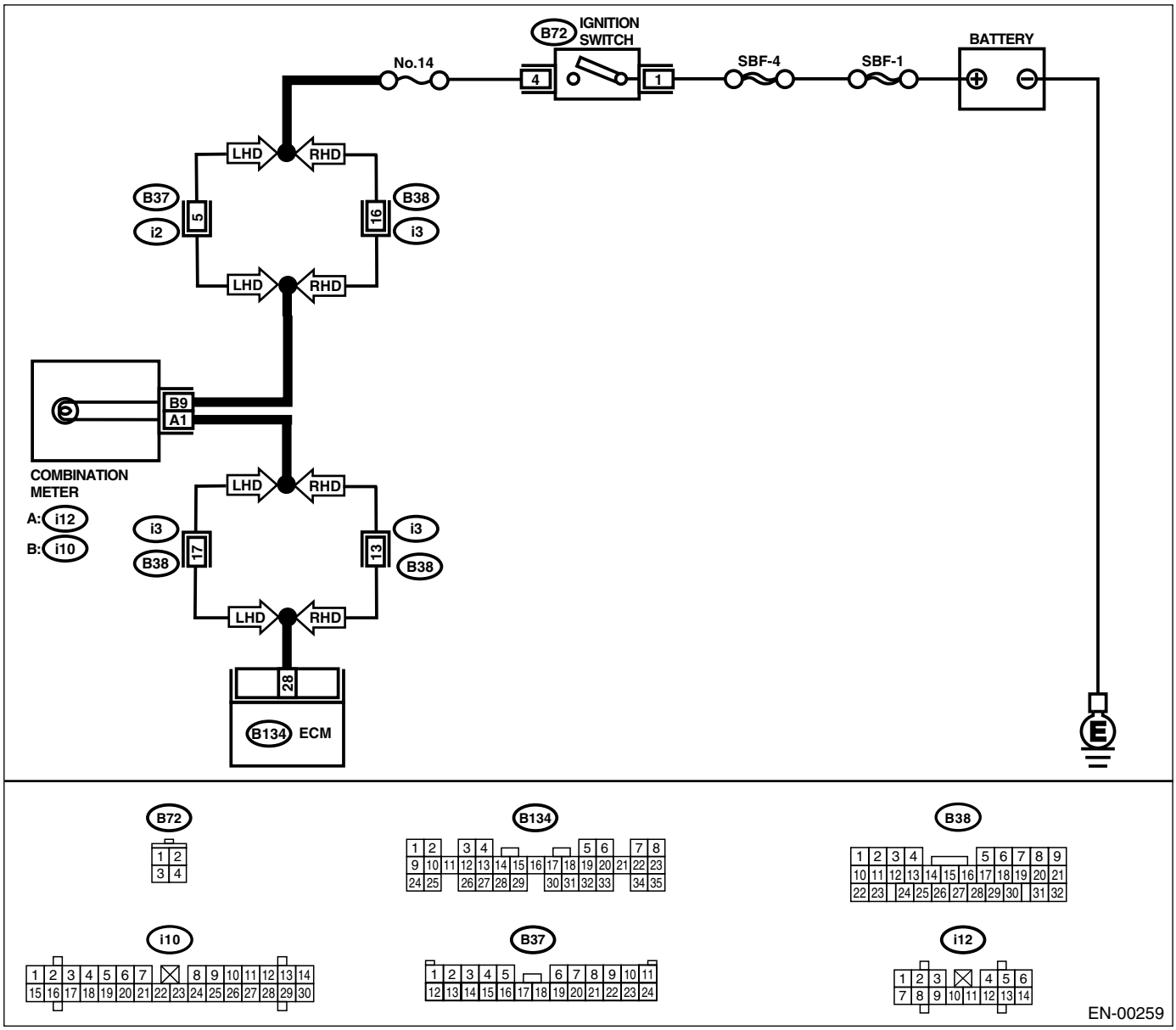

| Step | | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK OUTPUT SIGNAL FROM ECM.**<br>1)Turn the ignition switch to ON.<br>2)Measure the voltage between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B134) No. 28 (+) — Chassis ground (–):***<br>Is the measured value less than specified value? | 1 V | Go to step **4.** | Go to step **2.** |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 2 | **CHECK POOR CONTACT.**<br>Does the MIL illuminate when shaking or pulling ECM connector and harness? | MIL illuminates. | Repair poor contact in ECM connector. | Go to step **3.** |
| 3 | **CHECK ECM CONNECTOR.**<br>Is the ECM connector correctly connected? | Correctly connected. | Replace the ECM. <Ref. to FU(SOHC)-46, Engine Control Module.> | Repair connection of ECM connector. |
| 4 | **CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Remove the combination meter. <Ref. to IDI-12, Combination Meter Assembly.><br>3)Disconnect the connector from ECM and combination meter.<br>4)Measure the resistance of harness between ECM and combination meter connector.<br>***Connector & terminal***<br>***(B134) No. 28 — (i12) No. 1:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **5.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between ECM and combination meter connector<br>• Poor contact in coupling connector |
| 5 | **CHECK POOR CONTACT.**<br>Check poor contact in combination meter connector.<br>Is there poor contact in combination meter connector? | Poor contact occurs. | Repair poor contact in combination meter connector. | Go to step **6.** |
| 6 | **CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.**<br>1)Turn the ignition switch to ON.<br>2)Measure the voltage between combination meter connector and chassis ground.<br>***Connector & terminal***<br>***(i12) No. 9 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **7.** | Check the following and repair if necessary.<br>NOTE:<br>• Broken down ignition relay.<br>• Blown out fuse (No. 5).<br>• If replaced fuse (No. 5) blows easily, check the harness for short circuit of harness between fuse (No. 5) and ignition relay connector.<br>• Open or short circuit in harness between fuse (No. 5) and battery terminal<br>• Open circuit in harness between fuse (No. 5) and ignition relay connector<br>• Poor contact in ignition relay connector<br>• Poor contact in ignition switch connector |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 7 | **CHECK LAMP BULB.**<br>Remove the engine malfunction indicator lamp bulb.<br>Is the lamp bulb condition OK? | Lamp bulb is OK. | Repair combination meter connector. | Replace the lamp bulb. |

## D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF.

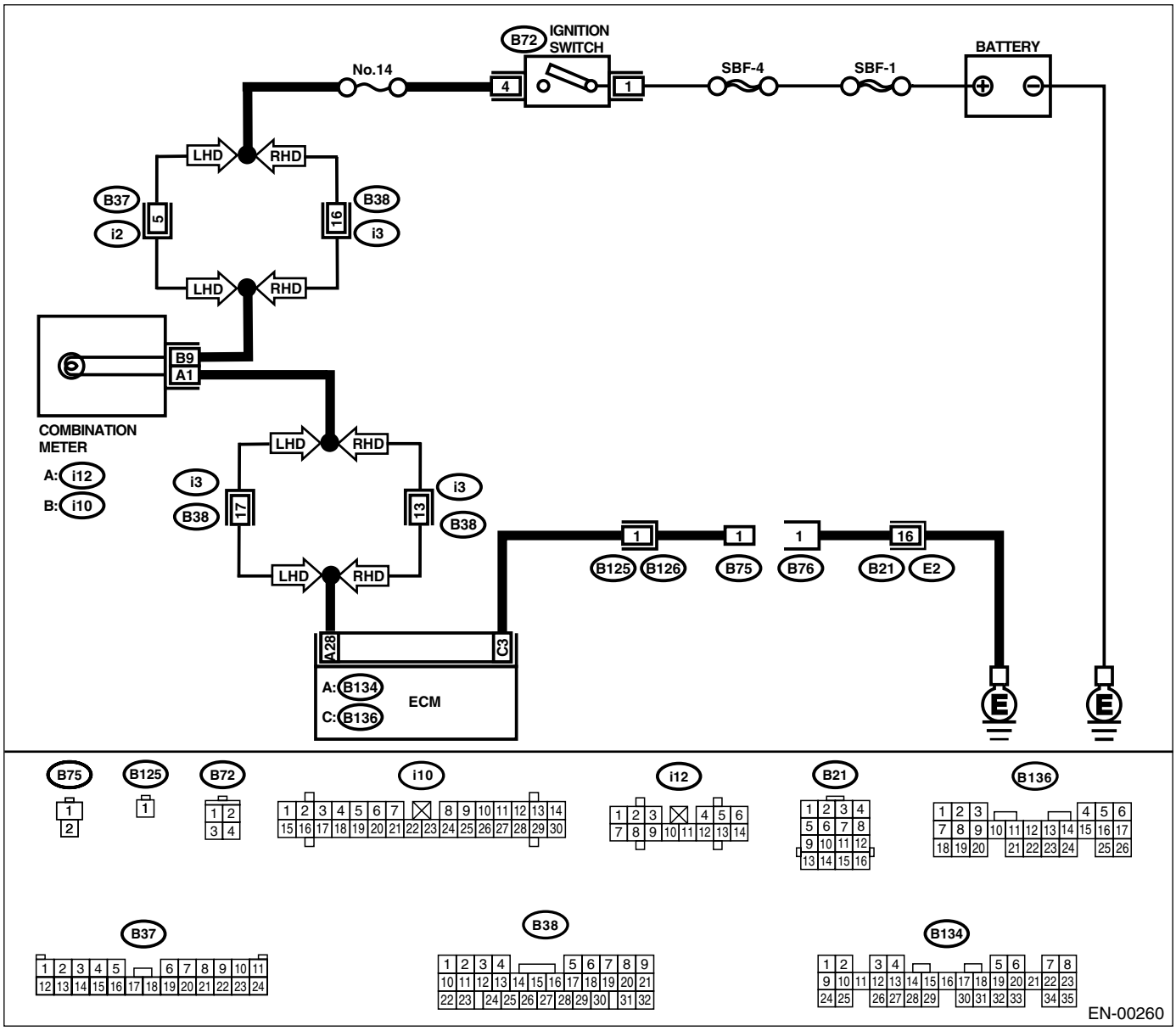
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.
- **TROUBLE SYMPTOM:**
  - Although MIL comes on when the engine runs, trouble code is not shown on the Subaru select monitor or OBD-II general scan tool display.
- **WIRING DIAGRAM:**




| Step | | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ECM.<br>3)Turn the ignition switch to ON.<br>Does the MIL illuminate? | MIL illuminates. | Repair short circuit in harness between combination meter and ECM connector. | Replace the ECM. <Ref. to FU(SOHC)-46, Engine Control Module.> |

## E: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ.

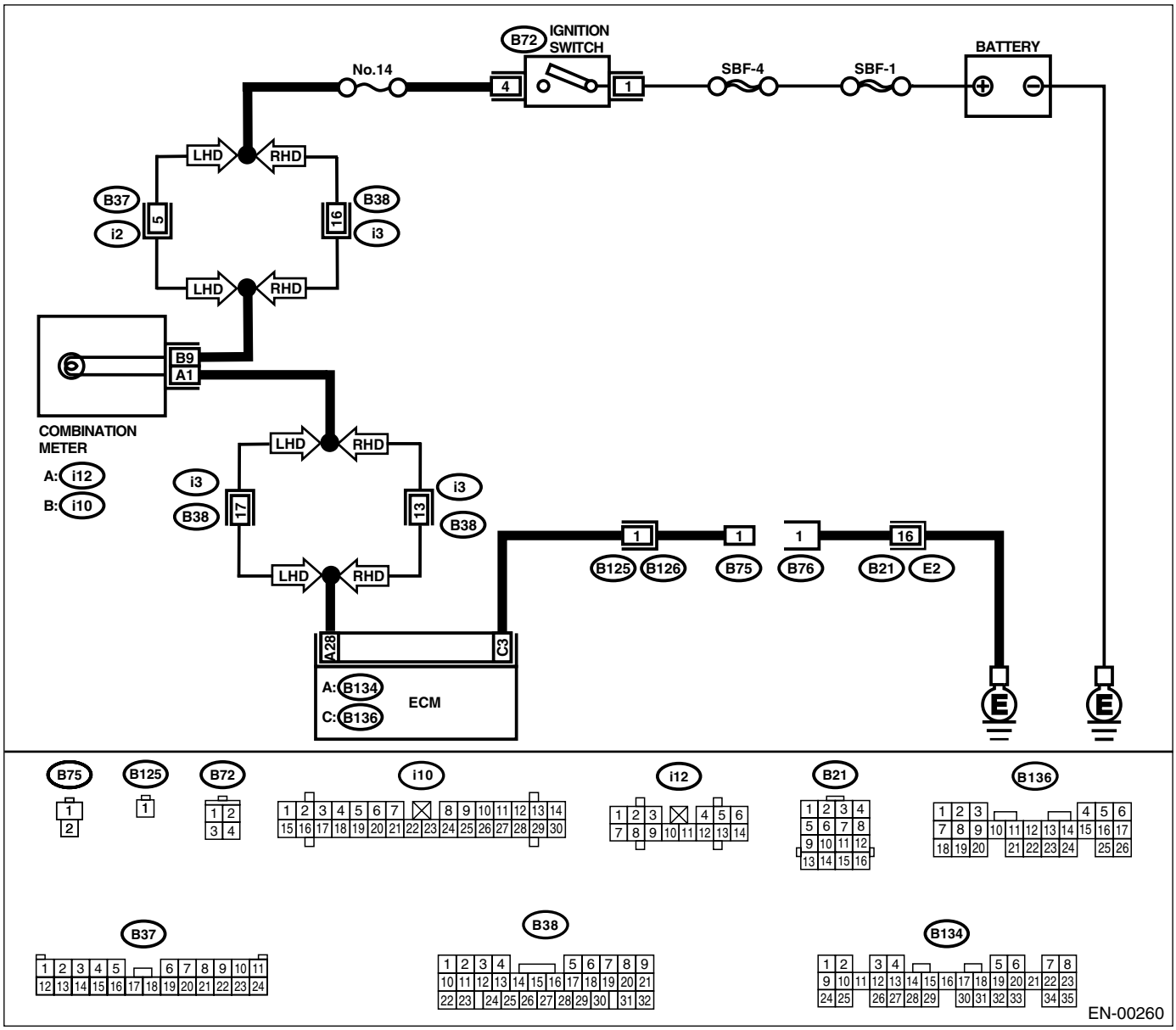
- **DIAGNOSIS:**
  - The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
  - Test mode connector circuit is in open.
- **TROUBLE SYMPTOM:**
  - When in inspection mode, MIL does not blink at a cycle of 3 Hz.
- **WIRING DIAGRAM:**



| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK STATUS OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the test mode connector.<br>3)Turn the ignition switch to ON. (engine OFF)<br>Does the MIL illuminate? | MIL illuminates. | Go to step **2.** | Repair the MIL circuit. <Ref. to EN(SOHC)-52, CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON., Engine Malfunction Indicator Lamp (MIL).> |
| 2 | **CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ECM.<br>3)Turn the ignition switch to ON.<br>Does the MIL illuminate? | MIL illuminates. | Repair ground short circuit in harness between combination meter and ECM connector. | Go to step **3.** |
| 3 | **CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ECM.<br>3)Measure the resistance of harness between test mode connector and chassis ground.<br>***Connector & terminal***<br>***(B76) No. 1 — Chassis ground:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **4.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between test mode connector and chassis ground |
| 4 | **CHECK POOR CONTACT.**<br>Check poor contact in ECM connector.<br>Is there poor contact in ECM connector? | Poor contact occurs. | Repair poor contact in ECM connector. | Go to step **5.** |
| 5 | **CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.**<br>1)Connect the test mode connector.<br>2)Measure the resistance of harness between ECM and chassis ground.<br>***Connector & terminal***<br>***(B136) No. 3 — Chassis ground:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **6.** | Repair open circuit in harness between ECM and test mode connector. |
| 6 | **CHECK POOR CONTACT.**<br>Check poor contact in ECM connector.<br>Is there poor contact in ECM connector? | Poor contact occurs. | Repair poor contact in ECM connector. | Replace the ECM. <Ref. to FU(SOHC)-46, Engine Control Module.> |

## F: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 HZ.

- **DIAGNOSIS:**
  - Test mode connector circuit is shorted.
- **TROUBLE SYMPTOM:**
  - MIL blinks at a cycle of 3 Hz when the ignition switch is turned to ON.
- **WIRING DIAGRAM:**



| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK TEST MODE CONNECTOR.**<br>1)Disconnect the test mode connector.<br>2)Turn the ignition switch to ON.<br>Does the MIL blink? | MIL blinks. | Go to step **2.** | System is in good order.<br>NOTE:<br>MIL blinks at a cycle of 3 Hz when test mode connector is connected. |
| 2 | **CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ECM.<br>3)Measure the resistance of harness between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B136) No. 3 — Chassis ground:***<br>Is the measured value less than specified value? | 5 Ω | Repair short circuit in harness between ECM and test mode connector. | Replace the ECM. <Ref. to FU(SOHC)-46, Engine Control Module.> |

# 17.Diagnostics for Engine Starting Failure

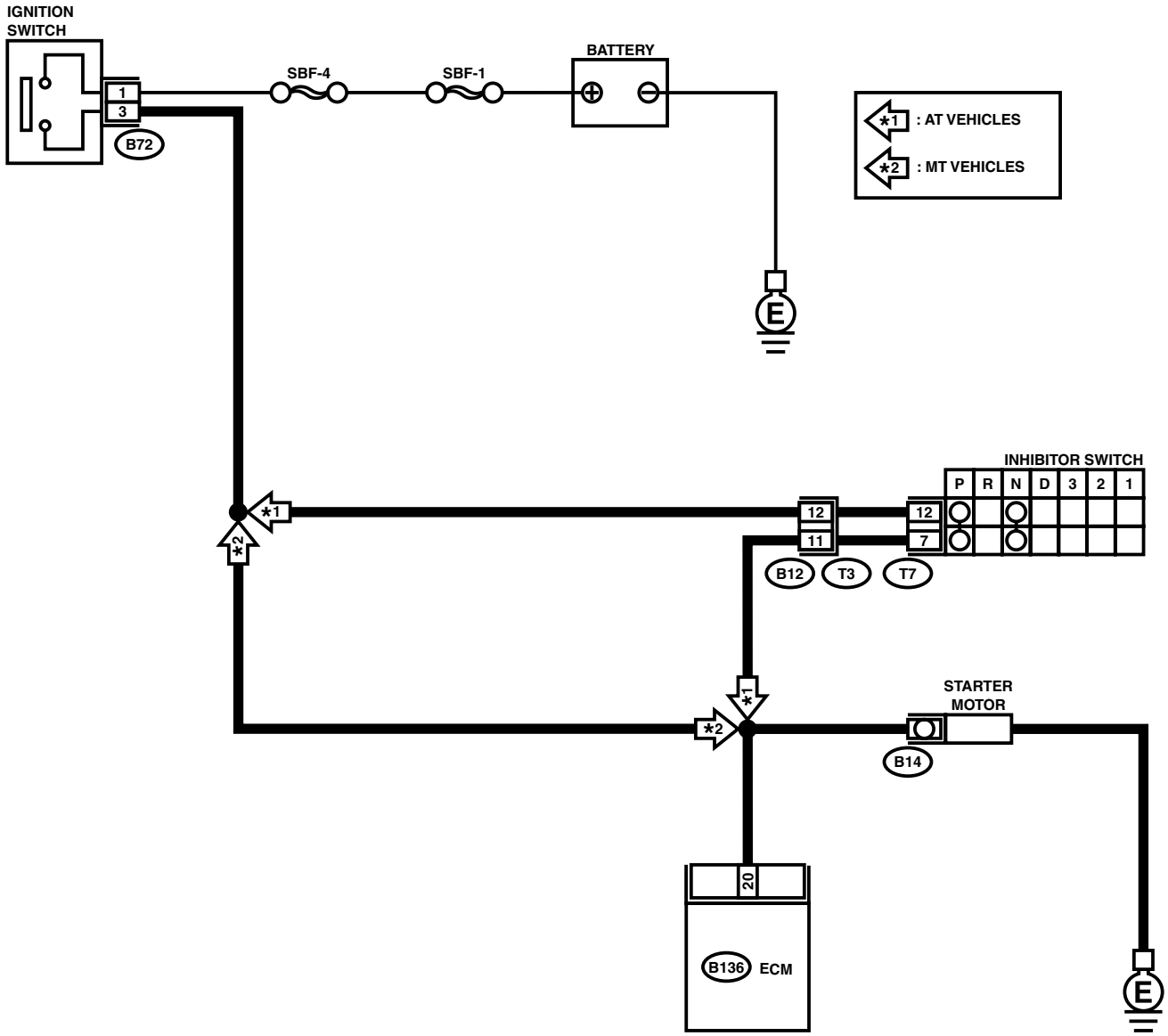
## A: PROCEDURE

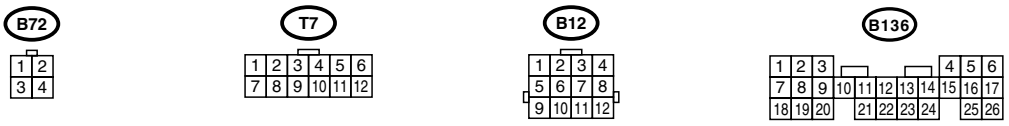
| |
|---|
| 1. Inspection of starter motor circuit. <Ref. to EN(SOHC)-61, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.> |
| ↓ |
| 2. Inspection of ECM power supply and ground line. <Ref. to EN(SOHC)-64, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.> |
| ↓ |
| 3. Inspection of ignition control system. <Ref. to EN(SOHC)-67, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.> |
| ↓ |
| 4. Inspection of fuel pump circuit. <Ref. to EN(SOHC)-70, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.> |
| ↓ |
| 5. Inspection of fuel injector circuit. <Ref. to EN(SOHC)-73, 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(SOHC)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-40, Inspection Mode.>.**

- **WIRING DIAGRAM:**




EN-00261

# DIAGNOSTICS FOR ENGINE STARTING FAILURE

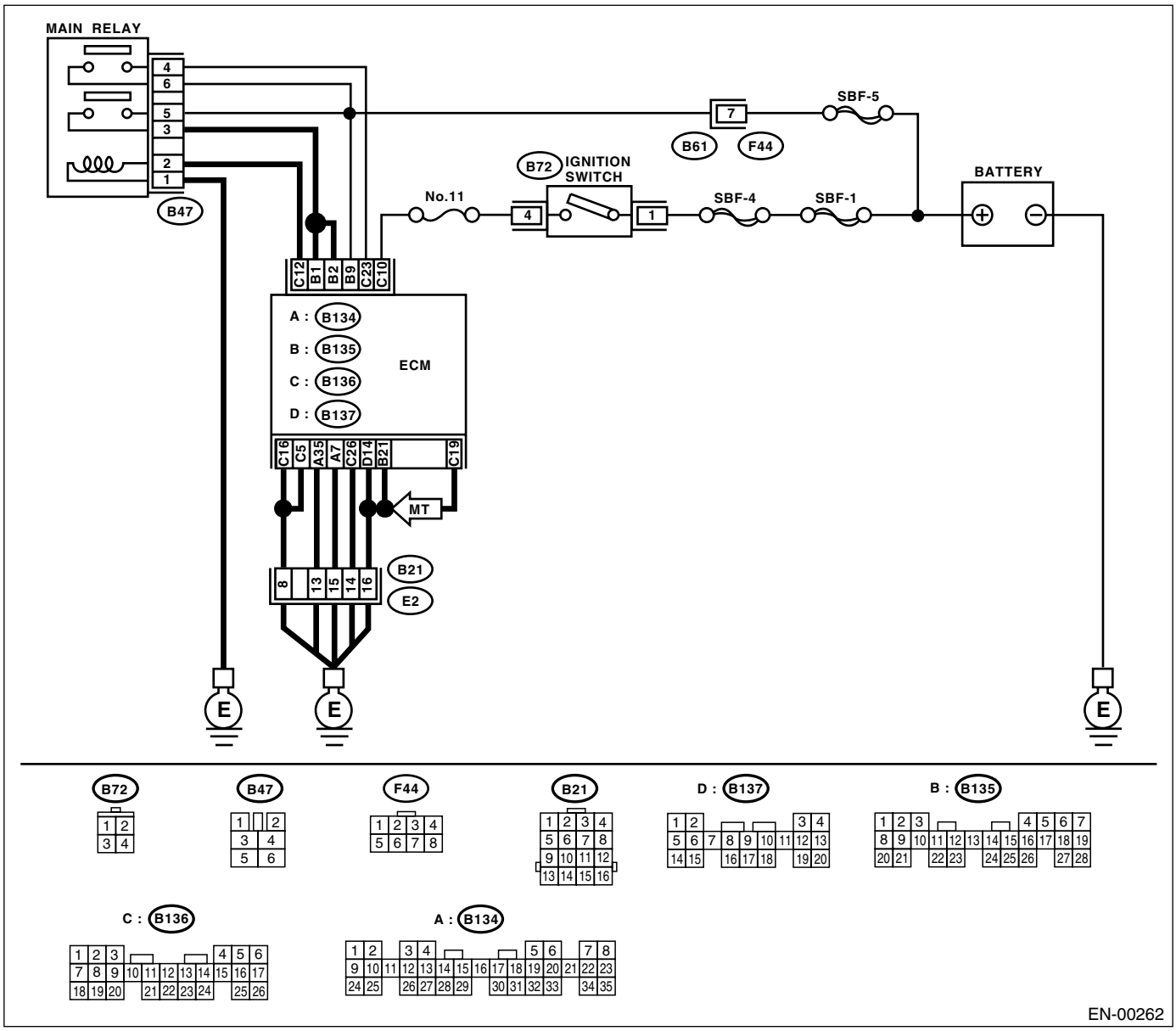
| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK BATTERY.**<br>Is the measured value more than specified value? | 12 V | Go to step **2.** | Charge or replace the battery. |
| 2 | **CHECK INPUT SIGNAL FOR STARTER MOTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from starter motor.<br>3)Turn the ignition switch to ST.<br>4)Measure the power supply voltage between starter motor connector terminal and engine ground.<br>***Connector & terminal***<br>***(B14) No. 1 (+) — Engine ground (–):***<br>Is the measured value more than specified value?<br>NOTE:<br>•On AT vehicles, place the selector lever in the "P" or "N" position.<br>•On MT vehicles, depress the clutch pedal. | 10 V | Go to step **3.** | Go to step **4.** |
| 3 | **CHECK GROUND CIRCUIT OF STARTER MOTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the terminal from starter motor.<br>3)Measure the resistance of ground cable between ground cable terminal and engine ground.<br>Is the measured value less than specified value? | 5 Ω | Check the starter motor. <Ref. to SC(SOHC)-6, Starter.> | Repair open circuit of ground cable. |
| 4 | **CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.**<br>1)Disconnect the connector from ignition switch.<br>2)Measure the power supply voltage between ignition switch connector and chassis ground.<br>***Connector & terminal***<br>***(B72) No. 1 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **5.** | Repair open circuit in harness between ignition switch and battery, and check fuse SBF No. 4 and SBF No. 1. |
| 5 | **CHECK IGNITION SWITCH.**<br>1)Disconnect the connector from ignition switch.<br>2)Measure the resistance between ignition switch terminals while turning ignition switch to the "ST" position.<br>***Terminals***<br>***No. 1 — No. 3:***<br>Is the measured value less than specified value? | 5 Ω | Go to step **6.** | Replace the ignition switch. |
| 6 | **CHECK TRANSMISSION TYPE.**<br>Is the target AT vehicle? | Target is AT vehicle. | Go to step **7.** | A temporary poor contact. Check each connector for poor contact. |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 7 | **CHECK INPUT VOLTAGE OF INHIBITOR SWITCH.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from inhibitor switch.<br>3)Connect the connector to ignition switch.<br>4)Measure the input voltage between inhibitor switch connector terminal and engine ground while turning ignition switch to ST.<br>***Connector & terminal***<br>***(B12) No. 12 (+) — Engine ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **8.** | Repair open or ground short circuit in harness between inhibitor switch and ignition switch.<br>NOTE:<br>Check security system (if equipped). |
| 8 | **CHECK INHIBITOR SWITCH.**<br>1)Place the selector lever in the “P” or “N” position.<br>2)Measure the resistance between inhibitor switch terminals.<br>***Connector & terminal***<br>***(T3) No. 11 — No. 12:***<br>Is the measured value less than specified value? | 1 Ω | Repair open or ground short circuit in harness between inhibitor switch and starter motor. | Replace the inhibitor switch.<Ref. to AT-48, Inhibitor Switch.> |

## C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

**CAUTION:**
**After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE<Ref. to EN(SOHC)-47, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(SOHC)-40, Inspection Mode.>**

- **WIRING DIAGRAM:**



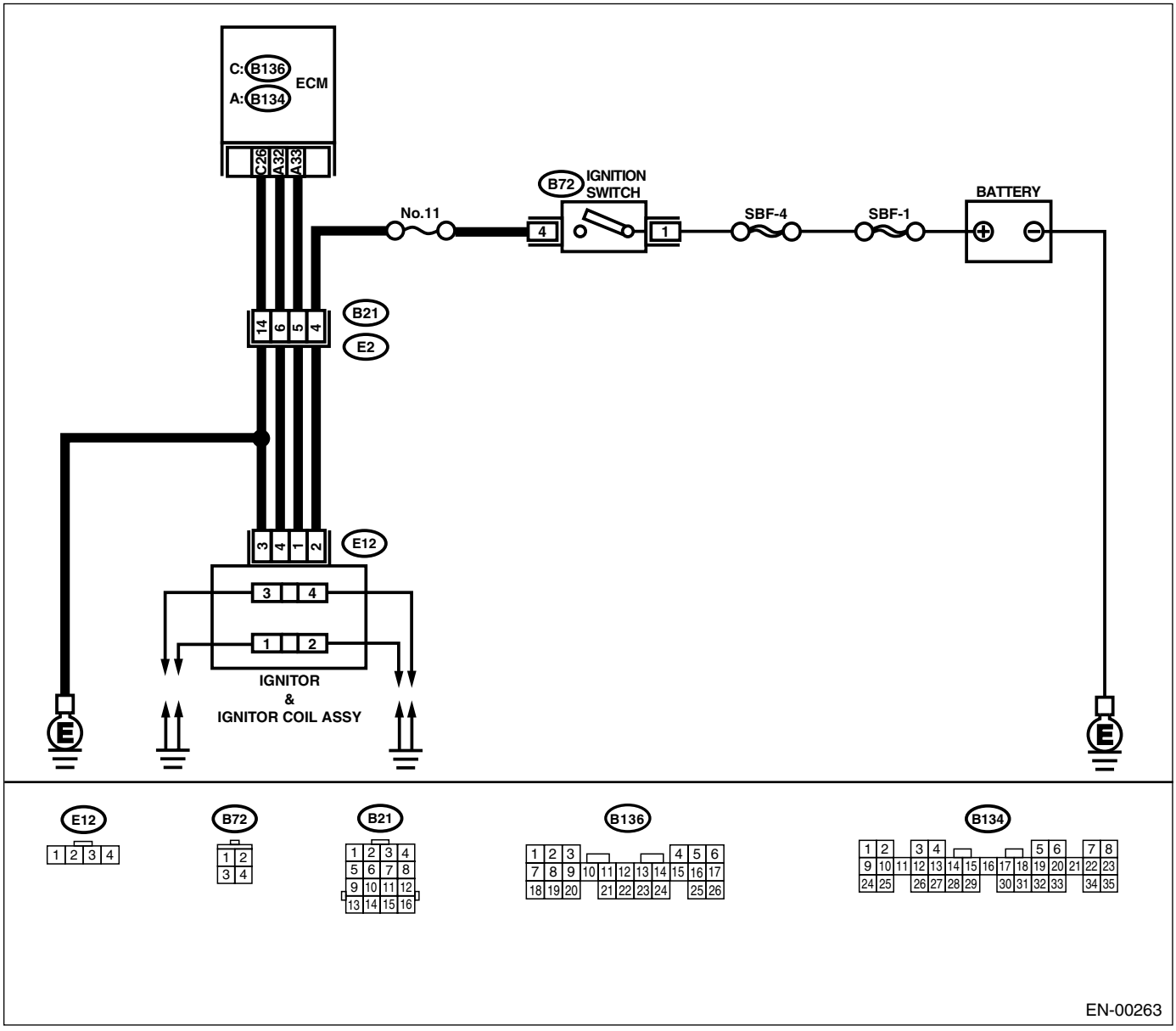
| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK MAIN RELAY.**<br>1)Turn the ignition switch to OFF.<br>2)Remove the main relay.<br>3)Connect the battery to main relay terminals No. 1 and No. 2.<br>4)Measure the resistance between main relay terminals.<br>***Terminals***<br>***No. 3 — No. 5:***<br>***No. 4 — No. 6:***<br>Is the measured value less than specified value? | 10 Ω | Go to step **2.** | Replace the main relay. |
| 2 | **CHECK GROUND CIRCUIT OF ECM.**<br>1)Disconnect the connector from ECM.<br>2)Measure the resistance of harness between ECM and chassis ground.<br>***Connector & terminal***<br>***(B134) No. 7 — Chassis ground:***<br>***(B134) No. 35 — Chassis ground:***<br>***(B135) No. 21 — Chassis ground:***<br>***(B136) No. 5 — Chassis ground:***<br>***(B136) No. 16 — Chassis ground: (MT vehicles)***<br>***(B136) No. 19 — Chassis ground:***<br>***(B136) No. 26 — Chassis ground:***<br>***(B137) No. 14 — Chassis ground:***<br>Is the measured value less than specified value? | 5 Ω | Go to step **3.** | Repair open circuit in harness between ECM connector and engine grounding terminal. |
| 3 | **CHECK INPUT VOLTAGE OF ECM.**<br>Measure the voltage between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B135) No. 9 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **4.** | Repair open or ground short circuit of power supply circuit. |
| 4 | **CHECK INPUT VOLTAGE OF ECM.**<br>1)Turn the ignition switch to ON.<br>2)Measure the voltage between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B136) No. 10 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **5.** | Repair open or ground short circuit of power supply circuit. |
| 5 | **CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Measure the resistance between ECM and chassis ground.<br>***Connector & terminal***<br>***(B136) No. 12 — Chassis ground:***<br>Is the measured value more than specified value? | 1 MΩ | Go to step **6.** | Repair ground short circuit in harness between ECM connector and main relay connector, then replace the ECM. |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 6 | **CHECK OUTPUT VOLTAGE FROM ECM.**<br>1)Connect the connector to ECM.<br>2)Turn the ignition switch to ON.<br>3)Measure the voltage between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B136) No. 12 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **7.** | Replace the ECM. |
| 7 | **CHECK INPUT VOLTAGE OF MAIN RELAY.**<br>Check the voltage between main relay connector and chassis ground.<br>***Connector & terminal***<br>***(B47) No. 2 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **8.** | Repair open circuit in harness between ECM connector and main relay connector. |
| 8 | **CHECK GROUND CIRCUIT OF MAIN RELAY.**<br>1)Turn the ignition switch to OFF.<br>2)Measure the resistance between main relay connector and chassis ground.<br>***Connector & terminal***<br>***(B47) No. 1 — Chassis ground:***<br>Is the measured value less than specified value? | 5 Ω | Go to step **9.** | Repair open circuit between main relay and chassis ground. |
| 9 | **CHECK INPUT VOLTAGE OF MAIN RELAY.**<br>Measure the voltage between main relay connector and chassis ground.<br>***Connector & terminal***<br>***(B47) No. 5 (+) — Chassis ground (–):***<br>***(B47) No. 6 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **10.** | Repair open or ground short circuit in harness of power supply circuit. |
| 10 | **CHECK INPUT VOLTAGE OF ECM.**<br>1)Connect the main relay connector.<br>2)Turn the ignition switch to ON.<br>3)Measure the voltage between ECM connector and chassis ground.<br>***Connector & terminal***<br>***(B135) No. 1 (+) — Chassis ground (–):***<br>***(B135) No. 2 (+) — Chassis ground (–):***<br>***(B136) No. 23 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Check ignition control system. <Ref. to EN(SOHC)-67, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.> | Repair open or ground short circuit in 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(SOHC)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-40, Inspection Mode.>.**

- **WIRING DIAGRAM:**



# DIAGNOSTICS FOR ENGINE STARTING FAILURE

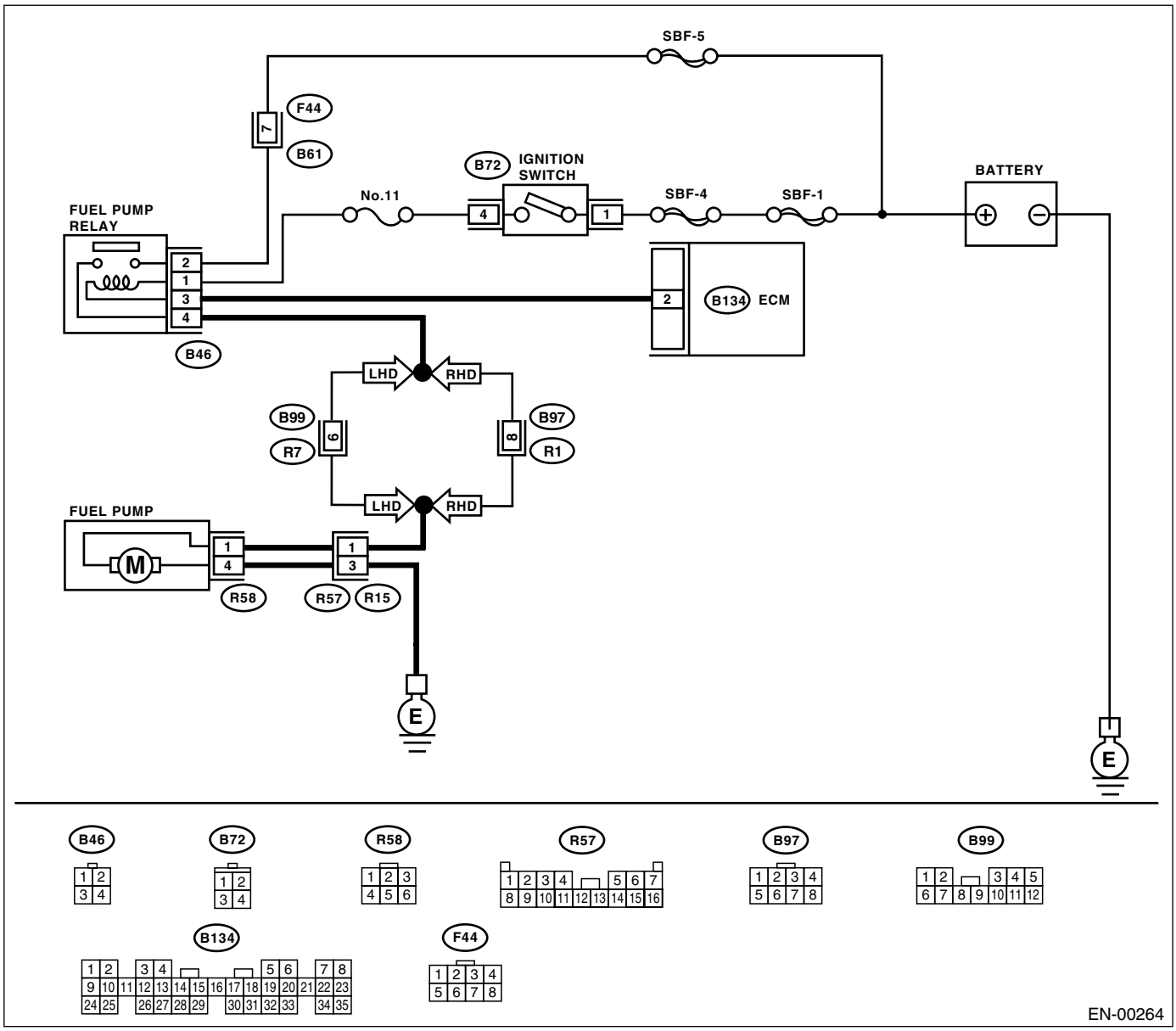
| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK IGNITION SYSTEM FOR SPARKS.**<br>1)Remove the plug cord cap from each spark plug.<br>2)Install the new spark plug on plug cord cap.<br>**CAUTION:**<br>**Do not remove the spark plug from engine.**<br>3)Contact the spark plug's thread portion on engine.<br>4)While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.<br>Does spark occur at each cylinder? | Spark occurs at each cylinder. | Check fuel pump system. <Ref. to EN(SOHC)-70, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.> | Go to step **2.** |
| 2 | **CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ignition coil & ignitor assembly.<br>3)Turn the ignition switch to ON.<br>4)Measure the power supply voltage between ignition coil & ignitor assembly connector and engine ground.<br>***Connector & terminal***<br>***(E12) No. 2 (+) — Engine ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **3.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between ignition coil & ignitor assembly, and ignition switch connector<br>• Poor contact in coupling connectors |
| 3 | **CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.**<br>1)Turn the ignition switch to OFF.<br>2)Measure the resistance between ignition coil & ignitor assembly connector and engine ground.<br>***Connector & terminal***<br>***(E12) No. 3 — Engine ground:***<br>Is the measured value less than specified value? | 5 Ω | Go to step **4.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal |
| 4 | **CHECK IGNITION COIL & IGNITOR ASSEMBLY.**<br>1)Remove the spark plug cords.<br>2)Measure the resistance between spark plug cord contact portions to check secondary coil.<br>***Terminals***<br>***No. 1 — No. 2:***<br>***No. 3 — No. 4:***<br>Is the measured value within specified value? | 10 — 15 kΩ | Go to step **5.** | Replace the ignition coil & ignitor assembly. <Ref. to IG(SOHC)-8, Ignition Coil and Ignitor Assembly.> |
| 5 | **CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.**<br>1)Connect the connector to ignition coil & ignitor assembly.<br>2)Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground.<br>***Connector & terminal***<br>***(E12) No. 1 (+) — Engine ground (–):***<br>***(E12) No. 4 (+) — Engine ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **6.** | Replace the ignition coil & ignitor assembly. <Ref. to IG(SOHC)-8, Ignition Coil and Ignitor Assembly.> |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 6 | **CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from ECM.<br>3)Disconnect the connector from ignition coil & ignitor assembly.<br>4)Measure the resistance of harness between ECM and ignition coil & ignitor assembly connector.<br>***Connector & terminal***<br>***(B134) No. 33 — (E12) No. 1:***<br>***(B134) No. 32 — (E12) No. 4:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **7.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between ECM and ignition coil & ignitor assembly connector<br>• Poor contact in coupling connector |
| 7 | **CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.**<br>Measure the resistance of harness between ECM and engine ground.<br>***Connector & terminal:***<br>***(B134) No. 33 — Engine ground:***<br>***(B134) No. 32 — Engine ground:***<br>Is the measured value more than specified value? | 1 MΩ | Go to step **8.** | Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector. |
| 8 | **CHECK POOR CONTACT.**<br>Check poor contact in ECM connector. | Is there poor contact in ECM connector? | Repair poor contact in ECM connector. | Check fuel pump circuit. <Ref. to EN(SOHC)-70, 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(SOHC)-47, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(SOHC)-40, Inspection Mode.>.**

- **WIRING DIAGRAM:**

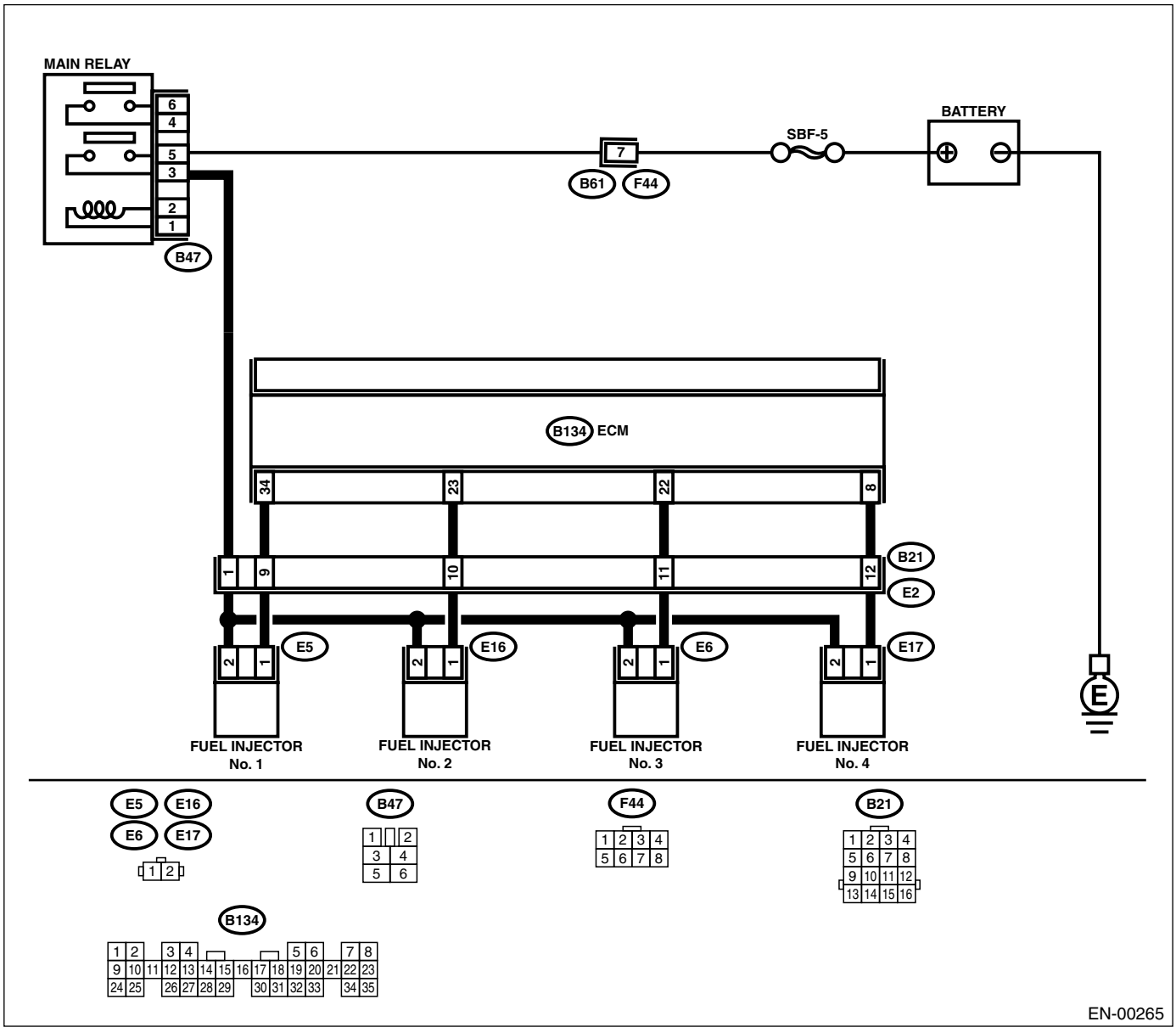


| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK OPERATING SOUND OF FUEL PUMP.**<br>Make sure that fuel pump is in operation for two seconds when turning the ignition switch to ON.<br>Does the fuel pump produce operating sound?<br>NOTE:<br>Fuel pump operation can also be executed using Subaru Select Monitor (Function mode: FD01).<br>For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(SOHC)-48, Compulsory Valve Operation Check Mode.> | Operating sound occurs. | Check fuel injector circuit. <Ref. to EN(SOHC)-73, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.> | Go to step **2.** |
| 2 | **CHECK GROUND CIRCUIT OF FUEL PUMP.**<br>1)Turn the ignition switch to OFF.<br>2)Remove the fuel pump access hole lid.<br>3)Disconnect the connector from fuel pump.<br>4)Measure the resistance of harness connector between fuel pump and chassis ground.<br>***Connector & terminal***<br>***(R58) No. 4 — Chassis ground:***<br>Is the measured value less than specified value? | 5 Ω | Go to step **3.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between fuel pump connector and chassis grounding terminal<br>• Poor contact in coupling connector |
| 3 | **CHECK POWER SUPPLY TO FUEL PUMP.**<br>1)Turn the ignition switch to ON.<br>2)Measure the voltage of power supply circuit between fuel pump connector and chassis ground.<br>***Connector & terminal***<br>***(R58) No. 1 (+) — Chassis ground (–):***<br>Is the measured value more than specified value? | 10 V | Replace the fuel pump. <Ref. to FU(SOHC)-57, Fuel Pump.> | Go to step **4.** |
| 4 | **CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Measure the resistance of harness connector between fuel pump and fuel pump relay.<br>***Connector & terminal***<br>***(R58) No. 1 — (B46) No. 4:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **5.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between fuel pump connector and chassis grounding terminal<br>• Poor contact in coupling connectors |
| 5 | **CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.**<br>Measure the resistance of harness between fuel pump and fuel pump relay connector.<br>***Connector & terminal***<br>***(R58) No. 1 — Chassis ground:***<br>Is the measured value more than specified value? | 1 MΩ | Go to step **6.** | Repair short circuit in harness between fuel pump and fuel pump relay connector. |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 6 | **CHECK FUEL PUMP RELAY.**<br>1)Disconnect the connectors from fuel pump relay and main relay.<br>2)Remove the fuel pump relay and main relay with bracket.<br>3)Connect the battery to fuel pump relay connector terminals No. 1 and No. 3.<br>4)Measure the resistance between connector terminals of fuel pump relay.<br>***Terminals***<br>***No. 2 — No. 4:***<br>Is the measured value less than specified value? | 10 Ω | Go to step **7.** | Replace the fuel pump relay. <Ref. to FU(SOHC)-48, Fuel Pump Relay.> |
| 7 | **CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.**<br>1)Disconnect the connectors from ECM.<br>2)Measure the resistance of harness between ECM and fuel pump relay connector.<br>***Connector & terminal***<br>***(B134) No. 2 — (B46) No. 3:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **8.** | Repair open circuit in harness between ECM and fuel pump relay connector. |
| 8 | **CHECK POOR CONTACT.**<br>Check poor contact in ECM connector.<br>Is there poor contact in ECM connector? | Poor contact occurs. | Repair poor contact in ECM connector. | Check fuel injector circuit. <Ref. to EN(SOHC)-73, 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(SOHC)-47, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(SOHC)-40, Inspection Mode.>**
- **WIRING DIAGRAM:**




| | Step | Check | Yes | No |
|---|---|---|---|---|
| 1 | **CHECK OPERATION OF EACH FUEL INJECTOR.**<br>While cranking the engine, check that each fuel injector emits “operating” sound. Use a sound scope or attach a screwdriver to the injector for this check.<br>Does the fuel injector emits operating sound? | Operating sound occurs. | Check the fuel pressure. <Ref. to ME(SOHC)-28, INSPECTION, Fuel Pressure.> | Go to step **2.** |

| | Step | Check | Yes | No |
|---|---|---|---|---|
| 2 | **CHECK POWER SUPPLY TO EACH FUEL INJECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Disconnect the connector from #1 cylinder fuel injector.<br>3)Turn the ignition switch to ON.<br>4)Measure the power supply voltage between the fuel injector terminal and engine ground.<br>***Connector & terminal***<br>***#1 (E5) No. 2 (+) — Engine ground (–):***<br>***#2 (E16) No. 2 (+) — Engine ground (–):***<br>***#3 (E6) No. 2 (+) — Engine ground (–):***<br>***#4 (E17) No. 2 (+) — Engine ground (–):***<br>Is the measured value more than specified value? | 10 V | Go to step **3.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between main relay and fuel injector connector<br>• Poor contact in main relay connector<br>• Poor contact in coupling connector (B22)<br>• Poor contact in fuel injector connector |
| 3 | **CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.**<br>1)Disconnect the connector from ECM.<br>2)Measure the resistance of harness between ECM and fuel injector connector.<br>***Connector & terminal***<br>***#1 (B134) No. 34 — (E5) No. 1:***<br>***#2 (B134) No. 23 — (E16) No. 1:***<br>***#3 (B134) No. 22 — (E6) No. 1:***<br>***#4 (B134) No. 8 — (E17) No. 1:***<br>Is the measured value less than specified value? | 1 Ω | Go to step **4.** | Repair harness and connector.<br>NOTE:<br>In this case, repair the following:<br>• Open circuit in harness between ECM and fuel injector connector<br>• Poor contact in coupling connector |
| 4 | **CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.**<br>Measure the resistance of harness between ECM and fuel injector connector.<br>***Connector & terminal***<br>***#1 (B134) No. 34 — Chassis ground:***<br>***#2 (B134) No. 23 — Chassis ground:***<br>***#3 (B134) No. 22 — Chassis ground:***<br>***#4 (B134) No. 8 — Chassis ground:***<br>Is the measured value more than specified value? | 1 MΩ | Go to step **5.** | Repair ground short circuit in harness between ECM and fuel injector connector. |
| 5 | **CHECK EACH FUEL INJECTOR.**<br>1)Turn the ignition switch to OFF.<br>2)Measure the resistance between each fuel injector terminals.<br>***Terminals***<br>***No. 1 — No. 2:***<br>Is the measured value within specified value? | 5 — 20 Ω | Go to step **6.** | Replace the faulty fuel injector. |
| 6 | **CHECK POOR CONTACT.**<br>Check poor contact in ECM connector.<br>Is there poor contact in ECM connector? | Poor contact occurs. | Repair poor contact in ECM connector. | Inspection using “General Diagnostic Table”. <Ref. to EN(SOHC)-261, INSPECTION, General Diagnostic Table.> |

# 18.List of Diagnostic Trouble Code (DTC)

## A: LIST

| DTC No. | Item | Index |
|---|---|---|
| P0030 | HO2S Heater Control Circuit (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-81, 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(SOHC)-83, 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(SOHC)-86, 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(SOHC)-88, 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(SOHC)-91, DTC P0038 — HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0068 | Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance | <Ref. to EN(SOHC)-93, DTC P0068 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0107 | Manifold Absolute Pressure/Barometric Pressure Circuit Low Input | <Ref. to EN(SOHC)-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(SOHC)-98, DTC P0108 — MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0111 | Intake Air Temperature Circuit Range/Performance | <Ref. to EN(SOHC)-101, DTC P0111 — INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0112 | Intake Air Temperature Circuit Low Input | <Ref. to EN(SOHC)-103, DTC P0112 — INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0113 | Intake Air Temperature Circuit High Input | <Ref. to EN(SOHC)-105, DTC P0113 — INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0117 | Engine Coolant Temperature Circuit Low Input | <Ref. to EN(SOHC)-108, DTC P0117 — ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0118 | Engine Coolant Temperature Circuit High Input | <Ref. to EN(SOHC)-110, DTC P0118 — ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0121 | Throttle/Pedal Position Sensor/ Switch “A” Circuit Range/Performance | <Ref. to EN(SOHC)-113, DTC P0121 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0122 | Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input | <Ref. to EN(SOHC)-115, DTC P0122 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0123 | Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input | <Ref. to EN(SOHC)-118, DTC P0123 — THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0125 | Insufficient Coolant Temperature for Closed Loop Fuel Control | <Ref. to EN(SOHC)-120, DTC P0125 — INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0129 | Barometric Pressure Too Low | <Ref. to EN(SOHC)-122, DTC P0129 — BAROMETRIC PRESSURE TOO LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |

# LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

| DTC No. | Item | Index |
|---|---|---|
| P0130 | $O_2$ Sensor Circuit (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-123, DTC P0130 — $O_2$ SENSOR CIRCUIT (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0131 | $O_2$ Sensor Circuit Low Voltage (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-126, DTC P0131 — $O_2$ SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0132 | $O_2$ Sensor Circuit High Voltage (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-128, DTC P0132 — $O_2$ SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0133 | $O_2$ Sensor Circuit Slow Response (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-130, DTC P0133 — $O_2$ SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0134 | $O_2$ Sensor Circuit No Activity Detected (Bank 1 Sensor 1) | <Ref. to EN(SOHC)-132, DTC P0134 — $O_2$ SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0137 | $O_2$ Sensor Circuit Low Voltage (Bank 1 Sensor 2) | <Ref. to EN(SOHC)-134, DTC P0137 — $O_2$ SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0138 | $O_2$ Sensor Circuit High Voltage (Bank 1 Sensor 2) | <Ref. to EN(SOHC)-137, DTC P0138 — $O_2$ SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0139 | $O_2$ Sensor Circuit Slow Response (Bank 1 Sensor 2) | <Ref. to EN(SOHC)-140, DTC P0139 — $O_2$ SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0171 | System too Lean (Bank 1) | <Ref. to EN(SOHC)-141, DTC P0171 — SYSTEM TOO LEAN (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0172 | System too Rich (Bank 1) | <Ref. to EN(SOHC)-142, DTC P0172 — SYSTEM TOO RICH (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0301 | Cylinder 1 Misfire Detected | <Ref. to EN(SOHC)-144, DTC P0301 — CYLINDER 1 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0302 | Cylinder 2 Misfire Detected | <Ref. to EN(SOHC)-144, DTC P0302 — CYLINDER 2 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0303 | Cylinder 3 Misfire Detected | <Ref. to EN(SOHC)-144, DTC P0303 — CYLINDER 3 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0304 | Cylinder 4 Misfire Detected | <Ref. to EN(SOHC)-145, DTC P0304 — CYLINDER 4 MISFIRE DETECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0327 | Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor) | <Ref. to EN(SOHC)-152, DTC P0327 — KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0328 | Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor) | <Ref. to EN(SOHC)-154, DTC P0328 — KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0335 | Crankshaft Position Sensor “A” Circuit | <Ref. to EN(SOHC)-156, DTC P0335 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0336 | Crankshaft Position Sensor “A” Circuit Range/Performance | <Ref. to EN(SOHC)-158, DTC P0336 — CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0340 | Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor) | <Ref. to EN(SOHC)-160, DTC P0340 — CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0341 | Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor) | <Ref. to EN(SOHC)-162, DTC P0341 — CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0400 | Exhaust Gas Recirculation Flow | <Ref. to EN(SOHC)-165, DTC P0400 — EXHAUST GAS RECIRCULATION FLOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |

| DTC No. | Item | Index |
|---|---|---|
| P0420 | Catalyst System Efficiency Below Threshold (Bank 1) | <Ref. to EN(SOHC)-168, DTC P0420 — CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0458 | Evaporative Emission Control System Purge Control Valve Circuit Low | <Ref. to EN(SOHC)-170, DTC P0458 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0459 | Evaporative Emission Control System Purge Control Valve Circuit High | <Ref. to EN(SOHC)-173, DTC P0459 — EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0461 | Fuel Level Sensor Circuit Range/Performance | <Ref. to EN(SOHC)-176, DTC P0461 — FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0462 | Fuel Level Sensor Circuit Low Input | <Ref. to EN(SOHC)-178, DTC P0462 — FUEL LEVEL SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0463 | Fuel Level Sensor Circuit High Input | <Ref. to EN(SOHC)-181, DTC P0463 — FUEL LEVEL SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0464 | Fuel Level Sensor Circuit Intermittent | <Ref. to EN(SOHC)-184, DTC P0464 — FUEL LEVEL SENSOR CIRCUIT INTERMITTENT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0483 | Cooling Fan Rationality Check | <Ref. to EN(SOHC)-186, DTC P0483 — COOLING FAN RATIONALITY CHECK —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0502 | Vehicle Speed Sensor Circuit Low Input | <Ref. to EN(SOHC)-189, DTC P0502 — VEHICLE SPEED SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0503 | Vehicle Speed Sensor Circuit High Input | <Ref. to EN(SOHC)-190, DTC P0503 — VEHICLE SPEED SENSOR CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0506 | Idle Control System RPM Lower Than Expected | <Ref. to EN(SOHC)-192, DTC P0506 — IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0507 | Idle Control System RPM Higher Than Expected | <Ref. to EN(SOHC)-194, DTC P0507 — IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0512 | Starter Request Circuit | <Ref. to EN(SOHC)-196, DTC P0512 — STARTER REQUEST CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0513 | Incorrect Immobilizer Key | <Ref. to IM-20, DTC P0153 INCORRECT IMMOBILIZER KEY (USE OF UNREGISTERED KEY), Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P0519 | Idle Control System Circuit Performance | <Ref. to EN(SOHC)-199, DTC P0519 — IDLE CONTROL SYSTEM CIRCUIT PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0565 | Cruise Control On Signal | <Ref. to EN(SOHC)-201, DTC P0565 — CRUISE CONTROL ON SIGNAL —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0604 | Internal Control Module Random Access Memory (RAM) Error | <Ref. to EN(SOHC)-203, DTC P0604 — INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0691 | Cooling Fan 1 Control Circuit Low | <Ref. to EN(SOHC)-205, DTC P0691 — COOLING FAN 1 CONTROL CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0692 | Cooling Fan 1 Control Circuit High | <Ref. to EN(SOHC)-209, DTC P0692 — COOLING FAN 1 CONTROL CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0703 | Torque Converter/Brake Switch “B” Circuit | <Ref. to EN(SOHC)-212, DTC P0703 — TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |

# LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

| DTC No. | Item | Index |
|---|---|---|
| P0705 | Transmission Range Sensor Circuit (PRNDL Input) | <Ref. to AT-114, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).> |
| P0710 | Transmission Fluid Temperature Sensor Circuit | <Ref. to AT-43, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0716 | Input/Turbine Speed Sensor Circuit Range/Performance | <Ref. to AT-59, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0720 | Output Speed Sensor Circuit | <Ref. to AT-54, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0726 | Engine Speed Input Circuit Range/ Performance | <Ref. to AT-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0731 | Gear 1 Incorrect Ratio | <Ref. to EN(SOHC)-214, DTC P0731 — GEAR 1 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0732 | Gear 2 Incorrect Ratio | <Ref. to EN(SOHC)-214, DTC P0732 — GEAR 2 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0733 | Gear 3 Incorrect Ratio | <Ref. to EN(SOHC)-214, DTC P0733 — GEAR 3 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0734 | Gear 4 Incorrect Ratio | <Ref. to EN(SOHC)-215, DTC P0734 — GEAR 4 INCORRECT RATIO —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0741 | Torque Converter Clutch Circuit Performance or Stuck Off | <Ref. to EN(SOHC)-216, DTC P0741 — TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0743 | Torque Converter Clutch Circuit Electrical | <Ref. to AT-87, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0748 | Pressure Control Solenoid “A” Electrical | <Ref. to AT-79, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0753 | Shift Solenoid “A” Electrical | <Ref. to AT-66, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0758 | Shift Solenoid “B” Electrical | <Ref. to AT-69, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0771 | Shift Solenoid “E” Performance or Stuck Off | <Ref. to AT-72, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0778 | Pressure Control Solenoid “B” Electrical | <Ref. to AT-83, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0785 | Shift/Timing Solenoid | <Ref. to AT-75, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0851 | Neutral Switch Input Circuit Low | <Ref. to EN(SOHC)-218, DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (AT VEHICLES) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).><Ref. to EN(SOHC)-220, DTC P0851 — NEUTRAL SWITCH INPUT CIRCUIT LOW (MT VEHICLES) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0852 | Neutral Switch Input Circuit High | <Ref. to EN(SOHC)-223, DTC P0852 — NEUTRAL SWITCH INPUT CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0864 | TCM Communication Circuit Range/ Performance | <Ref. to EN(SOHC)-226, DTC P0864 — TCM COMMUNICATION CIRCUIT RANGE/PERFORMANCE —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0865 | TCM Communication Circuit Low | <Ref. to EN(SOHC)-228, DTC P0865 — TCM COMMUNICATION CIRCUIT LOW —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P0866 | TCM Communication Circuit High | <Ref. to EN(SOHC)-230, DTC P0866 — TCM COMMUNICATION CIRCUIT HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1110 | Atmospheric Pressure Sensor Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-232, DTC P1110 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1111 | Atmospheric Pressure Sensor Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-233, DTC P1111 — ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |

| DTC No. | Item | Index |
|---|---|---|
| P1134 | A/F Sensor Micro-computer Problem | <Ref. to EN(SOHC)-234, DTC P1134 — A/F SENSOR MICRO-COMPUTER PROBLEM —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1137 | $O_2$ Sensor Circuit (Bank1 Sensor1) | <Ref. to EN(SOHC)-235, DTC P1137 — $O_2$ SENSOR CIRCUIT (BANK1 SENSOR1) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1492 | EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-238, 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(SOHC)-238, 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(SOHC)-238, 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(SOHC)-238, 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(SOHC)-238, 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(SOHC)-238, 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(SOHC)-239, 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(SOHC)-241, DTC P1499 — EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1510 | ISC Solenoid Valve Signal #1 Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-243, DTC P1510 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1511 | ISC Solenoid Valve Signal #1 Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-243, DTC P1511 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 1 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1512 | ISC Solenoid Valve Signal #2 Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-243, DTC P1512 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1513 | ISC Solenoid Valve Signal #2 Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-243, DTC P1513 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 2 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1514 | ISC Solenoid Valve Signal #3 Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-243, DTC P1514 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1515 | ISC Solenoid Valve Signal #3 Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-243, DTC P1515 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 3 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1516 | ISC Solenoid Valve Signal #4 Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-244, DTC P1516 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1517 | ISC Solenoid Valve Signal #4 Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-246, DTC P1517 — IDLE AIR CONTROL SOLENOID VALVE SIGNAL 4 CIRCUIT HIGH INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1518 | Starter Switch Circuit Low input | <Ref. to EN(SOHC)-248, DTC P1518 — STARTER SWITCH CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |

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| P1560 | Back-up Voltage Circuit Malfunction | <Ref. to EN(SOHC)-251, DTC P1560 — BACK-UP VOLTAGE CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1570 | Antenna | <Ref. to IM-21, DTC P1570 ANTENNA, Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1571 | Reference Code Incompatibility | <Ref. to IM-15, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1572 | IMM Circuit Failure (Except antenna circuit) | <Ref. to IM-16, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1574 | Key Communication Failure | <Ref. to IM-19, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1576 | EGI Control Module EEPROM | <Ref. to IM-20, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1577 | IMM Control Module EEPROM | <Ref. to IM-20, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostics Chart with Diagnostic Trouble Code (DTC).> |
| P1698 | Engine Torque Control Cut Signal Circuit Malfunction (Low Input) | <Ref. to EN(SOHC)-253, DTC P1698 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (LOW INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1699 | Engine Torque Control Cut Signal Circuit Malfunction (High Input) | <Ref. to EN(SOHC)-255, DTC P1699 — ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT MALFUNCTION (HIGH INPUT) —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1700 | Throttle Position Sensor Circuit Malfunction for AT | <Ref. to AT-47, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1711 | Engine Torque Control Signal #1 Circuit Malfunction | <Ref. to EN(SOHC)-257, DTC P1711 — ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |
| P1712 | Engine Torque Control Signal #2 Circuit Malfunction | <Ref. to EN(SOHC)-259, DTC P1712 — ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> |