**ENGINE (DIAGNOSTICS)(H4DOTC)**

# *EN(H4DOTC)(diag)*

1. Basic Diagnostic Procedure
2. Check List for Interview
3. General Description
4. Electrical Component Location
5. Control Module I/O Signal
6. Inspection Mode
7. Warning Light Illumination Pattern
8. Data Monitor
9. Freeze Frame Data
10. Active Test
11. Work Support
12. All Readiness Diagnostic Code(s)
13. Diagnostic Trouble Code (DTC)
14. Diagnostic Procedure with Diagnostic Trouble Code (DTC)
15. Diagnostics with Phenomenon
16. General Scan Tool

## PROCEDURE

### 1. CHECK ENGINE START FAILURE.

1. Ask the customer when and how the trouble occurred using the Check List for Interview. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Check List for Interview>CHECK.
2. Start the engine.

Does the engine start?

Yes — Go to 2.

No — Check "Diagnostics with Phenomenon". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon.

### 2. CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.

Check the illumination status of malfunction indicator light. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern>PROCEDURE.

Does the malfunction indicator light illuminate?

Yes — Go to 3.

No — Check "Warning Light Illumination Pattern". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern.

### 3. CHECK COMMUNICATION STATUS.

1. Turn the ignition switch to OFF.
2. Connect the Subaru Select Monitor or general scan tool to the data link connector.
3. Turn the ignition switch to ON, and run the Subaru Select Monitor or general scan tool.

**Note:**
- **Subaru Select Monitor**
  **For detailed operation procedures, refer to "Help" of application.**
- **General scan tool**
  **For detailed operation procedures, refer to the general scan tool operation manual.**

Does Subaru Select Monitor or general scan tool communicate with vehicle normally?

Yes — Go to 4.

No — Perform the inspection according to "Basic Diagnostic Procedure" of LAN system. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

### 4. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Engine] displayed? (Current code)

Yes — Save DTC and freeze frame data, then repair the trouble cause. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC). Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.
After repair, go to the next step.
Go to 5.

No — Repair the related parts.

**Note:**
**If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnosis of malfunction indicator light circuit or combination meter. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern.**

**5. FINAL CHECK.**

1. Connect all connectors.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Execute the inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Read the readiness code of [Engine] using Subaru Select Monitor and check that the concerned self-diagnosis is completed. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).
5. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Engine] displayed? (Current code)

| | |
|---|---|
| Yes | Check the connection of connector. If there is no faulty connector, perform the diagnosis for the displayed DTCs. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Finish the diagnosis. |

## CHECK

### 1. CHECK LIST NO. 1

- Inspect the following items regarding the vehicle's state.
- Print out below for use.

| | | | |
|---|---|---|---|
| Customer's name | | Engine No. | |
| Date of purchase | Year Month Date | Fuel type | |
| Date of repair | Year Month Date | Odometer reading | km |
| V.I.N. | | | miles |
| Weather | ❑ Fine<br>❑ Cloudy<br>❑ Rainy<br>❑ Snowy<br>❑ Various/Others: | | |
| Ambient air 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>❑ Other: | | |
| Engine temperature | ❑ Cold<br>❑ Warming-up<br>❑ After warming-up<br>❑ Any temperature<br>❑ Other: | | |
| Engine speed | rpm | | |
| Vehicle speed | km/h (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 | Audio | ❑ ON/❑ OFF |
| A/C compressor | ❑ ON/❑ OFF | Rear entertainment system | ❑ ON/❑ OFF |
| Radiator fan | ❑ ON/❑ OFF | Car phone | ❑ ON/❑ OFF |
| Front wiper | ❑ ON/❑ OFF | Wireless device | ❑ ON/❑ OFF |
| Rear wiper | ❑ ON/❑ OFF | | |
| Engine oil type | | | |
| • Grade:<br>• Viscosity: | | | |
| Use of additives (engine oil): ❑ Yes/ ❑ No | | | |
| • Part name: | | | |
| Wrong fuel filled: ❑ Yes / ❑ No | | | |
| • Date of filling:<br>• Fuel type: | | | |
| Use a service station different from a usual one: ❑ Yes / ❑ No | | | |
| • Date of filling:<br>• Fuel type: | | | |
| Use of additives (fuel): ❑ Yes/ ❑ No | | | |
| • Part name: | | | |

## 2. CHECK LIST NO. 2

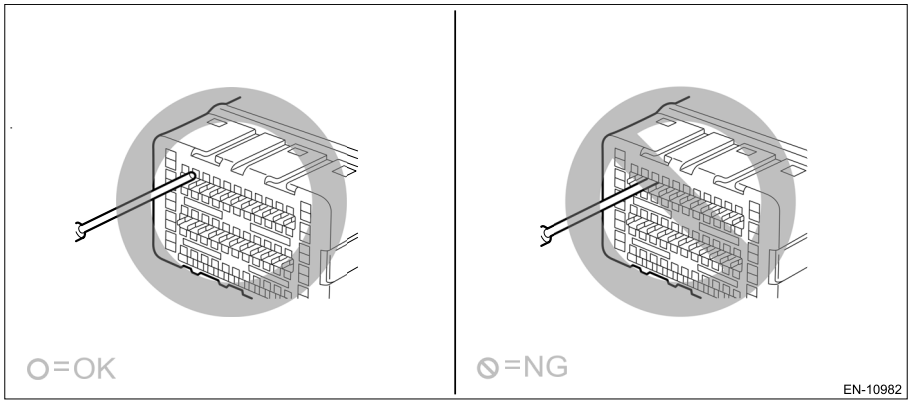
- Check the following item about the vehicle’s state when the malfunction indicator light turns on.
- Print out below for use.

| |
|---|
| a) Other warning lights or indicators illuminate: ❑ Yes / ❑ No |
| ❑ Fuel level warning light<br>❑ Charge warning light<br>❑ Engine coolant temperature warning light<br>❑ Oil pressure warning light<br>❑ ATF temperature warning light or Sport indicator light<br>❑ Driver’s control center differential indicator light<br>❑ ABS warning light<br>❑ VDC warning light<br>❑ Cruise indicator light<br>❑ SI-CRUISE warning light<br>❑ EyeSight warning light<br>❑ Immobilizer indicator light<br>❑ STEERING warning light<br>❑ Electronic parking brake warning light<br>❑ Glow indicator light<br>❑ Sedimenter warning light<br>❑ Auto Start Stop indicator light<br>❑ Auto Start Stop OFF indicator light<br>❑ Hybrid fail lamp<br>❑ GPF warning light<br>❑ Exhaust system warning display<br>❑ Other: |
| b) Fuel level |
| • Lack of fuel: ❑ Yes / ❑ No<br>• Indicator position of fuel gauge:<br>• Experienced running out of fuel: ❑ Yes / ❑ No |
| c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No |
| • Part name: |
| d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No |
| • Part name: |
| e) Installing of other parts except genuine parts: ❑ Yes / ❑ No |
| • Part name:<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>❑ Does not shift<br>❑ Excessive shift shock |
| j) Check of control operation history Is there a control operation history?: ❑ Yes / ❑ No<br>Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Work Support>OPERATION. |

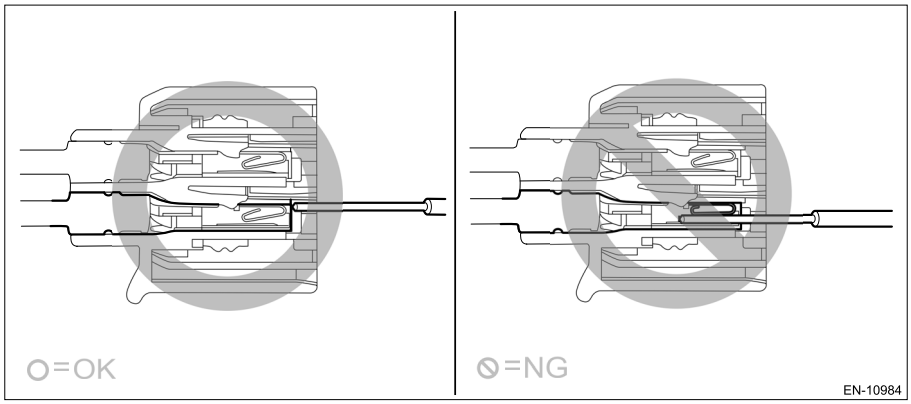
## CAUTION

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

   **Caution:**
   - **Do not use electrical test equipment on the airbag system circuits.**
   - **Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.**
2. Never connect the battery in reverse polarity. Doing so will damage the ECM instantly, and other parts will also be damaged.
3. Do not disconnect the battery cables while the engine is running. A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM etc.
4. After connecting the battery terminals, wait for at least 10 seconds before tuning the ignition switch to ON. Ref. to REPAIR CONTENTS>NOTE>BATTERY>GROUND TERMINAL REMOVAL OR INSTALLATION.
5. When disconnecting the connectors of the electrical components, always be sure to turn the ignition switch to OFF. Clear the memory after connecting the connectors. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
6. When measuring the voltage or resistance of individual sensors or all electrical control modules, use a tapered pin with a diameter of 0.6 mm (0.024 in) or less and touch it to the tip of terminal.



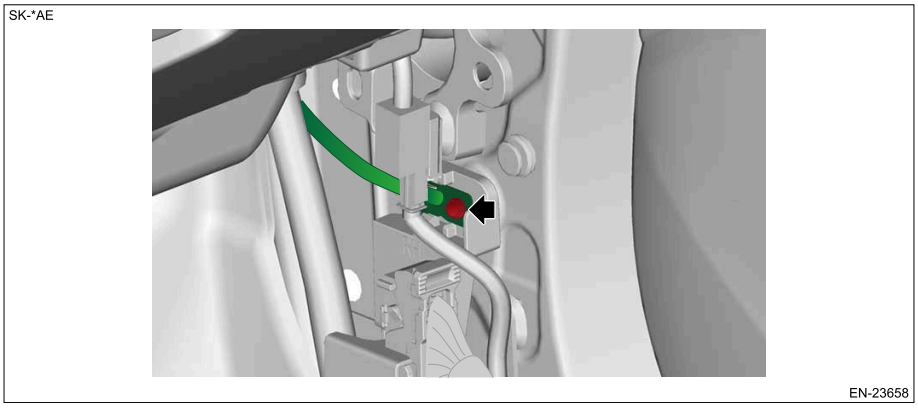

Never insert the tapered pin into the terminal because it deforms inside which may lead to a malfunction.



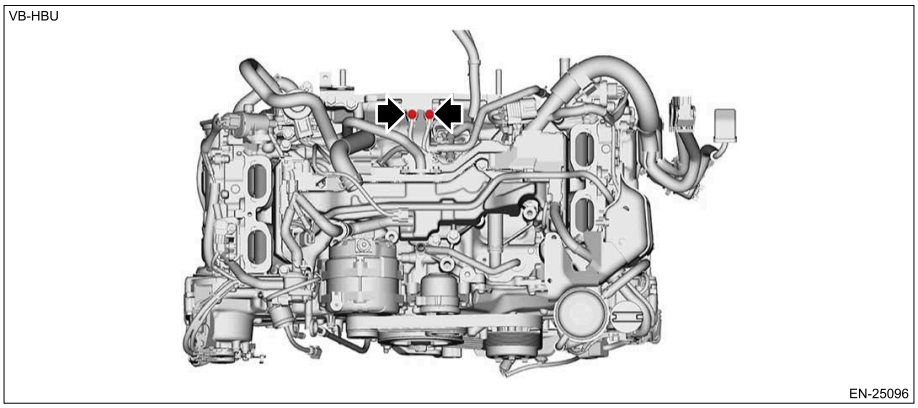

**Caution:**
**When replacing the ECM, be careful not to use the ECM of wrong specification to avoid any damage on the fuel injection system.**

**Note:**
**When replacing the ECM of the models with immobilizer, immobilizer system must be registered. For detailed operation procedure, refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".**

7. Take care not to allow water to get into the connectors when servicing or washing the vehicle in rainy weather. Avoid exposure to water even if the connectors are waterproof.
8. Use the body ground terminal for the grounding point when measuring voltage and resistance inside the passenger compartment.




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




10. All parts related to the engine control system are precision parts. Do not drop or otherwise apply impact. Do not reuse the parts that are dropped accidentally.
11. Observe the following cautions when installing a radio in vehicle.

**Caution:**
- **The antenna must be kept as far apart as possible from the ECM. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Electrical Component Location>LOCATION.**
- **The antenna feeder must be placed as far apart as possible from the ECM and engine control system harness.**
- **Carefully adjust the antenna for correct matching.**
- **When mounting a large power type radio, pay special attention to the three items mentioned above.**
- **Incorrect installation of the radio may affect the operation of ECM.**

12. When disconnecting the fuel tube, release the fuel pressure. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.
13. Warning lights may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. The reason for this is the rotating speed difference between the front and rear wheels. After the completion of diagnosis for engine control system, perform the clear memory of [Brake Control] using the Subaru Select Monitor. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

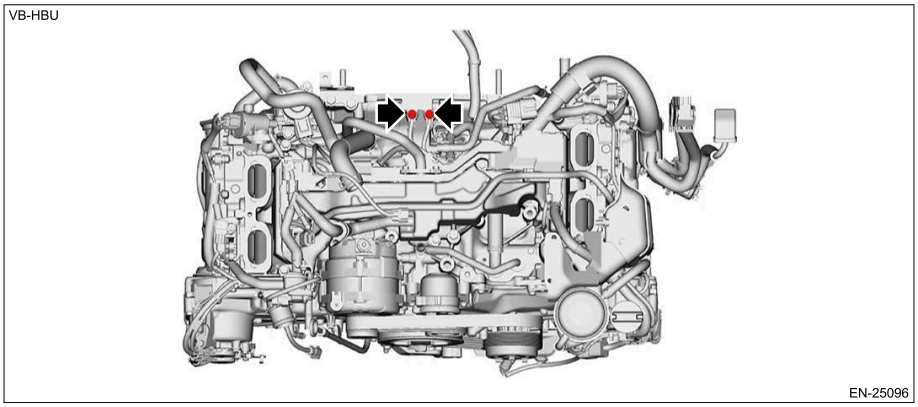
## ENGINE (DIAGNOSTICS)(H4DOTC) > General Description

## INSPECTION

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

### 1. BASIC INSPECTION

1. Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.
2. Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.
3. Make sure that the engine ground terminal has no contamination, corrosion or looseness and is properly connected to the engine.




## 2. CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS

1. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Perform the reproduction test.
3. Perform visual inspection of the connectors and the respective terminals and check the connection.
4. Check that excessive force is not applied to the wiring harness and connector.

### ENGINE (DIAGNOSTICS)(H4DOTC) > General Description

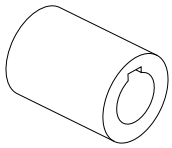
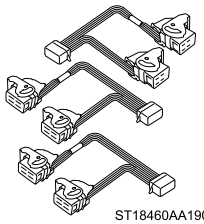
#### NOTE

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

  *: One driving cycle means the period between the ignition switch ON and the ignition switch OFF after driving.
- When performing diagnosis, connect the Subaru Select Monitor or general scan tool to the vehicle.
- When the ignition is turned ON or the engine is started immediately after replacing the battery or connecting the terminals, DTCs may be detected. Ref. to REPAIR CONTENTS>NOTE>BATTERY>GROUND TERMINAL REMOVAL OR INSTALLATION.
  Confirm this by asking the user.

## PREPARATION TOOL

### 1. SUBARU SPECIAL TOOL

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|---|---|---|
|  STSSM4 | — | SUBARU SELECT MONITOR 4 | Used for setting of each function and troubleshooting for electrical system.<br>**Note:**<br>• **For detailed operation procedures, refer to "Help" of application.**<br>• **Used together with interface for Subaru Select Monitor (such as DST-i and DST-010).** |
|  ST18252AA000 | 18252AA000 | CRANKSHAFT SOCKET | Used for rotating crankshaft. |
|  ST18460AA190 | 18460AA190 (Newly adopted tool) | CHECK BOARD | Used for measuring voltage and resistance of ECM terminals. |

### 2. OTHER

| | REMARKS |
|---|---|
| Oscilloscope | Used for measuring the sensor. |
| General scan tool (SAE J1978) | Used for troubleshooting the electrical system. |
| Circuit tester | Used for measuring resistance, voltage and current. |

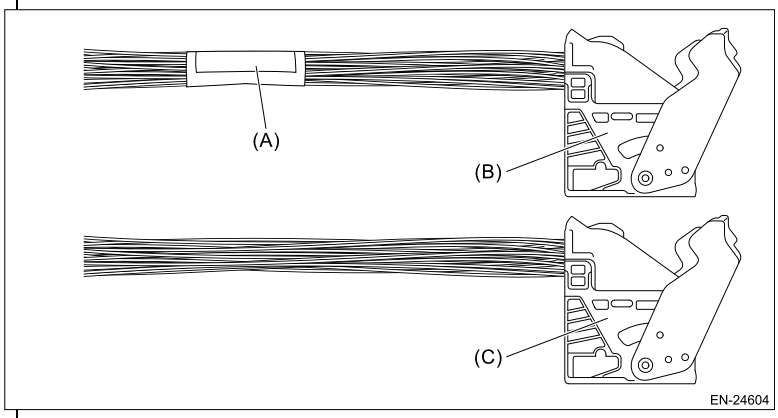
### 3. HOW TO USE CHECK BOARD

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM)>REMOVAL.

   **Caution:**
   **Make sure that the lock is released before moving the lever in order to avoid damaging the connector.**
3. Connect the ECM connector to the check board.
4. Connect the ECM connector (C) to ECM.

**Caution:**

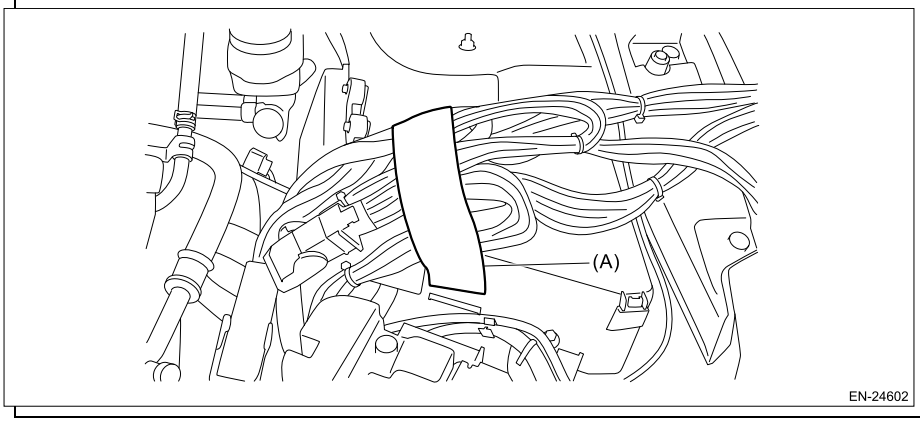
**Use the measurement connector (B) with part label (A) when measuring the voltage, current and resistance. If you insert a taper pin for measurement into the ECM connector (C) by mistake, do not use the check board again, otherwise a malfunction (poor contact, etc.) may occur on the vehicle.**




(A) Part label (B) Measurement connector (C) ECM connector

**Caution:**

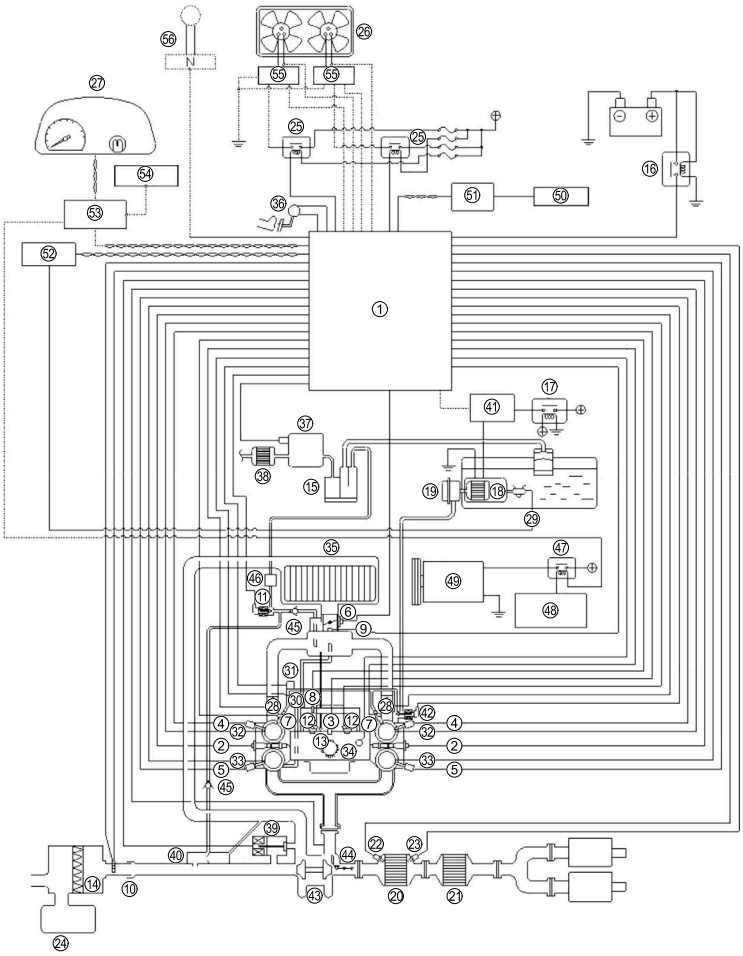
- **To prevent damage to the connector, when connecting the connector to ECM, insert the connector straight in until it stops, and while maintaining the position, lock the lever. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Affix the check board the using tape (A) so that it may not contact the vibrating portion such as engine.**




ENGINE (DIAGNOSTICS)(H4DOTC) > General Description

## SYSTEM BLOCK DIAGRAM

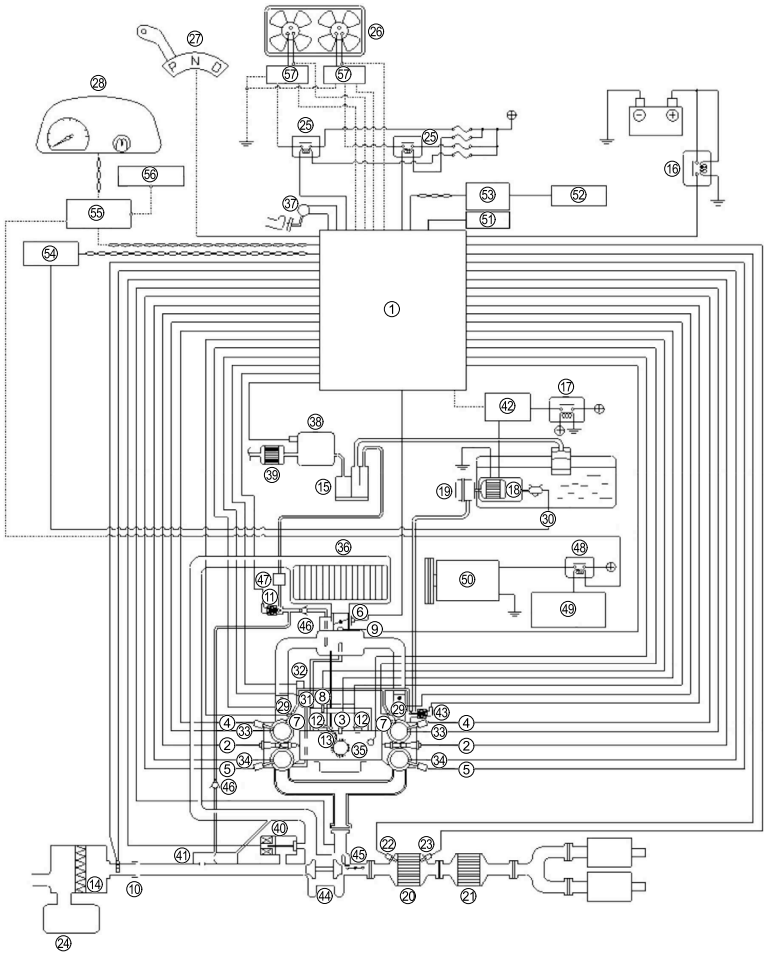
- MT model



EN-25097

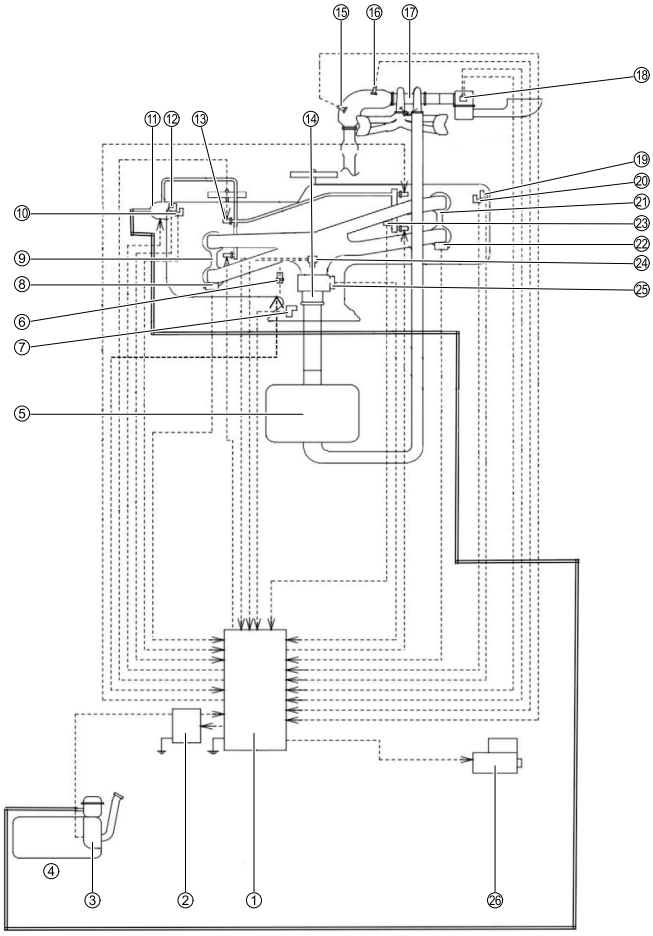
| | | |
|---|---|---|
| (1) Engine control module (ECM) | (20) Front catalytic converter | (39) Electronic air by-pass valve |
| (2) Ignition coil | (21) Rear catalytic converter | (40) Ejector |
| (3) Crankshaft position sensor | (22) Front oxygen (A/F) sensor | (41) Fuel pump CM |
| (4) Intake camshaft position sensor | (23) Rear oxygen sensor | (42) High-pressure fuel pump |
| (5) Exhaust camshaft position sensor | (24) Resonator chamber | (43) Turbocharger |
| (6) Electronic throttle control | (25) Radiator fan relay | (44) Electronic wastegate valve |
| (7) Fuel injector | (26) Radiator fan | (45) Check valve |
| (8) Engine coolant temperature sensor | (27) Combination meter | (46) CPC pressure sensor |
| (9) Manifold absolute pressure and intake air temperature sensor | (28) Tumble generator valve actuator | (47) A/C relay |
| (10) Mass air flow and intake air temperature sensor | (29) Fuel level sensor | (48) A/C control module |
| (11) Purge control solenoid valve | (30) EGR control valve | (49) A/C compressor |
| (12) Knock sensor | (31) Fuel pressure sensor | (50) ABS wheel speed sensor |
| (13) PCV valve | (32) Intake oil control solenoid | (51) VDC control module and hydraulic control unit (VDCCM&H/U) |
| (14) Air cleaner | (33) Exhaust oil control solenoid | (52) Body integrated unit |
| (15) Canister | (34) Engine oil temperature sensor | (53) Central gateway |
| (16) Main relay | (35) Intercooler | (54) Data link connector |
| (17) Fuel pump relay | (36) Accelerator pedal position sensor | (55) Radiator fan CM |
| (18) Fuel filter | (37) Leak check valve ASSY | (56) Neutral position switch |
| (19) Fuel pump | (38) Air filter | |

- CVT model



EN-25098

(1) Engine control module (ECM)
(2) Ignition coil
(3) Crankshaft position sensor
(4) Intake camshaft position sensor
(5) Exhaust camshaft position sensor
(6) Electronic throttle control
(7) Fuel injector
(8) Engine coolant temperature sensor
(9) Manifold absolute pressure and intake air temperature sensor
(10) Mass air flow and intake air temperature sensor
(11) Purge control solenoid valve
(12) Knock sensor
(13) PCV valve
(14) Air cleaner
(15) Canister
(16) Main relay
(17) Fuel pump relay
(18) Fuel filter
(19) Fuel pump
(20) Front catalytic converter
(21) Rear catalytic converter
(22) Front oxygen (A/F) sensor
(23) Rear oxygen sensor
(24) Resonator chamber
(25) Radiator fan relay
(26) Radiator fan
(27) Inhibitor switch
(28) Combination meter
(29) Tumble generator valve actuator
(30) Fuel level sensor
(31) EGR control valve
(32) Fuel pressure sensor
(33) Intake oil control solenoid
(34) Exhaust oil control solenoid
(35) Engine oil temperature sensor
(36) Intercooler
(37) Accelerator pedal position sensor
(38) Leak check valve ASSY
(39) Air filter
(40) Electronic air by-pass valve
(41) Ejector
(42) Fuel pump CM
(43) High-pressure fuel pump
(44) Turbocharger
(45) Electronic wastegate valve
(46) Check valve
(47) CPC pressure sensor
(48) A/C relay
(49) A/C control module
(50) A/C compressor
(51) Transmission control module (TCM)
(52) ABS wheel speed sensor
(53) VDC control module and hydraulic control unit (VDCCM&H/U)
(54) Body integrated unit
(55) Central gateway
(56) Data link connector
(57) Radiator fan CM

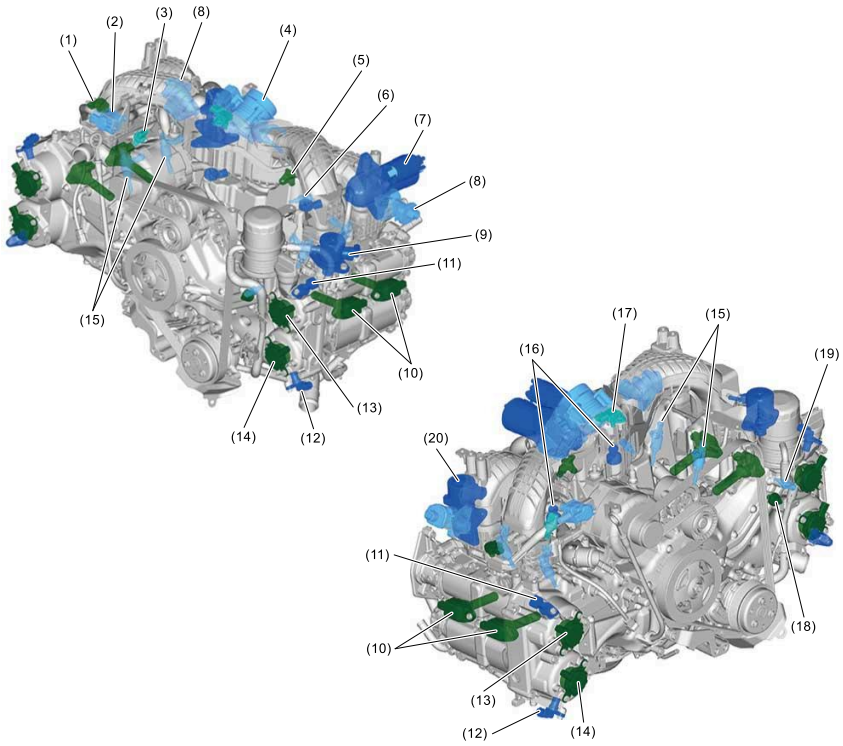



EN-25099

(1) Engine control module (ECM)
(2) Fuel pump CM
(3) Fuel pump
(4) Fuel tank
(5) Intercooler
(6) Engine coolant temperature sensor
(7) Crankshaft position sensor
(8) Tumble generator valve LH
(9) Tumble generator valve actuator LH
(10) Intake camshaft position sensor LH
(11) High-pressure fuel pump
(12) Exhaust camshaft position sensor LH
(13) Fuel injector
(14) Electronic throttle control
(15) Rear oxygen sensor
(16) Front oxygen (A/F) sensor
(17) Turbocharger
(18) Mass air flow and intake air temperature sensor
(19) Exhaust camshaft position sensor RH
(20) Intake camshaft position sensor RH
(21) Tumble generator valve actuator RH
(22) Tumble generator valve RH
(23) Fuel pressure sensor
(24) Manifold absolute pressure and intake air temperature sensor
(25) Throttle position sensor
(26) Starter

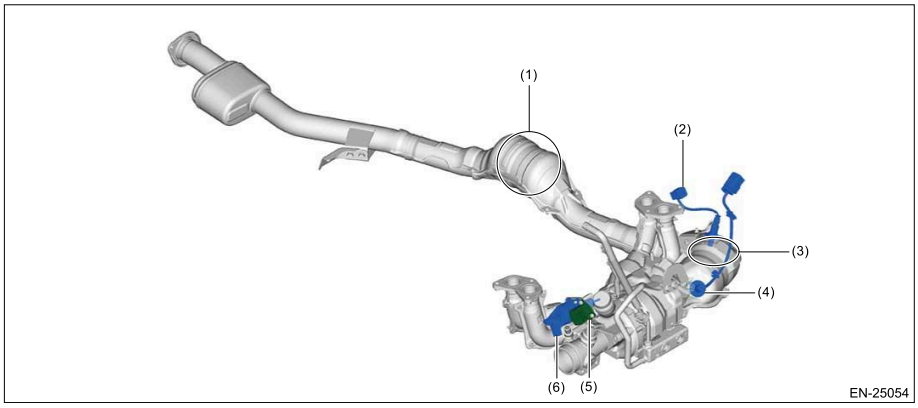
## LOCATION

### 1. ENGINE UNIT



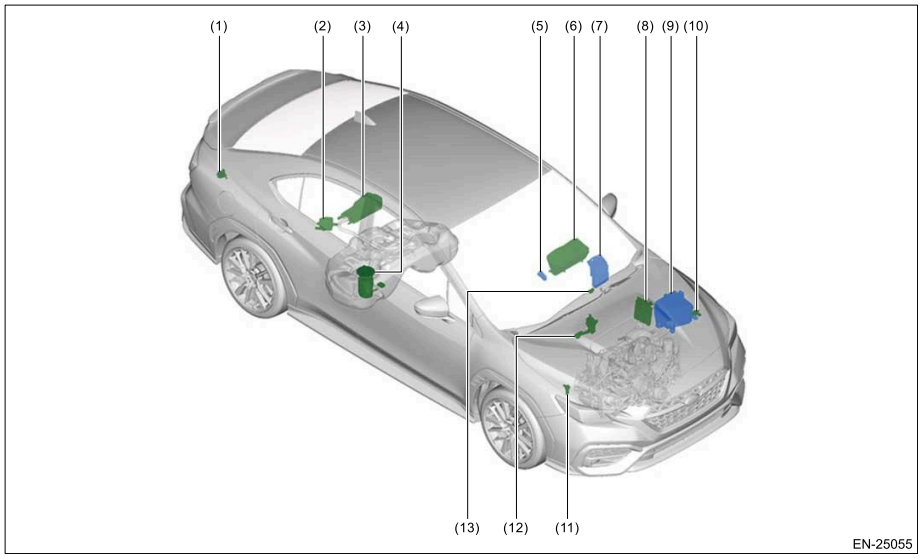

EN-25053

| | | |
|---|---|---|
| (1) CPC pressure sensor | (8) Tumble generator valve actuator | (15) Fuel injector |
| (2) Purge control solenoid valve | (9) High-pressure fuel pump | (16) Knock sensor |
| (3) Fuel pressure sensor | (10) Ignition coil | (17) Manifold absolute pressure and intake air temperature sensor |
| (4) Electronic throttle control | (11) Intake camshaft position sensor | (18) Oil pressure switch |
| (5) Crankshaft position sensor | (12) Exhaust camshaft position sensor | (19) Engine oil temperature sensor |
| (6) Engine coolant temperature sensor | (13) Intake oil control solenoid | (20) EGR control valve |
| (7) Starter motor | (14) Exhaust oil control solenoid | |



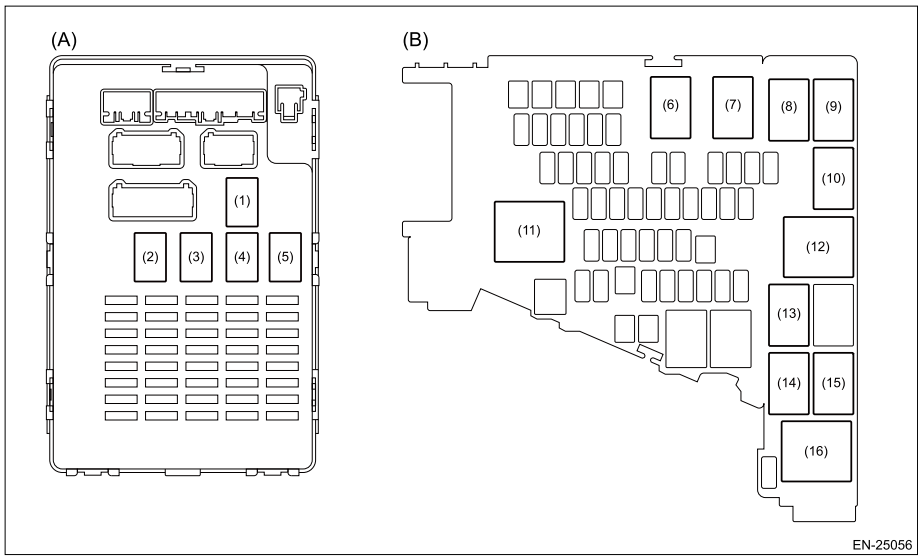

(1) Rear catalytic converter
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Front oxygen (A/F) sensor
(5) Electronic air by-pass valve
(6) Electronic wastegate valve

## 2. BODY




(1) Fuel pump CM
(2) Leak check valve ASSY
(3) Canister
(4) Fuel pump
(5) Push button ignition switch
(6) Combination meter
(7) F/B
(8) Engine control module (ECM)
(9) M/B
(10) Battery sensor
(11) Mass air flow and intake air temperature sensor
(12) Accelerator pedal position sensor
(13) Data link connector

## 3. FUSE AND RELAY




(A) F/B

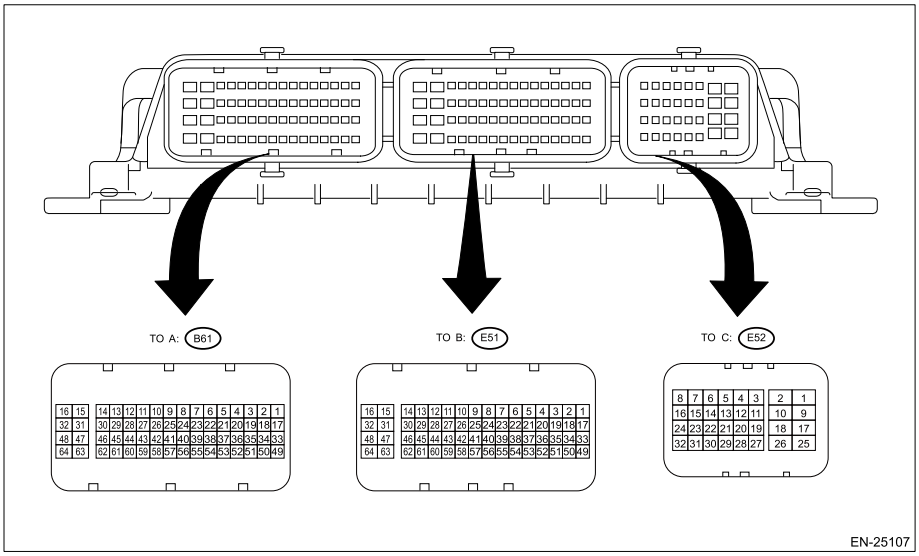
(B) M/B

(1) IG 1 relay
(2) IG 2 relay
(3) —
(4) —
(5) —
(6) —
(7) MB-IG relay
(8) Electronic throttle control relay
(9) Fuel pump relay
(10) —
(11) Main relay
(12) Sub fan relay
(13) -
(14) Starter relay
(15) Starter cut relay
(16) Main fan relay

**Note:**

**Only shows parts required for engine diagnosis.**

## ELECTRICAL SPECIFICATION




| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| Crankshaft position sensor | Power supply | E52 | 30 | 5 | 5 | — |
| | Signal | E52 | 4 | 0 or 5 | 0 or 5 | Waveforms 1 and 8 |
| | Ground | E52 | 5 | 0 | 0 | — |
| Intake camshaft position sensor | RH | E51 | 56 | 0 or 5 | 0 or 5 | Waveform 1 |
| | LH | E51 | 57 | 0 or 5 | 0 or 5 | Waveform 1 |
| Exhaust camshaft position sensor | RH | E51 | 24 | 0 or 5 | 0 or 5 | Waveform 1 |
| | LH | E51 | 40 | 0 or 5 | 0 or 5 | Waveform 1 |
| Camshaft position sensor ground | | E51 | 41 | 0 | 0 | — |
| Front oxygen (A/F) sensor | IP (+) signal | E51 | 52 | 0 — battery voltage | 2 — 4 | • Waveform 2<br>• When the ignition switch is turned to ON and after engine is warmed up (engine is OFF), voltage varies depending on the sensor temperature. |
| | VS (+) signal | E51 | 51 | 0 — battery voltage | 3 — 5 | • Waveform 2<br>• When the ignition switch is turned to ON and after engine is warmed up (engine is OFF), voltage varies depending on the sensor temperature. |
| | COM signal | E51 | 53 | 0 — battery voltage | 3 — 4 | When the ignition switch is turned to ON and after engine is warmed up (engine is OFF), voltage varies |

| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| | | | | | | depending on the sensor temperature. |
| | Heater signal | B61 | 32 | Battery voltage | 0 or battery voltage | Waveform 4 |
| Rear oxygen sensor | (+) signal | E51 | 5 | 2 — 3 | 2 — 3 | Waveform 3 |
| | (−) signal | E51 | 4 | 2 — 3 | 2 — 3 | — |
| | Heater signal | E52 | 3 | Battery voltage | 0 or battery voltage | Waveform 4 |
| Air flow sensor signal | | B61 | 62 | 0 or 5 | 0 or 5 | Waveform 13 |
| Intake air temperature sensor (Integrated with air flow sensor) | | B61 | 34 | 2 — 3 | 2 — 3 | — |
| Engine coolant temperature sensor | | E51 | 49 | 1 — 3 | 1 — 3 | — |
| Engine oil temperature sensor | | E51 | 36 | 1 — 3 | 1 — 3 | — |
| Manifold absolute pressure sensor | | E51 | 35 | 2 | 1 | — |
| Intake air temperature sensor (Integrated with manifold absolute pressure sensor) | | E51 | 34 | 2 — 3 | 2 — 3 | — |
| Fuel pressure sensor | Main signal | E51 | 22 | 1 — 1.6 | 1 | — |
| | Sub signal | E51 | 54 | 3 — 3.6 | 3 — 3.6 | — |
| CPC pressure sensor | | E51 | 50 | 1 — 4 | 1 — 4 | — |
| Knock sensor | RH | E51 | 3 | 2.5 | 2.5 | — |
| | LH | E51 | 2 | 2.5 | 2.5 | — |
| Accelerator pedal position sensor | Main power supply | B61 | 51 | 5 | 5 | — |
| | Main signal | B61 | 35 | Fully closed: 0.4 — 1<br>Fully open: 2.4 — 3.7 | Fully closed: 0.4 — 1<br>Fully open: 2.4 — 3.7 | Waveforms 2, 3, 5 and 6 |
| | Main ground | B61 | 19 | 0 | 0 | — |
| | Sub power supply | B61 | 49 | 5 | 5 | — |
| | Sub signal | B61 | 33 | Fully closed: 0.4 — 1<br>Fully open: 2.4 — 3.7 | Fully closed: 0.4 — 1<br>Fully open: 2.4 — 3.7 | — |
| | Sub ground | B61 | 17 | 0 | 0 | — |
| Tumble generator valve actuator RH | Position signal | E51 | 38 | 1 | 1 | Fully closed: 1<br>Fully opened: 3<br>Waveform 5 |
| | Motor open | E51 | 44 | 0 | 0 | When in operation: Waveform 5 |
| | Motor closed | E51 | 43 | 0 | 0 | When in operation: Waveform 5 |
| Tumble generator valve actuator LH | Position signal | E51 | 6 | 1 | 1 | Fully closed: 1<br>Fully opened: 3<br>Waveform 6 |
| | Motor open | E51 | 46 | 0 | 0 | When in operation: Waveform 6 |

| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| | Motor closed | E51 | 45 | 0 | 0 | When in operation: Waveform 6 |
| Intake oil control solenoid | RH | E51 | 14 | Battery voltage | 0 or battery voltage | Drive frequency: 125 Hz Waveform 7 |
| | LH | E51 | 13 | Battery voltage | 0 or battery voltage | Drive frequency: 125 Hz Waveform 7 |
| Exhaust oil control solenoid | RH | E51 | 12 | Battery voltage | 0 or battery voltage | Drive frequency: 125 Hz Waveform 7 |
| | LH | E51 | 11 | Battery voltage | 0 or battery voltage | Drive frequency: 125 Hz Waveform 7 |
| Purge control solenoid valve | | E52 | 19 | Battery voltage | Battery voltage | When in operation: 0 or battery voltage |
| Ignition coil | #1 | E51 | 10 | 0 | 0 or 5 | Waveform 8 |
| | #2 | E51 | 26 | 0 | 0 or 5 | Waveform 8 |
| | #3 | E51 | 42 | 0 | 0 or 5 | Waveform 8 |
| | #4 | E51 | 58 | 0 | 0 or 5 | Waveform 8 |
| EGR control valve | A (+) | E51 | 62 | 0 or battery voltage | 0 or battery voltage | — |
| | A (−) | E51 | 60 | 0 or battery voltage | 0 or battery voltage | — |
| | B (+) | E51 | 61 | 0 or battery voltage | 0 or battery voltage | — |
| | B (−) | E51 | 59 | 0 or battery voltage | 0 or battery voltage | — |
| Leak check valve assembly | Switching valve | B61 | 13 | Battery voltage | Battery voltage | Operating: 0 |
| | Vacuum pump | B61 | 30 | Battery voltage | Battery voltage | Operating: 0 |
| | Pressure sensor | B61 | 2 | 1 — 4 | 1 — 4 | When ignition switch is turned to ON: atmospheric pressure |
| Fuel pump control | Control signal | B61 | 11 | ON: 0 or battery voltage OFF: 0 | 0 or battery voltage | Waveform 9 |
| | Diagnostic signal | B61 | 36 | ON: Battery voltage OFF: 0 | Battery voltage | — |
| High-pressure fuel pump | HI | E52 | 1 | — | — | Measurement prohibited |
| | LO | E52 | 9 | — | — | Measurement prohibited |
| Fuel injector | Power supply | B61 | 16 | Battery voltage | Battery voltage | — |
| | #1 (+) | E51 | 16 | 0 | — | Measurement is prohibited while the engine is running. |
| | #1 (−) | E51 | 15 | 0 | — | |
| | #2 (+) | E51 | 32 | 0 | — | |
| | #2 (−) | E51 | 31 | 0 | — | |
| | #3 (+) | E51 | 48 | 0 | — | |
| | #3 (−) | E51 | 47 | 0 | — | |
| | #4 (+) | E51 | 64 | 0 | — | |
| | #4 (−) | E51 | 63 | 0 | — | |
| Electronic throttle control | Power supply | E52 | 22 | 5 | 5 | — |
| | Main signal | E52 | 31 | Fully closed: Approx. 0.7 | Fully closed: Approx. 0.7 | — |

| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| | | | | Fully open: Approx. 3.9 | Fully open: Approx. 3.9 | |
| | Sub signal | E52 | 15 | Fully closed: Approx. 4.4 Fully open: 1.1 | Fully closed: Approx. 4.4 Fully open: 1.1 | — |
| | Ground | E52 | 23 | 0 | 0 | — |
| | Motor (+) | E51 | 30 | 0 or battery voltage | 0 or battery voltage | Drive frequency: 10 kHz |
| | Motor (−) | E51 | 29 | 0 or battery voltage | 0 or battery voltage | Drive frequency: 10 kHz |
| Electronic throttle control motor power supply | | B61 | 64 | Battery voltage | Battery voltage | — |
| Electronic throttle control relay control | | B61 | 60 | 0 | 0 | — |
| Electronic wastegate valve | Position signal | E51 | 37 | 1 — 1.4 | 1 — 1.4 | — |
| | Motor (+) | E52 | 18 | 0 or battery voltage | 0 or battery voltage | — |
| | Motor (−) | E52 | 26 | 0 or battery voltage | 0 or battery voltage | — |
| Electronic air by-pass valve | | E51 | 9 | Battery voltage | Battery voltage | — |
| Radiator main fan | Control signal | B61 | 59 | 0 or battery voltage | 0 or battery voltage | ON |
| | Diagnostic signal | B61 | 9 | 0 or battery voltage | 0 or battery voltage | — |
| Main fan relay control | | B61 | 46 | 0 | 0 | — |
| Radiator sub fan | Control signal | B61 | 27 | 0 or battery voltage | 0 or battery voltage | ON |
| | Diagnostic signal | B61 | 41 | 0 or battery voltage | 0 or battery voltage | — |
| Sub fan relay control | | B61 | 45 | 0 | 0 | — |
| Self-shutoff relay control | | B61 | 29 | 0 | 0 | — |
| Starter relay control | | B61 | 12 | Battery voltage | Battery voltage | Models without push button start: Waveform 10 Models with push button start: Waveform 12 |
| Starter cut relay control | | B61 | 44 | Battery voltage | Battery voltage | Models without push button start: Waveform 10 Models with push button start: Waveform 11 and 12 |
| Starter switch | | B61 | 55 | 0 | 0 | Models without push button start: Waveform 10 Models with push button start: Waveform 11 |
| Starter switch 2 | | B61 | 53 | 0 | 0 | Models without push button start: Waveform 10 Models with push button start: Waveform 11 |
| Accessory cut request | | B61 | 43 | Battery voltage | Battery voltage | Models with push button start: Waveform 11 |

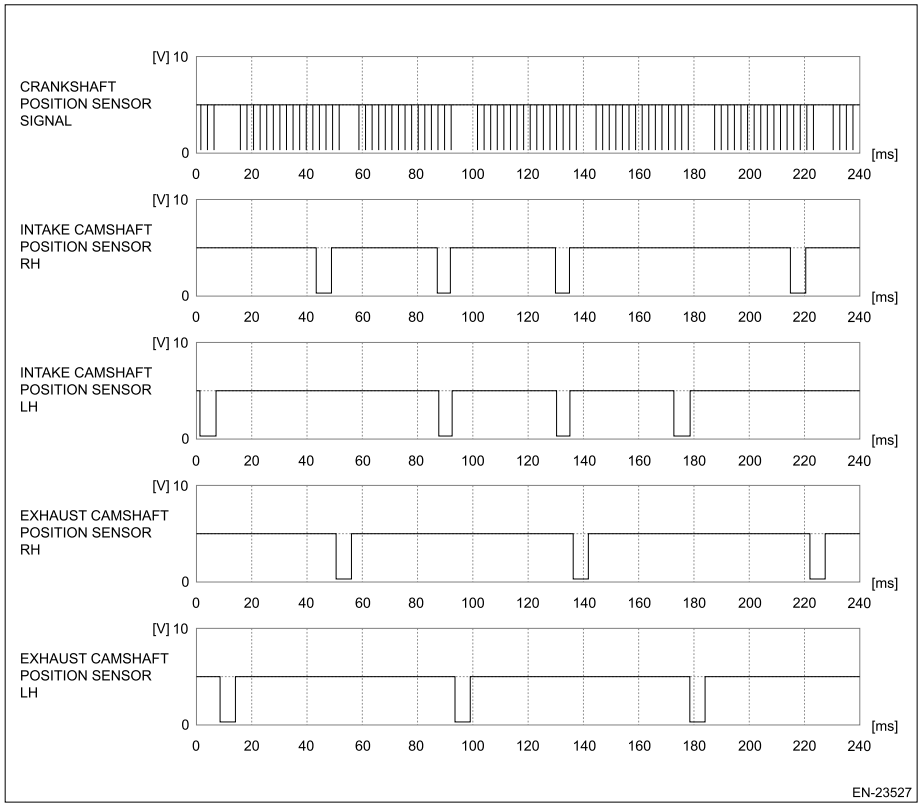
| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| Engine speed output | | B61 | 58 | Battery voltage | 0 or battery voltage | Models with push button start: Waveform 12 |
| Clutch start switch | | B61 | 56 | When clutch pedal is depressed: Battery voltage<br>When clutch pedal is released: 0 | When clutch pedal is depressed: Battery voltage<br>When clutch pedal is released: 0 | MT model |
| Clutch switch | | B61 | 24 | When clutch pedal is depressed: 0<br>When clutch pedal is released: Battery voltage | When clutch pedal is depressed: 0<br>When clutch pedal is released: Battery voltage | MT model |
| Brake switch 1 (Brake switch) | | B61 | 8 | When brake pedal is depressed: 0<br>When brake pedal is released: Battery voltage | When brake pedal is depressed: 0<br>When brake pedal is released: Battery voltage | — |
| Brake switch 2 (Stop light switch) | | B61 | 39 | When brake pedal is depressed: Battery voltage<br>When brake pedal is released: 0 | When brake pedal is depressed: Battery voltage<br>When brake pedal is released: 0 | — |
| Cruise control main switch | | B61 | 52 | ON: 0<br>OFF: 5 | ON: 0<br>OFF: 5 | Model without EyeSight |
| Cruise control command switch | | B61 | 1 | When operating nothing: 3.5 — 4.5<br>When operating RES/ACC: 2.5 — 3.5<br>When operating SET/COAST: 0.5 — 1.5<br>When operating CANCEL: 0 — 0.5 | When operating nothing: 3.5 — 4.5<br>When operating RES/ACC: 2.5 — 3.5<br>When operating SET/COAST: 0.5 — 1.5<br>When operating CANCEL: 0 — 0.5 | Model without EyeSight |
| Neutral position switch | Signal | E52 | 12 | ON: 0<br>OFF: Battery voltage | ON: 0<br>OFF: Battery voltage | — |
| | Ground | E52 | 13 | 0 | 0 | — |
| Oil level switch | | E51 | 23 | 0 | 0 | Oil level LOW: 5 |
| Ignition switch | | B61 | 54 | Battery voltage | Battery voltage | Models with push button start: Waveform 12 |
| Delivery mode switch | | B61 | 37 | Battery voltage | Battery voltage | When the fuse is installed: 0 |
| Blow-by leak diagnosis | | E51 | 39 | 0 | 0 | At the time of open circuit (fault): 5 |
| CAN communication (P/U1 CAN) | HI | B61 | 6 | — | — | — |
| | LO | B61 | 5 | — | — | — |
| CAN communication ((I)_P/U2 CAN) | HI | B61 | 22 | — | — | — |
| | LO | B61 | 21 | — | — | — |
| LIN communication | | B61 | 20 | — | — | — |
| Immobilizer communication | | B61 | 4 | — | — | — |
| Control module power supply | | B61 | 15 | Battery voltage | Battery voltage | — |
| | | B61 | 31 | Battery voltage | Battery voltage | — |

| Description | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON After warm-up (at engine OFF) | Engine ON After warm-up (at idle) | |
| Backup power supply | | B61 | 14 | Battery voltage | Battery voltage | — |
| Sensor power supply | | B61 | 50 | 5 | 5 | — |
| | | E51 | 1 | 5 | 5 | — |
| | | E51 | 17 | 5 | 5 | — |
| Ground | Sensor | B61 | 61 | 0 | 0 | — |
| | | E51 | 33 | 0 | 0 | — |
| | Engine 1 | B61 | 48 | 0 | 0 | — |
| | Engine 2 | B61 | 47 | 0 | 0 | — |
| | Engine 3 | B61 | 63 | 0 | 0 | — |
| | Engine 4 | E52 | 10 | 0 | 0 | — |
| | Engine 5 | E52 | 2 | 0 | 0 | — |

**Note:**

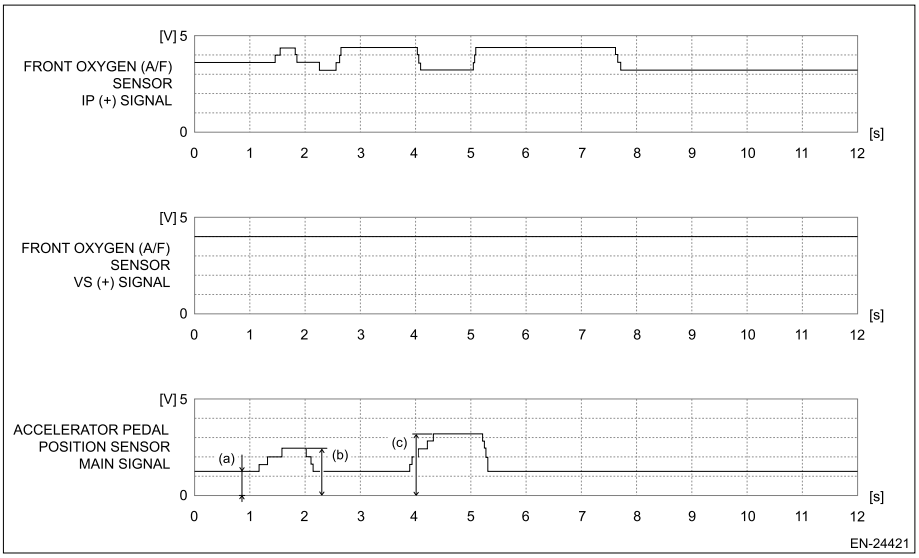
- **After engine is warmed up, attach the check board for measurement.**
- **Set the select lever in "P" range or "N" range, or the shift lever in neutral.**
- **Turn the A/C to OFF.**
- **Turn all the accessory switches to OFF.**
- **Waveforms vary depending on a measurement environment and vehicle condition.**
- **Oscilloscope waveform illustrated here is an example for reference. Noise and chattering in waveform are omitted.**

1. Waveform 1



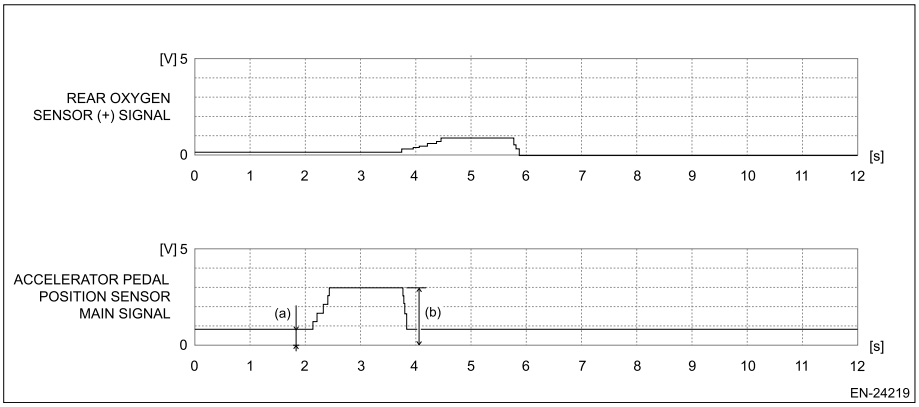

| | |
|---|---|
| Measured terminal | Crankshaft position sensor signal (E52) No. 4 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Intake camshaft position sensor RH (E51) No. 56 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Intake camshaft position sensor LH (E51) No. 57 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Exhaust camshaft position sensor RH (E51) No. 24 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Exhaust camshaft position sensor LH (E51) No. 40 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |

2. Waveform 2



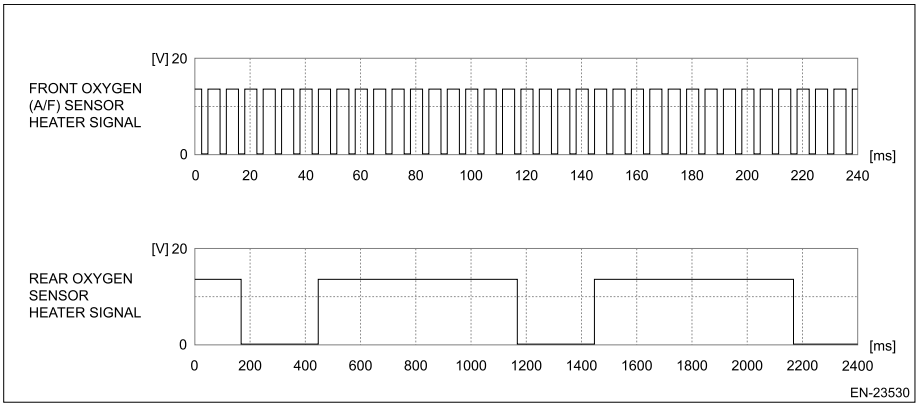

| | |
|---|---|
| Measured terminal | Front oxygen (A/F) sensor IP (+) signal (E51) No. 52 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Front oxygen (A/F) sensor VS (+) signal (E51) No. 51 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Accelerator pedal position sensor main signal (B61) No. 35 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | (a) accelerator pedal fully closed (b) accelerator pedal half open (c) accelerator pedal fully opened |

3. Waveform 3



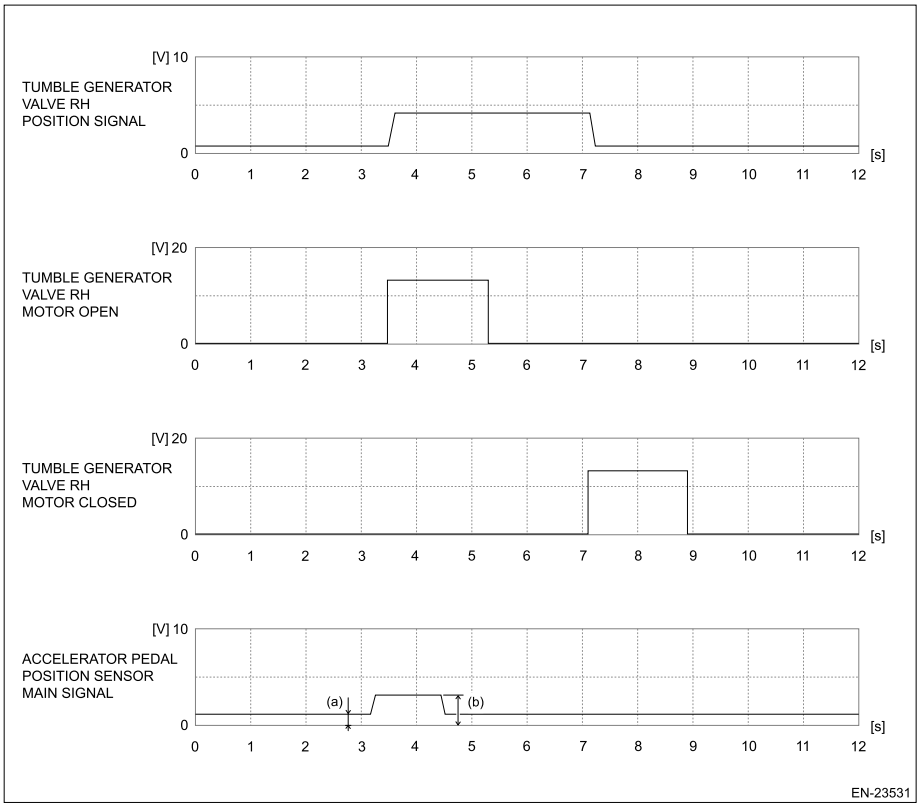

| | |
|---|---|
| Measured terminal | Rear oxygen sensor (+) signal (E51) No. 5 (+) — Rear oxygen sensor (−) signal (E51) No. 4 (−): |
| | Accelerator pedal position sensor main signal (B61) No. 35 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | (a) Accelerator pedal fully closed (b) Accelerator pedal fully opened |

4. Waveform 4



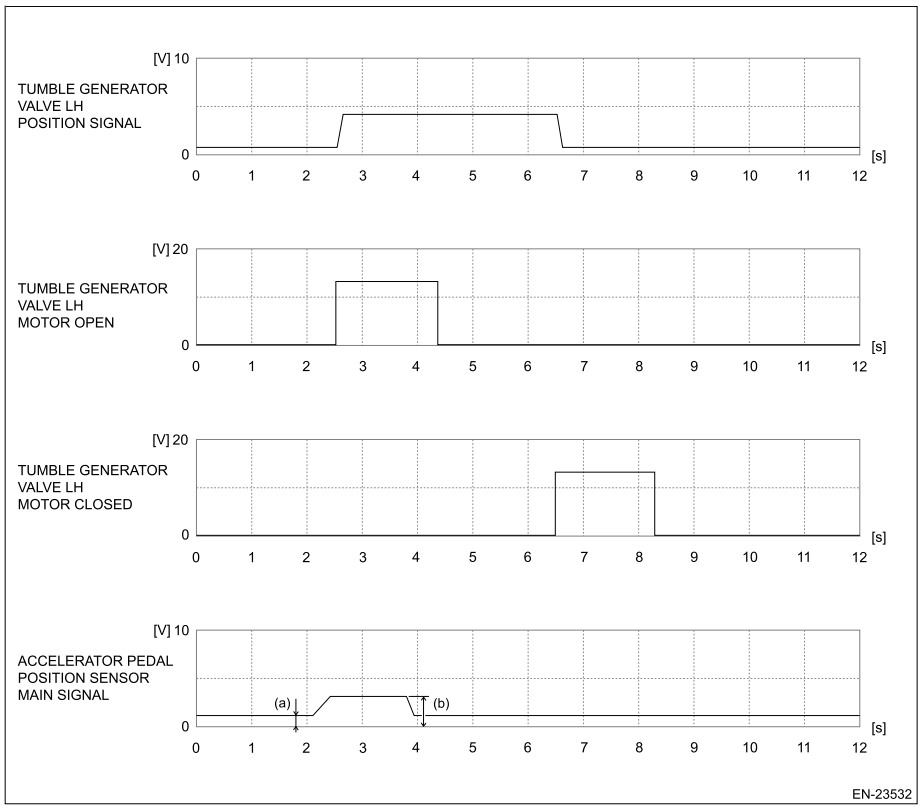

| | |
|---|---|
| Measured terminal | Front oxygen (A/F) sensor heater signal (B61) No. 32 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Rear oxygen sensor heater signal (E52) No. 3 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |

5. Waveform 5



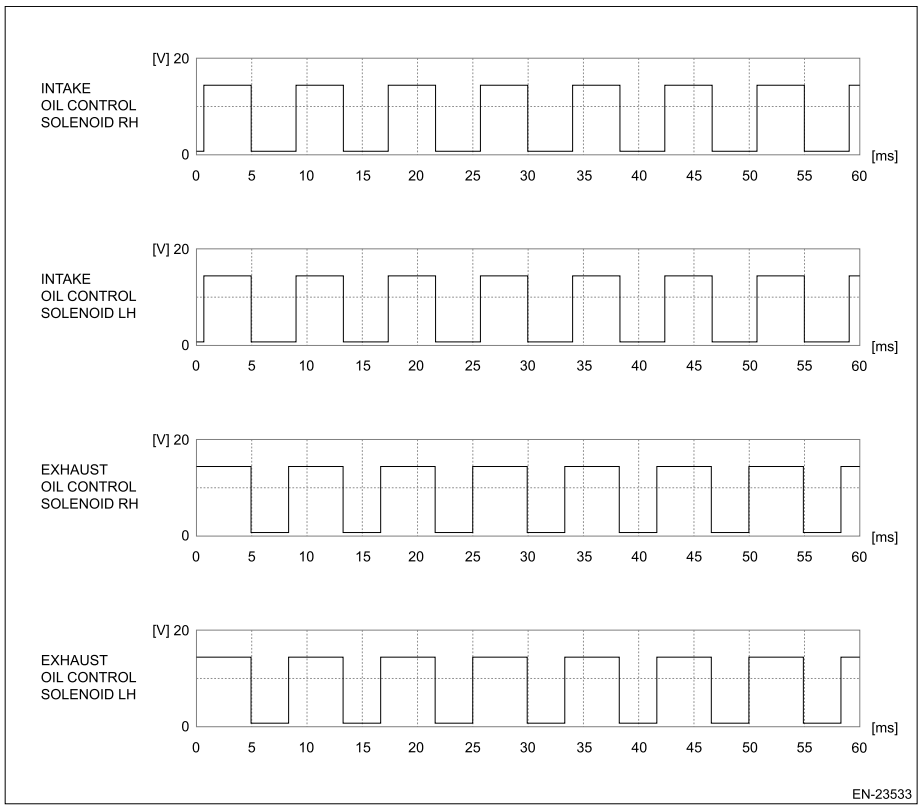

| | |
|---|---|
| Measured terminal | Tumble generator valve actuator RH position signal (E51) No. 38 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Tumble generator valve actuator RH motor open (E51) No. 44 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Tumble generator valve actuator RH motor closed (E51) No. 43 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Accelerator pedal position sensor main signal (B61) No. 35 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | (a) Accelerator pedal fully closed (b) Accelerator pedal fully opened |

6. Waveform 6



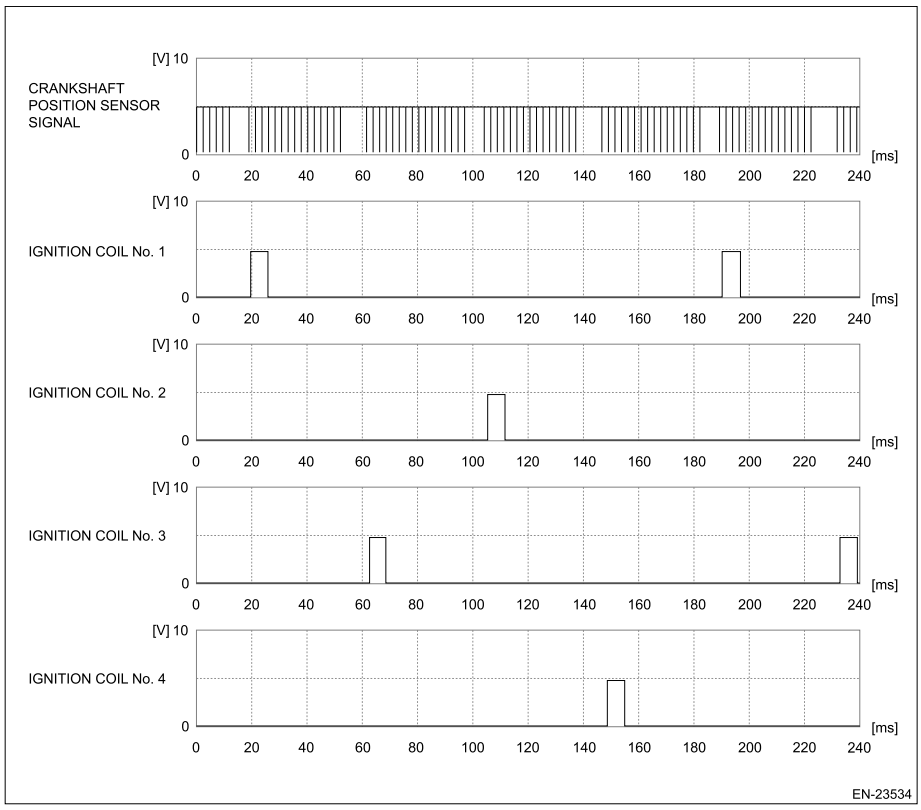

| | |
|---|---|
| Measured terminal | Tumble generator valve actuator LH position signal (E51) No. 6 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Tumble generator valve actuator LH motor open (E51) No. 46 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Tumble generator valve actuator LH motor closed (E51) No. 45 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Accelerator pedal position sensor main signal (B61) No. 35 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | (a) Accelerator pedal fully closed (b) Accelerator pedal fully opened |

7. Waveform 7



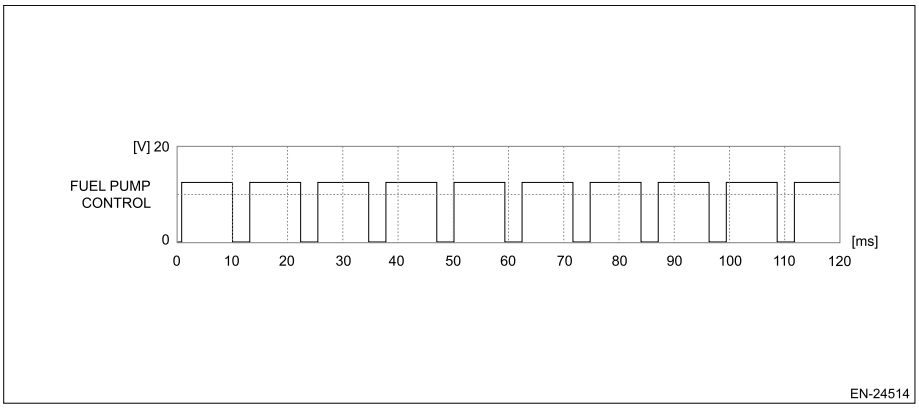

| | |
|---|---|
| Measured terminal | Intake oil control solenoid RH (E51) No. 14 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Intake oil control solenoid LH (E51) No. 13 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Exhaust oil control solenoid RH (E51) No. 12 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Exhaust oil control solenoid LH (E51) No. 11 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |

8. Waveform 8



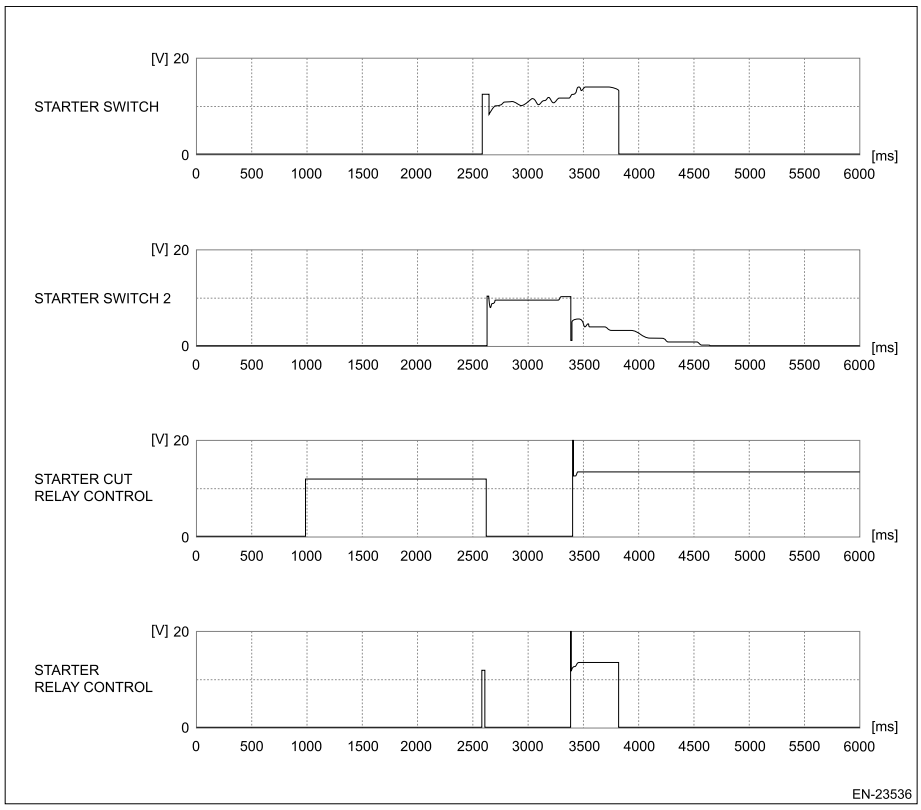

| | |
|---|---|
| Measured terminal | Crankshaft position sensor signal (E52) No. 4 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Ignition coil #1 (E51) No. 10 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Ignition coil #2 (E51) No. 26 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Ignition coil #3 (E51) No. 42 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Ignition coil #4 (E51) No. 58 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |

9. Waveform 9



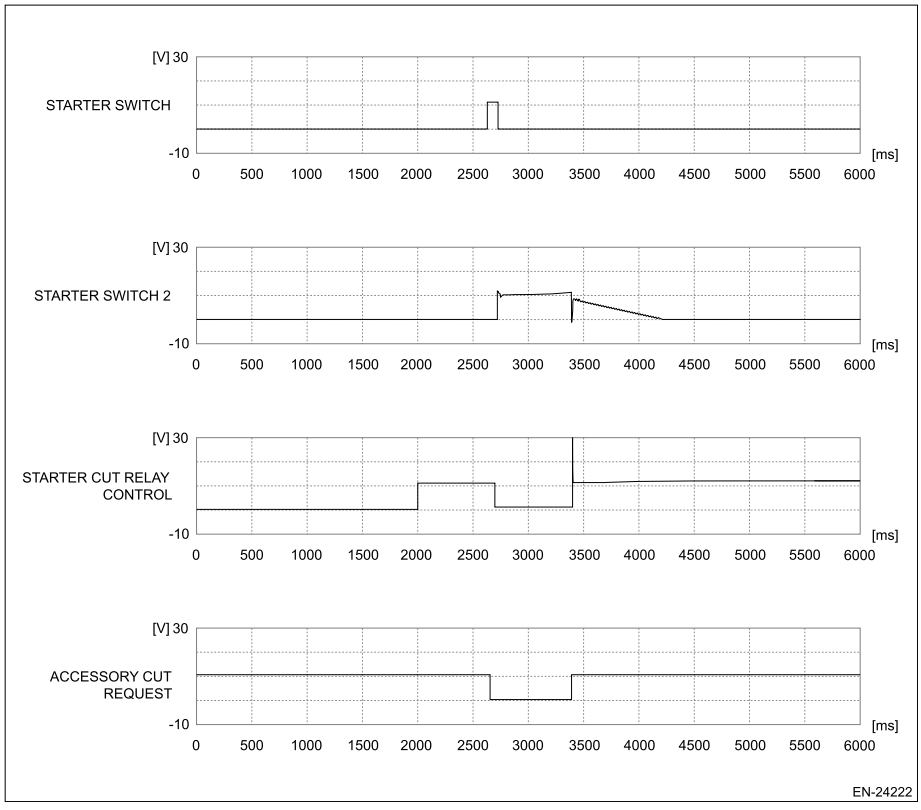

| | |
|---|---|
| Measured terminal | Fuel pump control (B61) No. 11 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |

10. Waveform 10




| | |
|---|---|
| Measured terminal | Starter switch (B61) No. 55 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Starter switch 2 (B61) No. 53 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Starter cut relay control (B61) No. 44 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Starter relay control (B61) No. 12 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | When engine is started |

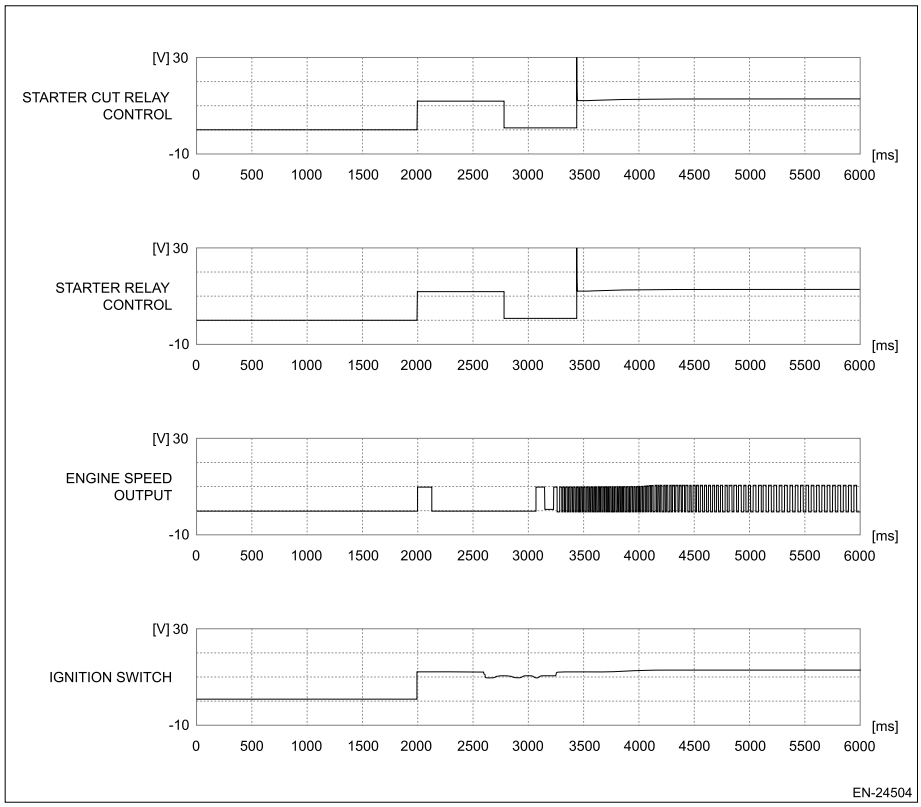
11. Waveform 11




| | |
|---|---|
| Measured terminal | Starter switch (B61) No. 55 (+) — Engine ground 3 (B61) No. 63 (−): |

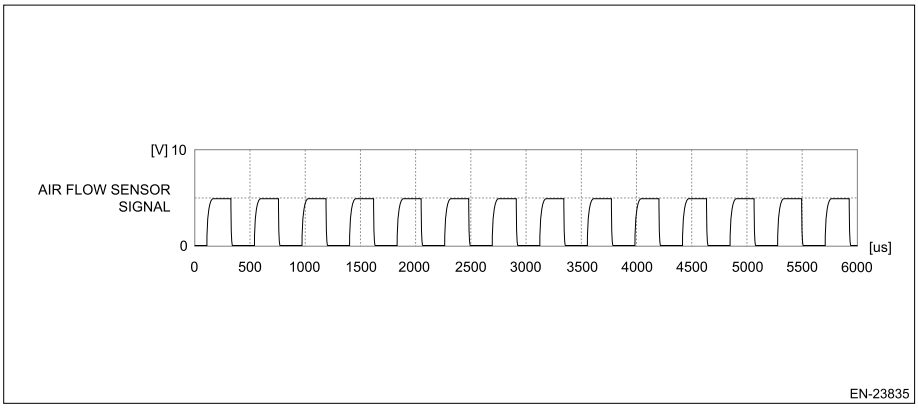
| | |
|---|---|
| | Starter switch 2 (B61) No. 53 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Starter cut relay control (B61) No. 44 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Accessory cut request (B61) No. 43 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | When engine is started |

12. Waveform 12

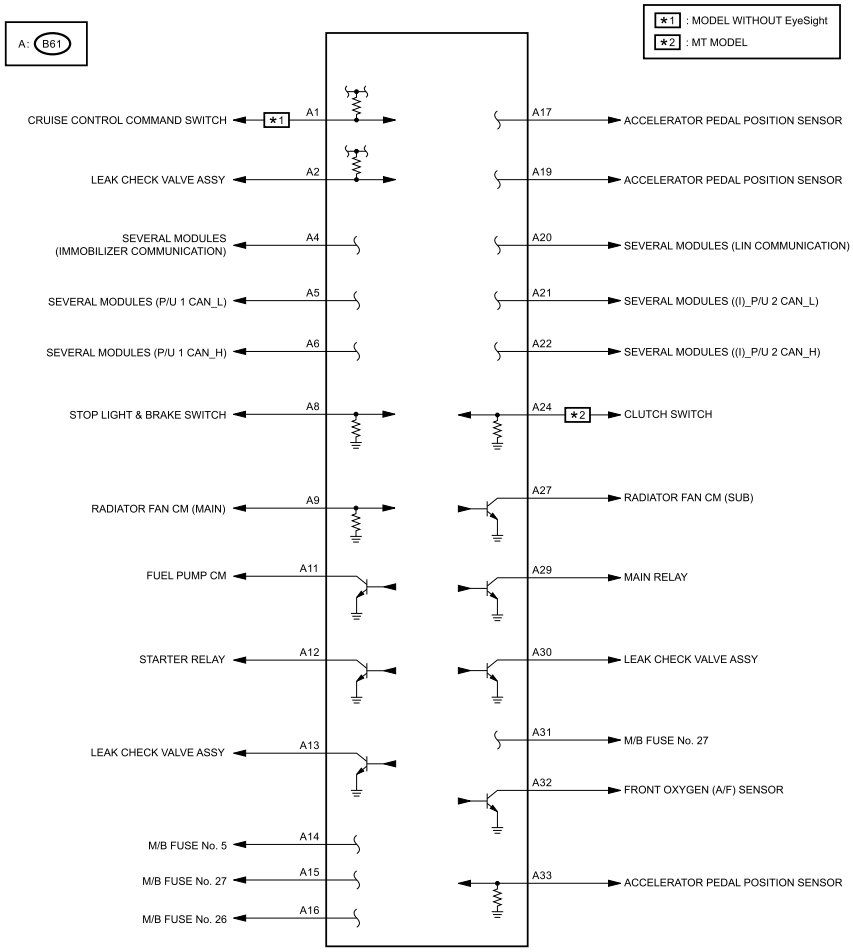



| | |
|---|---|
| Measured terminal | Starter cut relay control (B61) No. 44 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Starter relay control (B61) No. 12 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Engine speed output (B61) No. 58 (+) — Engine ground 3 (B61) No. 63 (−): |
| | Ignition switch (B61) No. 54 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | When engine is started |

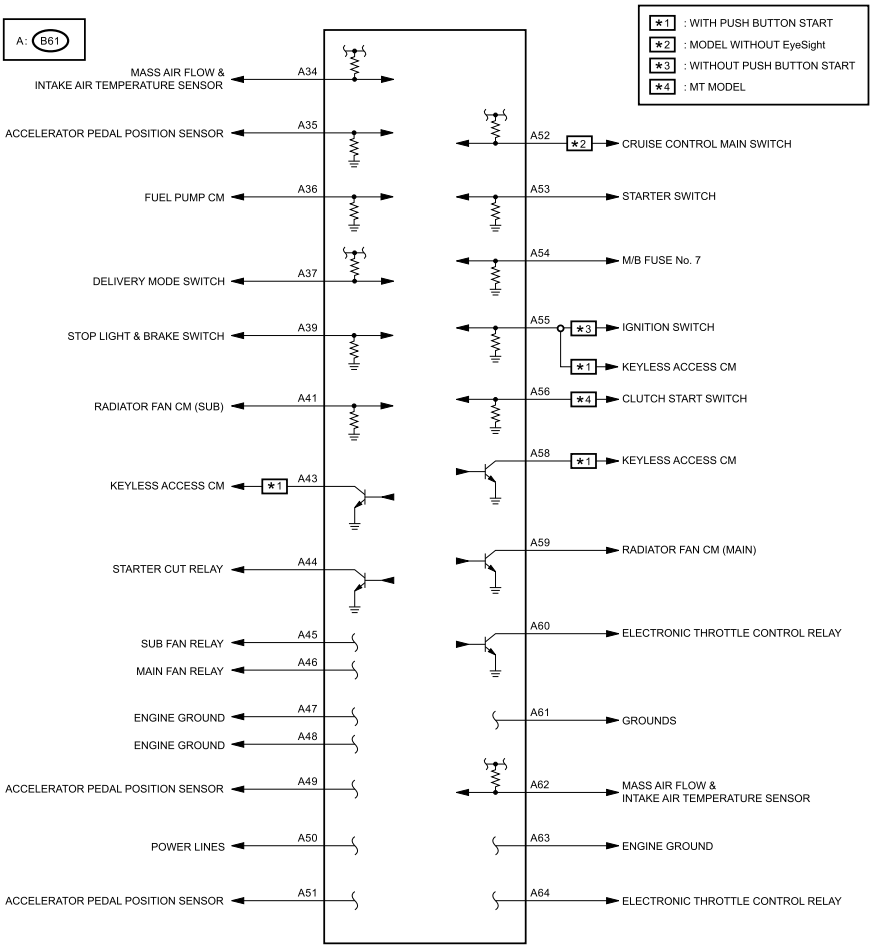
13. Waveform 13



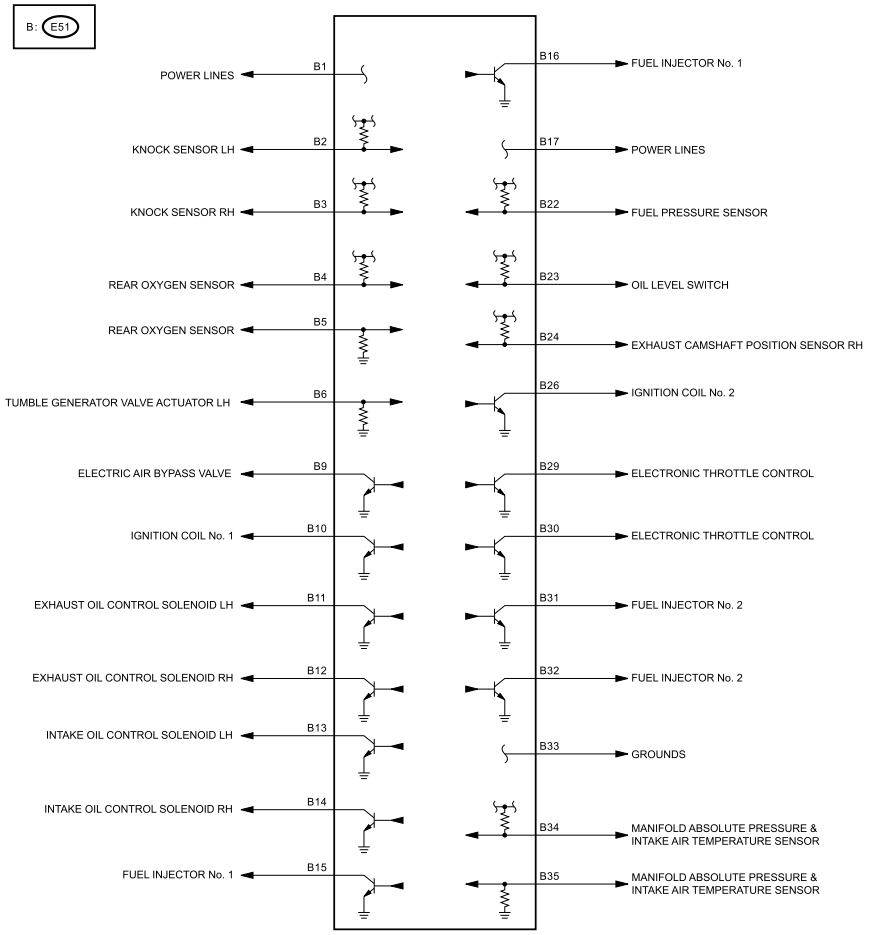

| | |
|---|---|
| Measured terminal | Air flow sensor signal (B61) No. 62 (+) — Engine ground 3 (B61) No. 63 (−): |
| Measuring condition | While engine idling |


A: B61
*1 : MODEL WITHOUT EyeSight
*2 : MT MODEL
CRUISE CONTROL COMMAND SWITCH
*1
A1
LEAK CHECK VALVE ASSY
A2
SEVERAL MODULES (IMMOBILIZER COMMUNICATION)
A4
SEVERAL MODULES (P/U 1 CAN_L)
A5
SEVERAL MODULES (P/U 1 CAN_H)
A6
STOP LIGHT & BRAKE SWITCH
A8
RADIATOR FAN CM (MAIN)
A9
FUEL PUMP CM
A11
STARTER RELAY
A12
LEAK CHECK VALVE ASSY
A13
M/B FUSE No. 5
A14
M/B FUSE No. 27
A15
M/B FUSE No. 26
A16
A17
ACCELERATOR PEDAL POSITION SENSOR
A19
ACCELERATOR PEDAL POSITION SENSOR
A20
SEVERAL MODULES (LIN COMMUNICATION)
A21
SEVERAL MODULES ((I)_P/U 2 CAN_L)
A22
SEVERAL MODULES ((I)_P/U 2 CAN_H)
A24
*2
CLUTCH SWITCH
A27
RADIATOR FAN CM (SUB)
A29
MAIN RELAY
A30
LEAK CHECK VALVE ASSY
A31
M/B FUSE No. 27
A32
FRONT OXYGEN (A/F) SENSOR
A33
ACCELERATOR PEDAL POSITION SENSOR

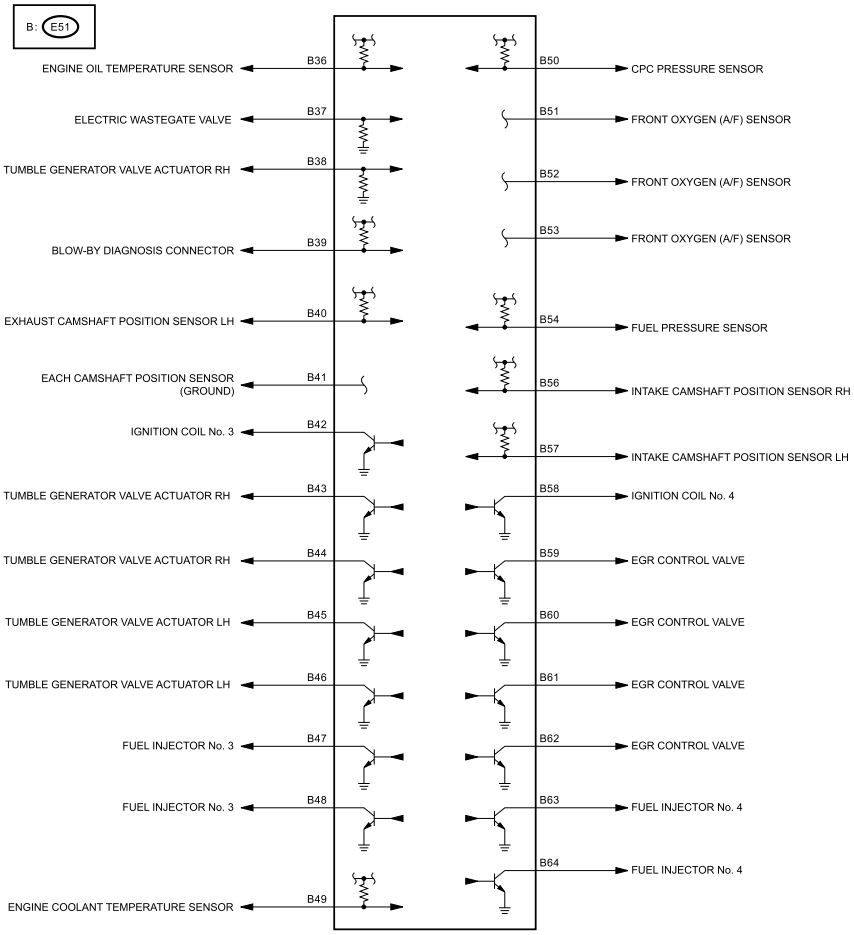
EN-25103


A: B61
*1 : WITH PUSH BUTTON START
*2 : MODEL WITHOUT EyeSight
*3 : WITHOUT PUSH BUTTON START
*4 : MT MODEL
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
A34
ACCELERATOR PEDAL POSITION SENSOR
A35
FUEL PUMP CM
A36
DELIVERY MODE SWITCH
A37
STOP LIGHT & BRAKE SWITCH
A39
RADIATOR FAN CM (SUB)
A41
KEYLESS ACCESS CM
*1
A43
STARTER CUT RELAY
A44
SUB FAN RELAY
A45
MAIN FAN RELAY
A46
ENGINE GROUND
A47
ENGINE GROUND
A48
ACCELERATOR PEDAL POSITION SENSOR
A49
POWER LINES
A50
ACCELERATOR PEDAL POSITION SENSOR
A51
A52
*2
CRUISE CONTROL MAIN SWITCH
A53
STARTER SWITCH
A54
M/B FUSE No. 7
A55
*3
IGNITION SWITCH
*1
KEYLESS ACCESS CM
A56
*4
CLUTCH START SWITCH
A58
*1
KEYLESS ACCESS CM
A59
RADIATOR FAN CM (MAIN)
A60
ELECTRONIC THROTTLE CONTROL RELAY
A61
GROUNDS
A62
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
A63
ENGINE GROUND
A64
ELECTRONIC THROTTLE CONTROL RELAY

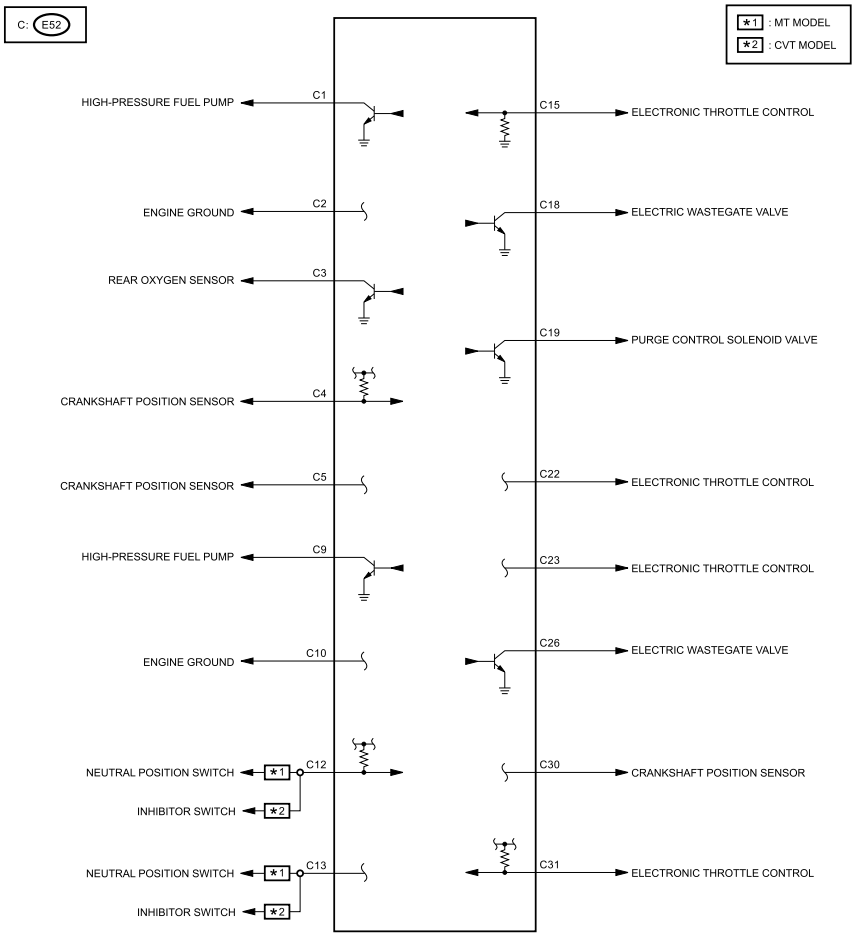
EN-25104


B: E51
POWER LINES
B1
KNOCK SENSOR LH
B2
KNOCK SENSOR RH
B3
REAR OXYGEN SENSOR
B4
REAR OXYGEN SENSOR
B5
TUMBLE GENERATOR VALVE ACTUATOR LH
B6
ELECTRIC AIR BYPASS VALVE
B9
IGNITION COIL No. 1
B10
EXHAUST OIL CONTROL SOLENOID LH
B11
EXHAUST OIL CONTROL SOLENOID RH
B12
INTAKE OIL CONTROL SOLENOID LH
B13
INTAKE OIL CONTROL SOLENOID RH
B14
FUEL INJECTOR No. 1
B15
B16
FUEL INJECTOR No. 1
B17
POWER LINES
B22
FUEL PRESSURE SENSOR
B23
OIL LEVEL SWITCH
B24
EXHAUST CAMSHAFT POSITION SENSOR RH
B26
IGNITION COIL No. 2
B29
ELECTRONIC THROTTLE CONTROL
B30
ELECTRONIC THROTTLE CONTROL
B31
FUEL INJECTOR No. 2
B32
FUEL INJECTOR No. 2
B33
GROUNDS
B34
MANIFOLD ABSOLUTE PRESSURE &
INTAKE AIR TEMPERATURE SENSOR
B35
MANIFOLD ABSOLUTE PRESSURE &
INTAKE AIR TEMPERATURE SENSOR

EN-25105


B: E51
ENGINE OIL TEMPERATURE SENSOR
B36
ELECTRIC WASTEGATE VALVE
B37
TUMBLE GENERATOR VALVE ACTUATOR RH
B38
BLOW-BY DIAGNOSIS CONNECTOR
B39
EXHAUST CAMSHAFT POSITION SENSOR LH
B40
EACH CAMSHAFT POSITION SENSOR (GROUND)
B41
IGNITION COIL No. 3
B42
TUMBLE GENERATOR VALVE ACTUATOR RH
B43
TUMBLE GENERATOR VALVE ACTUATOR RH
B44
TUMBLE GENERATOR VALVE ACTUATOR LH
B45
TUMBLE GENERATOR VALVE ACTUATOR LH
B46
FUEL INJECTOR No. 3
B47
FUEL INJECTOR No. 3
B48
ENGINE COOLANT TEMPERATURE SENSOR
B49
B50
CPC PRESSURE SENSOR
B51
FRONT OXYGEN (A/F) SENSOR
B52
FRONT OXYGEN (A/F) SENSOR
B53
FRONT OXYGEN (A/F) SENSOR
B54
FUEL PRESSURE SENSOR
B56
INTAKE CAMSHAFT POSITION SENSOR RH
B57
INTAKE CAMSHAFT POSITION SENSOR LH
B58
IGNITION COIL No. 4
B59
EGR CONTROL VALVE
B60
EGR CONTROL VALVE
B61
EGR CONTROL VALVE
B62
FUEL INJECTOR No. 4
B63
FUEL INJECTOR No. 4
B64

EN-25106


C: E52
*1 : MT MODEL
*2 : CVT MODEL
HIGH-PRESSURE FUEL PUMP
C1
ENGINE GROUND
C2
REAR OXYGEN SENSOR
C3
CRANKSHAFT POSITION SENSOR
C4
CRANKSHAFT POSITION SENSOR
C5
HIGH-PRESSURE FUEL PUMP
C9
ENGINE GROUND
C10
NEUTRAL POSITION SWITCH
*1
C12
INHIBITOR SWITCH
*2
NEUTRAL POSITION SWITCH
*1
C13
INHIBITOR SWITCH
*2
C15
ELECTRONIC THROTTLE CONTROL
C18
ELECTRIC WASTEGATE VALVE
C19
PURGE CONTROL SOLENOID VALVE
C22
ELECTRONIC THROTTLE CONTROL
C23
ELECTRONIC THROTTLE CONTROL
C26
ELECTRIC WASTEGATE VALVE
C30
CRANKSHAFT POSITION SENSOR
C31
ELECTRONIC THROTTLE CONTROL

EN-25144

## PROCEDURE

It is possible to diagnose the DTC by performing the indicated inspection mode. After correcting the DTC, perform a necessary inspection mode and make sure that the function is resumed correctly and the DTC is recorded.

### 1. INSPECTION MODE 1

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| B1571 | REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM) | — | — |
| B1572 | IMM CIRCUIT EXCEPT ANTENNA CIRCUIT | — | — |
| B1576 | ECM EEPROM | — | — |
| B1577 | IMMOBILIZER CM EEPROM | — | — |
| P0010 | "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1 | — | 1 |
| P0013 | "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1 | — | 1 |
| P0020 | "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2 | — | 1 |
| P0023 | "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2 | — | 1 |
| P0031 | A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1 | — | 1 |
| P0032 | A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1 | — | 1 |
| P0037 | A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2 | — | 2 |
| P0038 | A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2 | — | 2 |
| P003A | TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" POSITION EXCEEDED LEARNING LIMIT | — | 2 |
| P0072 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW | — | 1 |
| P0073 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH | — | 1 |
| P0097 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW BANK 1 | — | 1 |
| P0098 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH BANK 1 | — | 1 |
| P0102 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW | — | 1 |
| P0103 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH | — | 1 |
| P0107 | MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW | — | 1 |
| P0108 | MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH | — | 1 |
| P0112 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1 | — | 1 |
| P0113 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1 | — | 1 |
| P0117 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW | — | 1 |
| P0118 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH | — | 1 |
| P0122 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW | — | 1 |
| P0123 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH | — | 1 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0131 | A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1 | — | 1 |
| P0132 | A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1 | — | 1 |
| P0191 | FUEL RAIL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1 | — | 2 |
| P0192 | FUEL RAIL PRESSURE SENSOR CIRCUIT LOW BANK 1 | — | 1 |
| P0193 | FUEL RAIL PRESSURE SENSOR CIRCUIT HIGH BANK 1 | — | 1 |
| P0197 | ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT LOW | — | 1 |
| P0198 | ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT HIGH | — | 1 |
| P0222 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW | — | 1 |
| P0223 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH | — | 1 |
| P0230 | FUEL PUMP PRIMARY CIRCUIT | — | 2 |
| P023F | FUEL PUMP SECONDARY CIRCUIT/OPEN | — | 1 |
| P0327 | KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR | — | 1 |
| P0328 | KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR | — | 1 |
| P0332 | KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT LOW BANK 2 | — | 1 |
| P0333 | KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT HIGH BANK 2 | — | 1 |
| P0335 | CRANKSHAFT POSITION SENSOR "A" CIRCUIT | — | 1 |
| P0336 | CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE | — | 2 |
| P0340 | CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR | — | 1 |
| P0341 | CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR | — | 1 |
| P0345 | CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2 | — | 1 |
| P0346 | CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2 | — | 1 |
| P0351 | IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN | — | 1 |
| P0352 | IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN | — | 1 |
| P0353 | IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN | — | 1 |
| P0354 | IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN | — | 1 |
| P0365 | CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1 | — | 1 |
| P0366 | CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1 | — | 1 |
| P0390 | CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2 | — | 1 |
| P0391 | CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2 | — | 1 |
| P0458 | EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW | — | 2 |
| P0480 | FAN 1 CONTROL CIRCUIT | — | 2 |
| P0481 | FAN 2 CONTROL CIRCUIT | — | 2 |
| P04DB | CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED | — | 1 |
| P0512 | STARTER (SWITCH) REQUEST CIRCUIT | — | 1 |
| P0560 | SYSTEM VOLTAGE | — | 1 |
| P0604 | INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR | — | 1 |
| P0605 | INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR | — | 1 |
| P0606 | CONTROL MODULE PROCESSOR | — | 1 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P060A | INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE | — | 1 |
| P060B | INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE | — | 1 |
| P0616 | STARTER RELAY "A" CIRCUIT LOW | — | 1 |
| P0617 | STARTER RELAY "A" CIRCUIT HIGH | — | 1 |
| P062F | INTERNAL CONTROL MODULE EEPROM ERROR | — | 1 |
| P065A | GENERATOR/ALTERNATOR SYSTEM PERFORMANCE | — | 1 |
| P0685 | ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN | — | 2 |
| P06B1 | SENSOR POWER SUPPLY "A" CIRCUIT LOW | — | 1 |
| P06B2 | SENSOR POWER SUPPLY "A" CIRCUIT HIGH | — | 1 |
| P06B4 | SENSOR POWER SUPPLY "B" CIRCUIT LOW | — | 1 |
| P06B5 | SENSOR POWER SUPPLY "B" CIRCUIT HIGH | — | 1 |
| P081A | STARTER DISABLE CIRCUIT LOW | — | 1 |
| P0A3B | GENERATOR/ALTERNATOR OVER TEMPERATURE | — | 1 |
| P1134 | A/F / O2 SENSOR BANK1 SENSOR1 SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION | — | 1 |
| P1160 | THROTTLE RETURN SPRING | — | 1 |
| P1192 | FUEL RAIL PRESSURE SENSOR "B" CIRCUIT LOW | — | 1 |
| P1193 | FUEL RAIL PRESSURE SENSOR "B" CIRCUIT HIGH | — | 1 |
| P1236 | FUEL INJECTOR DRIVER SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION | — | 1 |
| P1C00 | BATTERY MONITOR MODULE "A" PERFORMANCE | — | 1 |
| P1E00 | REGISTRATION FAULT OF AUTHENTICATION UNIT | — | 1 |
| P2009 | TGV CONTROL CIRCUIT LOW BANK 1 | — | 1 |
| P2012 | TGV CONTROL CIRCUIT LOW BANK 2 | — | 1 |
| P2016 | TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1 | — | 1 |
| P2017 | TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1 | — | 1 |
| P2021 | TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2 | — | 1 |
| P2022 | TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2 | — | 1 |
| P2101 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE | — | 1 |
| P2102 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW | — | 1 |
| P2103 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH | — | 1 |
| P2109 | THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE | — | 1 |
| P2119 | THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE | — | 1 |
| P2122 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW | — | 1 |
| P2123 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH | — | 1 |
| P2127 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW | — | 1 |
| P2128 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH | — | 1 |
| P2135 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION | — | 1 |
| P2138 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION | — | 1 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P2146 | FUEL INJECTOR GROUP "A" SUPPLY VOLTAGE CIRCUIT/OPEN | — | 1 |
| P2226 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT | — | 1 |
| P2228 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT LOW | — | 1 |
| P2229 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT HIGH | — | 1 |
| P2401 | EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW | — | 1 |
| P2419 | EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW | — | 1 |
| P24BA | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW | — | 1 |
| P24BB | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH | — | 1 |
| P24D7 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT LOW | — | 1 |
| P24D8 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT HIGH | — | 1 |
| P2530 | IGNITION SWITCH RUN POSITION CIRCUIT | — | 1 |
| P2564 | TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT LOW | — | 1 |
| P2565 | TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT HIGH | — | 1 |
| U0073 | CONTROL MODULE COMMUNICATION BUS OFF | — | 1 |
| U0077 | LIN COMMUNICATION BUS "ECM/PCM" OFF | — | 1 |
| U007B | CONTROL MODULE COMMUNICATION BUS "I" OFF | — | 1 |
| U0101 | LOST COMMUNICATION WITH TCM | — | 1 |
| U0122 | LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE | — | 1 |
| U0131 | LOST COMMUNICATION WITH POWER STEERING CONTROL MODULE | — | 1 |
| U0140 | LOST COMMUNICATION WITH BODY CONTROL MODULE | — | 1 |
| U0146 | LOST COMMUNICATION WITH SERIAL DATA GATEWAY MODULE "A" | — | 1 |
| U0151 | LOST COMMUNICATION WITH RESTRAINTS CONTROL MODULE | — | 1 |
| U0155 | LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE | — | 1 |
| U0162 | LOST COMMUNICATION WITH AUDIO VISUAL NAVIGATION DISPLAY MODULE | — | 1 |
| U0164 | LOST COMMUNICATION WITH HVAC CONTROL MODULE | — | 1 |
| U0402 | INVALID DATA RECEIVED FROM TCM | — | 1 |
| U0416 | INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE | — | 1 |
| U0420 | INVALID DATA RECEIVED FROM POWER STEERING CONTROL MODULE | — | 1 |
| U0422 | INVALID DATA RECEIVED FROM BODY CONTROL MODULE | — | 1 |
| U0423 | INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE | — | 1 |
| U0424 | INVALID DATA RECEIVED FROM HVAC CONTROL MODULE | — | 1 |
| U0452 | INVALID DATA RECEIVED FROM RESTRAINTS CONTROL MODULE | — | 1 |
| U0463 | INVALID DATA RECEIVED FROM NAVIGATION DISPLAY MODULE | — | 1 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| U1129 | LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE PU-CAN | — | 1 |
| U1235 | LOST COMMUNICATION WITH EyeSight | — | 1 |
| U1418 | INVALID DATA RECEIVED FROM BRAKE SYSTEM CONTROL MODULE PU-CAN | — | 1 |
| U1433 | INVALID DATA RECEIVED FROM EyeSight | — | 1 |
| U1712 | LOST LIN COMMUNICATION WITH BATTERY "1" MONITOR MODULE | — | 1 |
| U171F | LOST LIN COMMUNICATION WITH GENERATOR | — | 1 |
| U1C00 | INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY | — | 1 |
| U1C08 | INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS | — | 1 |
| U1C0C | INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS | — | 1 |
| U1D00 | CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY | — | 1 |
| U1D08 | INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS | — | 1 |
| U1D0C | CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS | — | 1 |
| U1E00 | LOST COMMUNICATION OF AUTHENTICATION DATA WITH GATEWAY "A" PU-BUS | — | 1 |
| U1E08 | LOST COMMUNICATION OF AUTHENTICATION DATA WITH VDC PU-BUS | — | 1 |
| U1E0C | LOST COMMUNICATION OF AUTHENTICATION DATA WITH EYESIGHT PU-BUS | — | 1 |

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Start the engine, and let it idle for 10 seconds or more.
4. Read the readiness code of [Engine] using Subaru Select Monitor and check that the concerned self-diagnosis is completed. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).
5. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

### 2. INSPECTION MODE A

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0087 | FUEL RAIL/SYSTEM PRESSURE - TOO LOW BANK 1 | Complete diagnosis with inspection mode B as well. | 1 |
| P0088 | FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1 | Complete diagnosis with inspection mode B as well. | 1 |
| P0128 | COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) | — | 2 |
| P013A | O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2 | — | 2 |
| P013E | O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2 | — | 2 |
| P0141 | O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2 | — | 2 |
| P014C | A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1 | — | 2 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P014D | A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1 | — | 2 |
| P015A | A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1 | — | 2 |
| P015B | A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1 | — | 2 |
| P0171 | SYSTEM TOO LEAN BANK 1 | Complete diagnosis with inspection mode B as well. | 2 |
| P0172 | SYSTEM TOO RICH BANK 1 | Complete diagnosis with inspection mode B as well. | 2 |
| P0300 | RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED | Complete diagnosis with inspection mode B as well. | 2 |
| P0301 | CYLINDER 1 MISFIRE DETECTED | Complete diagnosis with inspection mode B as well. | 2 |
| P0302 | CYLINDER 2 MISFIRE DETECTED | Complete diagnosis with inspection mode B as well. | 2 |
| P0303 | CYLINDER 3 MISFIRE DETECTED | Complete diagnosis with inspection mode B as well. | 2 |
| P0304 | CYLINDER 4 MISFIRE DETECTED | Complete diagnosis with inspection mode B as well. | 2 |
| P0459 | EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH | — | 2 |
| P0562 | SYSTEM VOLTAGE LOW | • Turn the A/C OFF during inspection.<br>• After starting the engine, start inspection (accelerate to 80 km/h (50 MPH) or more) within 30 seconds. | 1 |
| P0563 | SYSTEM VOLTAGE HIGH | | 1 |
| P2096 | POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1 | Complete diagnosis with inspection mode B as well. | 2 |
| P2097 | POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1 | Complete diagnosis with inspection mode B as well. | 2 |
| P2195 | A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1 | — | 2 |
| P2196 | A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1 | — | 2 |
| P2227 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE | — | 2 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P2270 | O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2 | — | 2 |
| P2271 | O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2 | — | 2 |

**Warning:**
**When performing inspection mode A on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive for 20 minutes or more at a constant speed of 80 km/h (50 MPH) or more.
4. Stop the vehicle and idle for one minute.
5. Read the readiness code of [Engine] using Subaru Select Monitor and check that the concerned self-diagnosis is completed. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).
6. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

### 3. INSPECTION MODE B

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0087 | FUEL RAIL/SYSTEM PRESSURE - TOO LOW BANK 1 | Complete diagnosis with inspection mode A as well. | 1 |
| P0088 | FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1 | Complete diagnosis with inspection mode A as well. | 1 |
| P0130 | A/F / O2 SENSOR CIRCUIT BANK 1 SENSOR 1 | — | 1 |
| P0137 | O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2 | — | 2 |
| P0138 | O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2 | — | 2 |
| P0140 | O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 2 | — | 2 |
| P0171 | SYSTEM TOO LEAN BANK 1 | Complete diagnosis with inspection mode A as well. | 2 |
| P0172 | SYSTEM TOO RICH BANK 1 | Complete diagnosis with inspection mode A as well. | 2 |
| P0300 | RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED | Complete diagnosis with inspection mode A as well. | 2 |
| P0301 | CYLINDER 1 MISFIRE DETECTED | Complete diagnosis with inspection mode A as well. | 2 |
| P0302 | CYLINDER 2 MISFIRE DETECTED | Complete diagnosis with inspection mode A as well. | 2 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0303 | CYLINDER 3 MISFIRE DETECTED | Complete diagnosis with inspection mode A as well. | 2 |
| P0304 | CYLINDER 4 MISFIRE DETECTED | Complete diagnosis with inspection mode A as well. | 2 |
| P0500 | VEHICLE SPEED SENSOR "A" CIRCUIT | — | 1 |
| P0506 | IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED | — | 2 |
| P0507 | IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED | — | 2 |
| P062D | FUEL INJECTOR DRIVER CIRCUIT PERFORMANCE BANK 1 | — | 1 |
| P0700 | TRANSMISSION CONTROL SYSTEM (MIL REQUEST) | — | 1 |
| P0851 | PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW | CVT model | 2 |
| P0852 | PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH | CVT model | 2 |
| P1261 | CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN | — | 1 |
| P1262 | CYLINDER 2 DIRECT FUEL INJECTOR CIRCUIT/OPEN | — | 1 |
| P1263 | CYLINDER 3 DIRECT FUEL INJECTOR CIRCUIT/OPEN | — | 1 |
| P1264 | CYLINDER 4 DIRECT FUEL INJECTOR CIRCUIT/OPEN | — | 1 |
| P162A | STARTER INTERLOCK INTERNAL CIRCUIT | — | 1 |
| P2096 | POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1 | Complete diagnosis with inspection mode A as well. | 2 |
| P2097 | POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1 | Complete diagnosis with inspection mode A as well. | 2 |

**Warning:**
**When performing inspection mode B on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive at 10 km/h (6 MPH) or more.
4. Stop the vehicle and idle for ten minutes.
5. Read the readiness code of [Engine] using Subaru Select Monitor and check that the concerned self-diagnosis is completed. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).
6. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

### 4. INSPECTION MODE H

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0071 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE | • 6 hours or more have elapsed since ignition switch is OFF under a completely warmed up condition. | 2 |
| P0096 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE BANK 1 | | 2 |

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0111 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1 | • For models with block heater, at least 6 hours must have elapsed without operating the block heater. | 2 |
| P0116 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE | | 2 |
| P0196 | ENGINE OIL TEMPERATURE SENSOR "A" RANGE/PERFORMANCE | | 2 |
| P050A | COLD START IDLE CONTROL SYSTEM PERFORMANCE | — | 2 |
| P050B | COLD START IGNITION TIMING PERFORMANCE | — | 2 |
| P24B9 | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE | 60 seconds or more have elapsed since ignition switch is OFF. | 2 |
| P24D6 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT RANGE/PERFORMANCE | — | 2 |

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. With the ignition switch ON (engine stopped), read the values in [Coolant Temp.] and [IAT Sensor #11]. Ref. to COMMON (DIAGNOSTICS)>Data Monitor.
4. If the values from step 3) satisfy the following conditions, idle the engine for two minutes or more.
   **Condition:**
   |Engine coolant temperature — Intake air temperature| ≤ 5°C (9°F)

   **Note:**
   - **If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.**
   - **For CVT models, hold the select lever to "P" range or "N" range at idling, and for MT models, the gear shift lever in the neutral position at idling.**
5. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

### 5. INSPECTION MODE I

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0455 | EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK) | • [Coolant Temp.] 5 — 45 ° (41 — 113 °F)<br>• [IAT Sensor #11]: 5 — 50 °C (41 — 122 °F) | 2 |
| P0456 | EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK) | | 2 |
| P04AE | EVAP SYSTEM PURGE CONTROL VALVE "B" PERFORMANCE/STUCK OPEN | | 2 |
| P1451 | EVAP SYSTEM CLOG DETECTED (PIPE) | | 2 |
| P2402 | EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH | | 1 |
| P2404 | EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE | | 2 |
| P2420 | EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH | | 1 |

**Warning:**
**When performing inspection mode I on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Caution:**
**Be careful of the state of the battery when performing the inspection mode I consecutively. Performing the inspection mode I consecutively without the engine running may cause a low battery voltage and battery discharge.**

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

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Prepare PC with Subaru Select Monitor installed.
3. Connect the USB cable to the interface for Subaru Select Monitor and the USB port on the personal computer (dedicated port for the Subaru Select Monitor).

   **Note:**
   **The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.**
4. Connect the diagnosis cable to the interface for Subaru Select Monitor.
5. Connect the interface for Subaru Select Monitor to the data link connector located in the lower portion of the instrument panel (on the driver's side). Ref. to COMMON (DIAGNOSTICS)>Data Link Connector.

   **Caution:**
   **Do not connect the scan tools except for Subaru Select Monitor and general scan tool.**
6. Start the PC.
7. Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
8. On [Start] screen, select [Generic OBDII].
9. On [Select System] screen, select [Evaporative System Leak Test].
10. On [Evaporative System Leak Test] screen, select [Evaporative System Leak Test].
11. On [Evaporative System Leak Test is running. Press Cancel to exit this function.] screen, click the [OK] button to perform evaporative system leak test.
12. When [Conditions have been enabled to control this function. Turn the ignition switch off to terminate the test.] display appears, wait for 30 minutes without clicking the [OK] button.

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

    **Note:**
    - **Clicking [OK] button brings [Evaporative System Leak Test] display back, although the test is continuing.**
    - **The Subaru Select Monitor screen does not change after the evaporative system leak test is complete or when the test is aborted by turning off the ignition switch.**
    - **If [Test conditions are not correct] screen is displayed, use the Subaru Select Monitor to check that the values of [Coolant Temp.] and [IAT Sensor #11] meet the criteria. If the conditions are satisfied, clear the memory. Ref. to COMMON (DIAGNOSTICS)>Clear memory.**
13. After 30 minutes passed from the start of step 12), click the [OK] button to return to the [Evaporative System Leak Test] display.
14. Return to the [Generic OBDII] screen, and select [OBD Mode test results].
15. Check TID $C1 — $CA of MID $3C in [OBD Mode test results].

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

**Result of on-board monitor test**

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

16. When the evaporative system leak test is completed correctly, read the pending code with the ignition switch turned to ON position. If the DTC is recorded, check the appropriate DTC. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

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

## 6. INSPECTION MODE J

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P2610 | ECM/PCM ENGINE OFF TIMER PERFORMANCE | — | 2 |

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Idle the engine for 15 minutes or more.
3. Turn the ignition switch to OFF.
4. After at least 10 hours passed from the start of step 3), read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

### 7. INSPECTION MODE N

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0016 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A | [Coolant Temp.]: 80°C (176°F) or more | 2 |
| P0018 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A | | 2 |

**Warning:**
**When performing inspection mode N on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

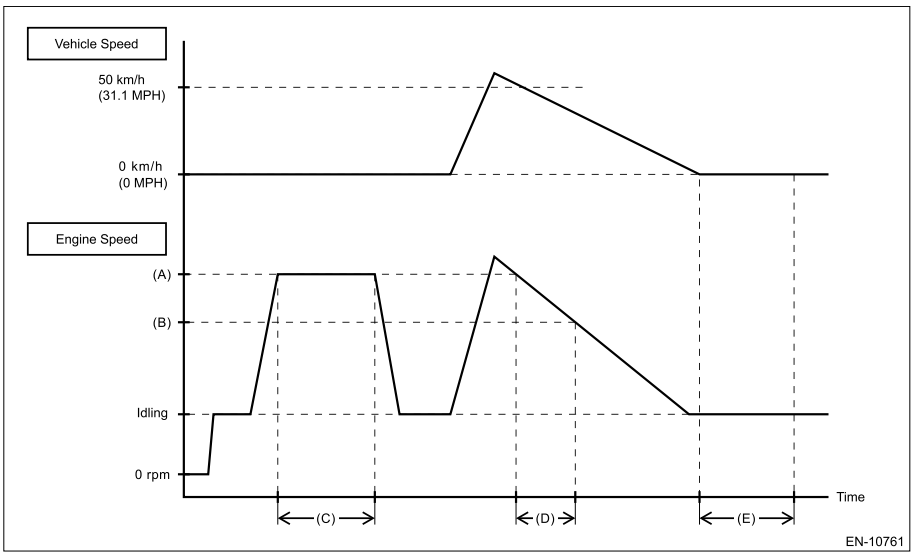
1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Check the data in condition column of table by using the Subaru Select Monitor or general scan tool.

   **Note:**
   - **Subaru Select Monitor**
     **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
   - **General scan tool**
     **For detailed operation procedures, refer to the general scan tool operation manual.**
4. While the conditions in the list are satisfied, race the engine at the speed of approx. 2500 rpm for 40 seconds or more.
5. Start to move the vehicle, then accelerate the vehicle to vehicle speed 50 km/h (31.1 MPH) or more.
6. When the vehicle speed reaches 50 km/h (31.1 MPH) or more, release the accelerator pedal, the brake pedal and the clutch pedal (MT model) to decelerate the vehicle without shifting the gear. At this time, select an appropriate gear beforehand so that the engine speed falls within the range from 2500 rpm to 1900 rpm for 5 seconds or more.

   **Note:**
   - **The vehicle speed does not matter so long as the engine speed can maintain from 2500 rpm to 1900 rpm for 5 seconds or more.**
     **Example: On a downhill grade, it can be performed with a low speed gear and at a low vehicle speed.**
   - **When it is performed with the electrical load such as the air conditioner, etc. turned OFF or the vehicle driven on a downhill grade, the engine speed decreases slowly. Therefore, the continuous time can be maintained easily.**
7. Bring the vehicle to a stop in a safe place, and idle it for 5 minutes or more.

   **Note:**
   **Driving method while vehicle is driven to a stop at safe place is not restricted.**
8. Read the readiness code of [Engine] using Subaru Select Monitor and check that the concerned self-diagnosis is completed. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).
9. With the vehicle idling, read the pending code of DTC using Subaru Select Monitor or general scan tool.

   **Note:**
   - **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).**
   - **If the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**




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

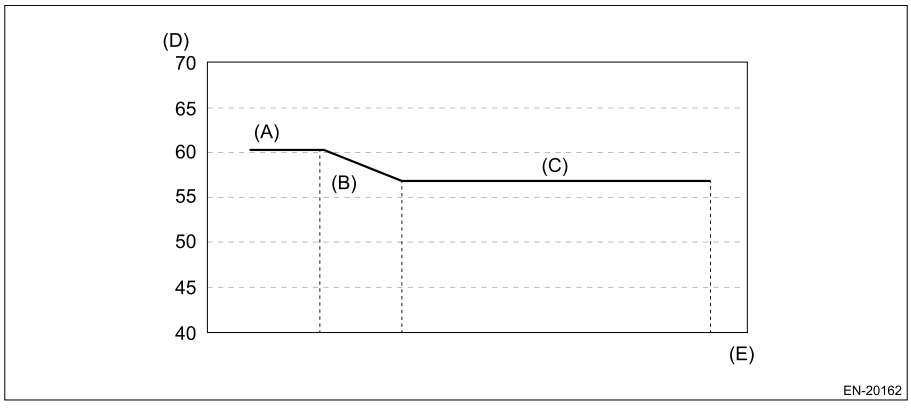
## 8. INSPECTION MODE O

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0441 | EVAP SYSTEM (CPC) INCORRECT PURGE FLOW | — | 2 |
| P04F1 | EVAP SYSTEM LOW PRESSURE PURGE LINE PERFORMANCE | — | 2 |

**Warning:**
**When performing inspection mode O on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(A) Drive the vehicle at a vehicle speed of 60 km/h (37 MPH) or more for at least 5 minutes in fully warm-up condition.
(B) Decelerate with the throttle fully closed for at least 3 seconds.
(C) Drive the vehicle at a constant vehicle speed by depressing the accelerator pedal for at least 30 seconds.
(D) Vehicle speed km/h (MPH)
(E) Sec.

4. Park the vehicle on a safe place.

**Note:**
**Driving method while vehicle is driven to a stop at safe place is not restricted.**

5. With the vehicle idling, read the pending code of DTC using Subaru Select Monitor or general scan tool.

**Note:**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).**
- **If the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**

## 9. INSPECTION MODE Q

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0017 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B | [Coolant Temp.]: 80°C (176°F) or more | 2 |
| P0019 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B | [Coolant Temp.]: 80°C (176°F) or more | 2 |

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Idle the engine for at least one minute.
4. Read the pending code of DTC using the Subaru Select Monitor or general scan tool.

**Note:**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).**
- **If the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**

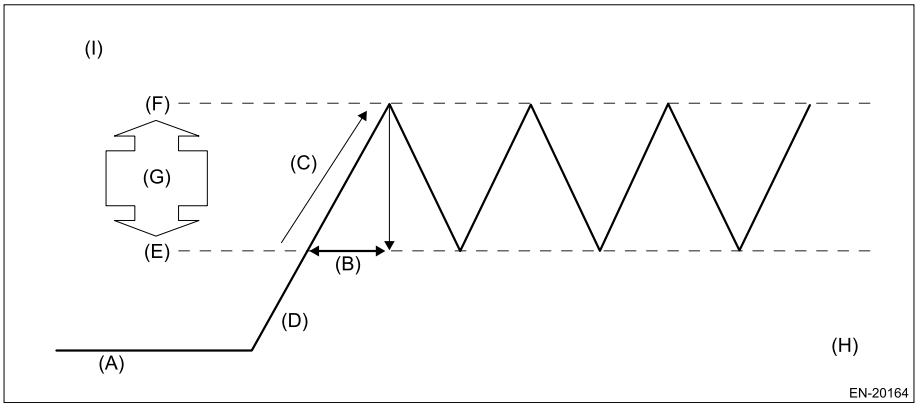
## 10. INSPECTION MODE R

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P219A | BANK 1 AIR-FUEL RATIO IMBALANCE | — | 2 |

**Warning:**
**When performing inspection mode R on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Keep the engine at idle for at least 30 seconds in a fully warm-up condition.
4. Start the driving.
5. With the gear position in the 4th in the manual mode for CVT model, and in the 4th for MT model, take 10 seconds to accelerate from 1500 rpm to 4000 rpm.
6. Decelerate to 1500 rpm in the 4th gear position. (There is no restrictions to the deceleration duration and how to use the brake.)
7. Repeat steps 5) and 6) 10 times (end when the pending code is acquired).




(A) Idle the engine for at least 30 seconds in a fully warm-up condition.
(B) 10 seconds
(C) Accelerating
(D) Engine speed
(E) 1500 rpm
(F) 4000 rpm
(G) Accelerate and decelerate in the 4th gear position in the manual mode.
(H) Time
(I) Accelerating and decelerating

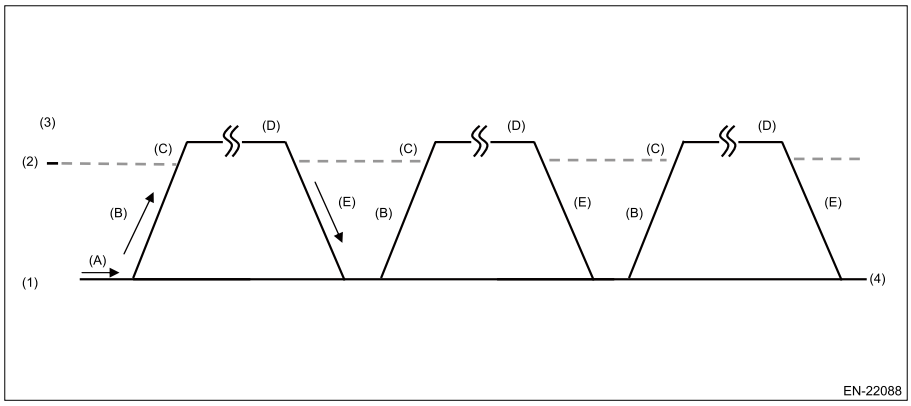
## 11. INSPECTION MODE S

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0033 | TURBOCHARGER/SUPERCHARGER BYPASS VALVE "A" CONTROL CIRCUIT | — | 1 |
| P1378 | PRE-IGNITION DETECTED | — | 1 |

**Warning:**
**When performing inspection mode S on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 65 km/h (40.4 MPH)
(3) Vehicle speed
(4) Time
(A) Idle the engine for five seconds or more.
(B) Accelerating
(C) Vehicle speed exceeds 65 km/h (40.4 MPH).
(D) Driving time (There is no restriction for driving time)
(E) Deceleration (There is no specified deceleration method)

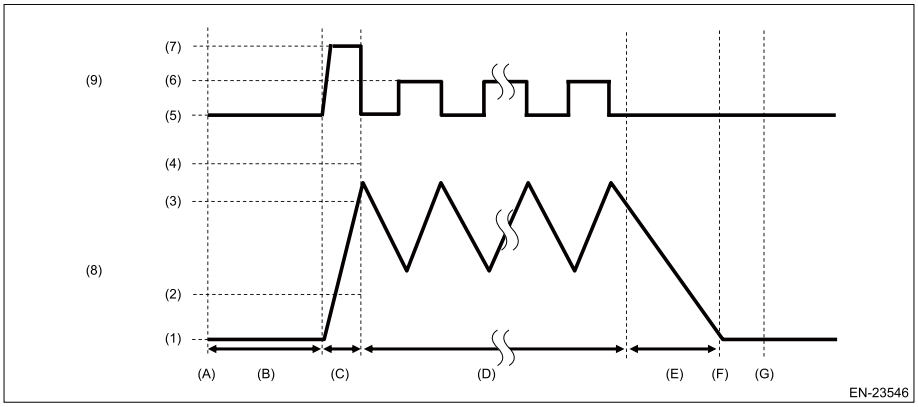
4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

## 12. INSPECTION MODE T

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P000A | "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1 | [Coolant Temp.]: 70°C (158°F) or more | 2 |
| P000B | "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1 | | 2 |
| P000C | "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2 | | 2 |
| P000D | "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2 | | 2 |
| P0011 | "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1 | | 2 |
| P0014 | "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1 | | 2 |
| P0021 | "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2 | | 2 |
| P0024 | "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2 | | 2 |
| P0045 | TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" CIRCUIT/OPEN | | 1 |

**Warning:**
**When performing inspection mode T on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 20 km/h (12.4 MPH)
(3) 60 km/h (37.3 MPH)
(4) 80 km/h (49.7 MPH)
(5) 0%
(6) 20%
(7) 30 — 60 %
(8) Vehicle speed
(9) Accelerator pedal opening angle

(A) Start the engine.
(B) Idle the engine for at least three minutes.
(C) Accelerate the vehicle to 60 km/h (37.3 MPH).
(D) While maintaining vehicle speed at 60 km/h (37.3 MPH) as a reference, repeat the accelerator opening 0% (5 seconds) ←→ 20% (5 seconds) for 20 minutes or more.
(E) Fully release the accelerator pedal to decelerate the vehicle for at least 5 seconds.
(F) Stop the vehicle. (Driving method while vehicle is driven to a stop at safe place is not restricted)
(G) Stop the engine.

**Note:**
**In pattern (D), it is acceptable to stop the vehicle depending on the traffic conditions. Drive the vehicle with the accelerator opening angle of 0% (5 seconds) ←→ 20% (5 seconds) for an accumulated duration of 20 minutes or more.**

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

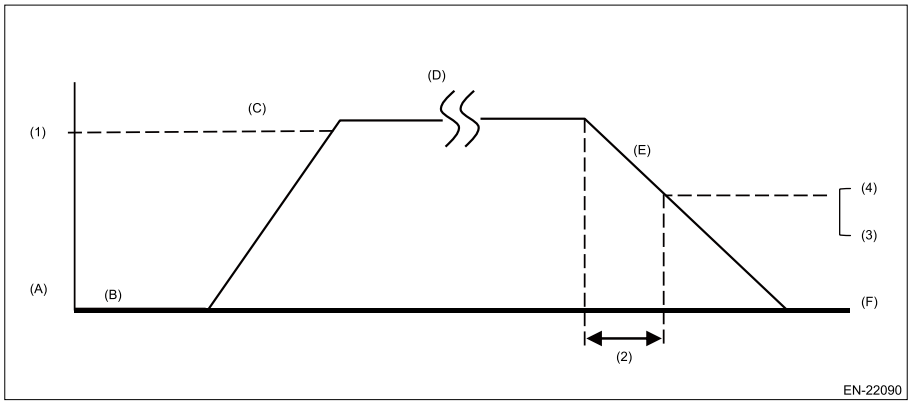
### 13. INSPECTION MODE U

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0401 | EGR ABNORMAL (EGR AMOUNT TOO SMALL) | — | 2 |
| P0402 | EGR "A" FLOW EXCESSIVE DETECTED | — | 2 |

**Warning:**
**When performing inspection mode U on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) Vehicle speed 60 km/h (37.3 MPH)
(2) Deceleration for 10 seconds or more (There is no restriction to the driving operation)
(3) Vehicle speed 40 km/h (24.9 MPH)
(4) Engine speed 1300 rpm or more

(A) Start the engine.
(B) Idle the engine for 20 seconds or more.
(C) Accelerate the vehicle to 60 km/h (37.3 MPH). (There is no restriction to the driving operation.)
(D) Drive at a constant speed. (Step (D) may be omitted according to road conditions.)
(E) With the accelerator pedal fully closed, decelerate the vehicle speed while taking at least 10 seconds and maintaining the vehicle speed at 40 km/h (24.9 MPH) or more as well as the engine speed 1300 rpm or more.
(F) Park the vehicle and stop the engine. (Driving method while vehicle is driven to a stop at safe place is not restricted.)

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

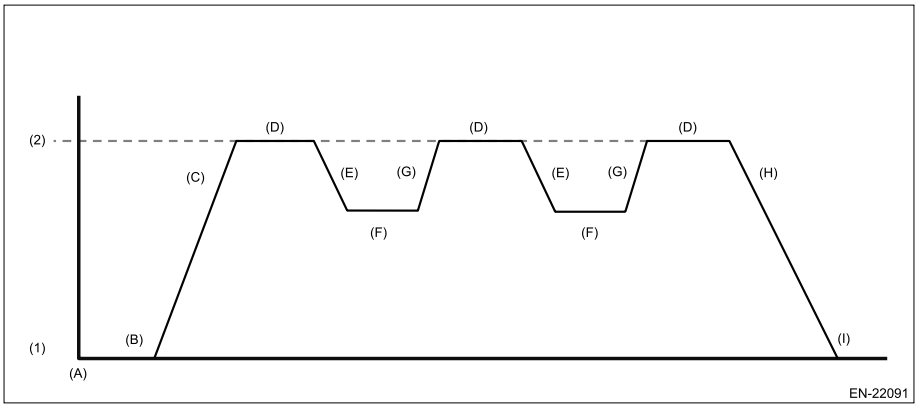
### 14. INSPECTION MODE V

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0420 | CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1 | — | 2 |

**Warning:**
**When performing inspection mode V on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) Vehicle speed 0 km/h (0 MPH)
(2) Vehicle speed 60 km/h (37 MPH)

(A) Start the engine.
(B) Idle the engine for at least five minutes.
(C) Accelerate the vehicle to 60 km/h (37 MPH).
(D) Using the Subaru Select Monitor, check the [Catalyst Temperature #11] value and drive at a constant speed of 60 km/h (37 MPH) until 475°C (887°F) or more is reached.
(E) From the state where [Catalyst Temperature #11] value is 475°C (887°F) or more and the vehicle speed is 60 km/h (37 MPH), change the accelerator opening angle to 0% to perform fuel cut for at least 5 seconds.
(F) Drive the vehicle with 10 to 20 % of the accelerator opening angle for at least 10 seconds.
(G) Accelerate the vehicle to 60 km/h (37 MPH).
(H) From the state where [Catalyst Temperature #11] value is 475°C (887°F) or more and the vehicle speed is 60 km/h (37 MPH), change the accelerator opening angle to 0% to stop the vehicle with fuel cut for at least 5 seconds.
(I) Idle the engine for 20 seconds or more.

**Note:**
- **The condition of acceleration or constant driving can be changed according to different traffic conditions.**
- **If diagnostic values have not been input after driving, repeat the cycle from step (C) without stopping the engine.**

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

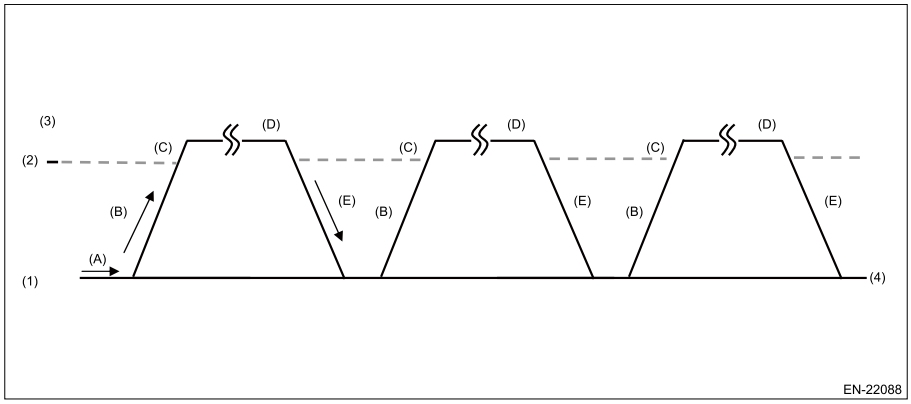
## 15. INSPECTION MODE W

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0134 | A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1 | — | 1 |
| P1492 | COIL 1 EGR "A" CONTROL CIRCUIT LOW | — | 1 |
| P1493 | COIL 1 EGR "A" CONTROL CIRCUIT HIGH | — | 1 |
| P1494 | COIL 2 EGR "A" CONTROL CIRCUIT LOW | — | 1 |
| P1495 | COIL 2 EGR "A" CONTROL CIRCUIT HIGH | — | 1 |
| P1496 | COIL 3 EGR "A" CONTROL CIRCUIT LOW | — | 1 |
| P1497 | COIL 3 EGR "A" CONTROL CIRCUIT HIGH | — | 1 |
| P1498 | COIL 4 EGR "A" CONTROL CIRCUIT LOW | — | 1 |
| P1499 | COIL 4 EGR "A" CONTROL CIRCUIT HIGH | — | 1 |

**Warning:**
**When performing inspection mode W on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 45 km/h (27 MPH)
(3) Vehicle speed
(4) Time
(A) Idle the engine for five seconds or more.
(B) Accelerating
(C) Vehicle speed exceeds 45 km/h (27 MPH).
(D) Driving time (There is no restriction for the time)
(E) Deceleration (There is no specified deceleration method)

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

## 16. INSPECTION MODE X

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P2004 | TGV CONTROL STUCK OPEN BANK 1 | — | 1 |
| P2005 | TGV CONTROL STUCK OPEN BANK 2 | — | 1 |
| P2006 | TGV CONTROL STUCK CLOSED BANK 1 | — | 1 |
| P2007 | TGV CONTROL STUCK CLOSED BANK 2 | — | 1 |

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Start the engine.
4. Shift the select lever to "P" range (CVT model), or the gear shift lever to the neutral position (MT model), and race the engine for 10 seconds or more.

**Note:**
**Keep Engine speed at 3500 rpm or more.**

5. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

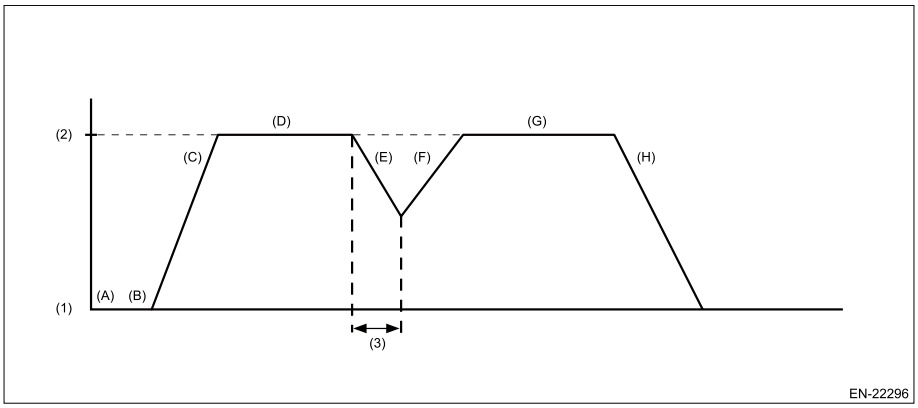
## 17. INSPECTION MODE Y

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P013B | O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2 | — | 2 |
| P013F | O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2 | — | 2 |

**Warning:**
**When performing inspection mode Y on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) Vehicle speed 0 km/h (0 MPH)
(2) Vehicle speed 60 km/h (37 MPH)
(3) 10 seconds
(A) Start the engine.
(B) Idle the engine for at least five minutes.
(C) Accelerate the vehicle to 60 km/h (37 MPH).
(D) Drive the vehicle at a constant speed of 60 km/h (37 MPH).
(E) From the state where the vehicle speed is 60 km/h (37 MPH), change the accelerator opening angle to 0% to perform fuel cut for 10 seconds.
(F) Accelerate the vehicle to 60 km/h (37 MPH).
(G) Drive the vehicle at a constant speed of 60 km/h (37 MPH).
(H) Slow down and stop the vehicle.

**Note:**
- **The condition of acceleration or constant driving can be changed according to different traffic conditions.**
- **If diagnostic values have not been input after driving, repeat the cycle from step (C) without stopping the engine.**
- **Cruise control should not be used.**

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

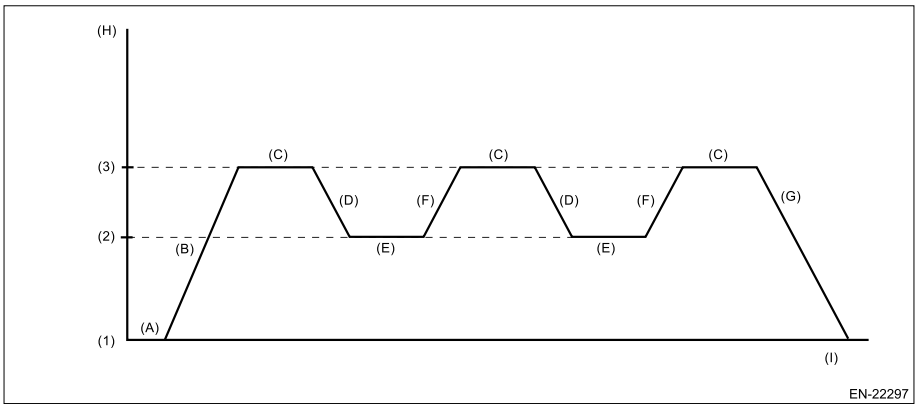
## 18. INSPECTION MODE Z

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0030 | A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1 | — | 2 |
| P0068 | MAP/MAF - THROTTLE POSITION CORRELATION | — | 2 |
| P0101 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE | — | 2 |
| P0244 | TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE | — | 2 |
| P04F0 | EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE | During acceleration, depress the pedal with the accelerator opening angle of 50% as a reference. | 2 |

**Warning:**
**When performing inspection mode Z on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 60 km/h (37 MPH)
(3) 88 km/h (55 MPH)

(A) Shift the select lever to "P" range, and let the engine idle for 10 seconds or more. (CVT model)
Place the gear shift lever in neutral position, and let the engine idle for 10 seconds or more. (MT model)
(B) Accelerate with the throttle half-open to 88 km/h (55 MPH) or more.
(C) Drive for 20 seconds or more at 88 km/h (55 MPH) or more.
(D) Decelerate the vehicle speed to 60 km/h (37 MPH) with fully closed throttle.
(E) Drive for 20 seconds or more at 60 km/h (37 MPH) or less.
(F) Accelerate with the throttle half-open to 88 km/h (55 MPH) or more.
(G) Stop vehicle with the throttle fully closed.
(H) Vehicle speed
(I) Sec.

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

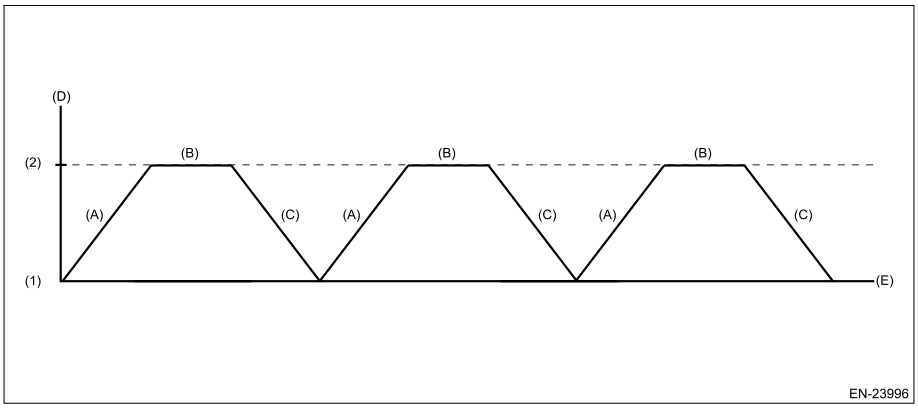
## 19. INSPECTION MODE AA

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P1449 | EVAP SYSTEM CLOG DETECTED (AIR FILTER) | — | 2 |

**Warning:**
**When performing inspection mode AA on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 60 km/h (37 MPH)
(A) Accelerate the vehicle to 60 km/h (37 MPH). (Sudden acceleration prohibited)
(B) Drive the vehicle at a constant speed for 3 minutes.
(C) Decelerating
(D) Vehicle speed
(E) Driving duration

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

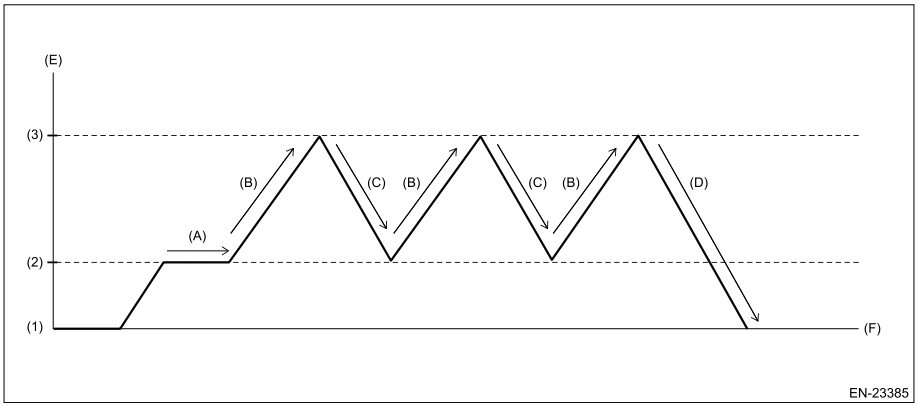
## 20. INSPECTION MODE AB

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0234 | TURBOCHARGER/SUPERCHARGER "A" OVERBOOST CONDITION | — | 2 |
| P0299 | TURBOCHARGER/SUPERCHARGER "A" UNDERBOOST CONDITION | — | 2 |
| P226B | TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL | — | 1 |

**Warning:**
**When performing inspection mode AB on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 30 km/h (18.6 MPH)
(3) 80 km/h (50 MPH)

(A) Accelerate and drive at a constant speed of 30 km/h (18.6 MPH) with the gear in 3rd speed. (For CVT models, keep the gear in 3rd speed of the manual mode)
(B) Accelerate with fully open throttle to 80 km/h (50 MPH) without shifting.
(C) Decrease the speed to 30 km/h (18.6 MPH) while holding the gear in 3rd speed.
(D) Slow down and stop the vehicle.
(E) Vehicle speed
(F) Driving duration

4. Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

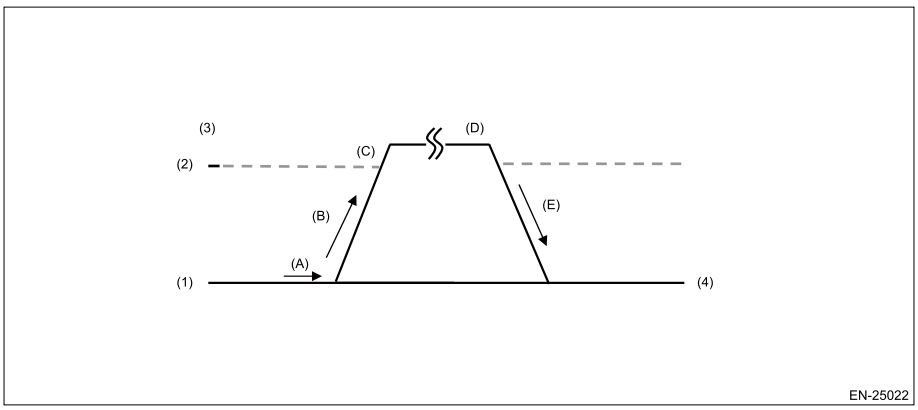
## 21. INSPECTION MODE AX

| DTC | Description & trouble part | Condition | Number of driving cycles on the detecting condition |
|---|---|---|---|
| P0851 | PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW | MT model | 2 |
| P0852 | PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH | MT model | 2 |

**Warning:**
**When performing inspection mode AX on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
**Perform the inspection mode after warming up the engine except that the engine coolant temperature at engine start is specified.**

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Drive according to the drive pattern described below.




(1) 0 km/h (0 MPH)
(2) 65 km/h (40 MPH)
(3) Vehicle speed
(4) Time

(A) Idle the engine for five seconds or more.

(B) Acceleration (Keep in the 5th gear position or higher with the vehicle speed up to 60 km/h (37.2 MPH) as a reference.)

(C) Vehicle speed exceeds 65 km/h (40.4 MPH).

(D) Driving time (There is no restriction for driving time)

(E) Deceleration (There is no specified deceleration method)

**4.** Read the pending code using the Subaru Select Monitor or general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

ENGINE (DIAGNOSTICS)(H4DOTC) > Warning Light Illumination Pattern

## PROCEDURE

| |
|---|
| 1. Activation of malfunction indicator light Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern>ACTIVATION OF MALFUNCTION INDICATOR LIGHT. |
| ↓ |
| 2. Malfunction indicator light does not come on Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern>MALFUNCTION INDICATOR LIGHT DOES NOT COME ON. |
| ↓ |
| 3. Malfunction indicator light does not go off Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern>MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF. |

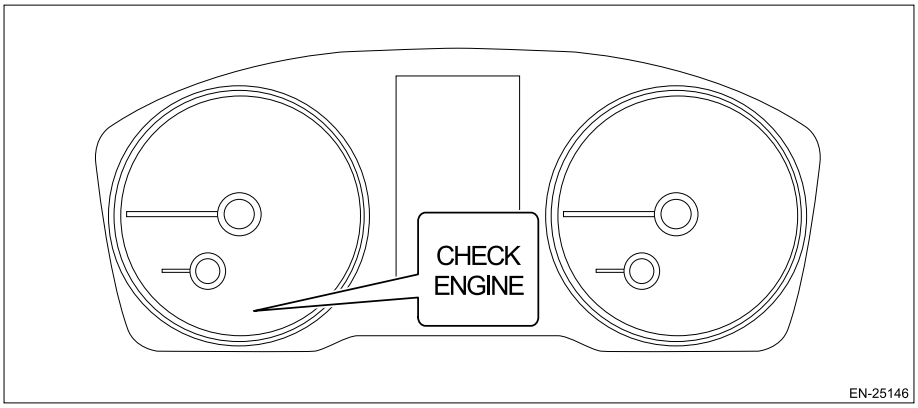
ENGINE (DIAGNOSTICS)(H4DOTC) > Warning Light Illumination Pattern

## ACTIVATION OF MALFUNCTION INDICATOR LIGHT

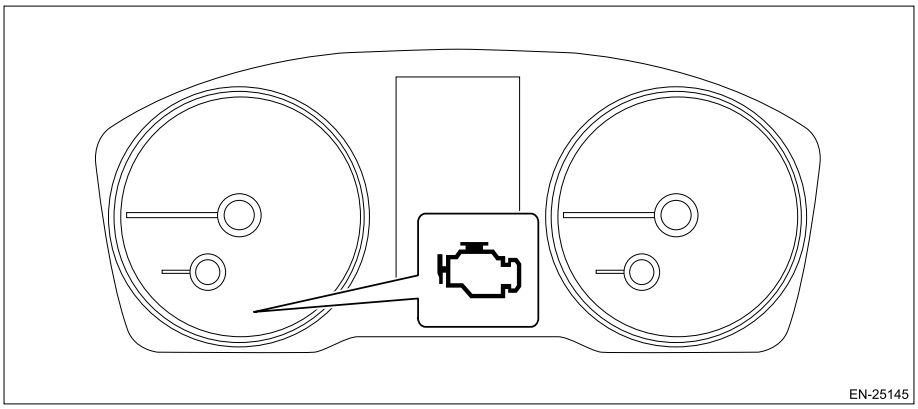
**1.** When the ignition switch is turned to ON (engine OFF), the malfunction indicator light in the combination meter illuminates.

**Note:**
**If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Warning Light Illumination Pattern>MALFUNCTION INDICATOR LIGHT DOES NOT COME ON.**

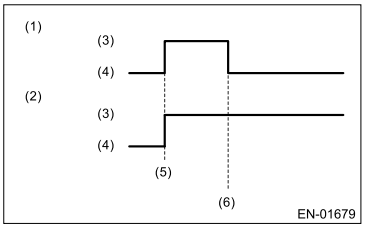
- For U4




- For C0

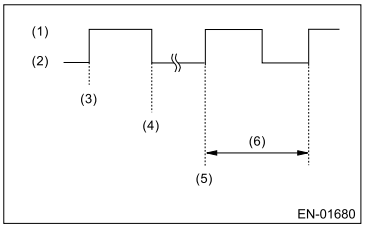



**2.** After starting the engine, the malfunction indicator light goes out. If it does not go off, any of the engine and emission control system has malfunction.




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

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




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

ENGINE (DIAGNOSTICS)(H4DOTC) > Warning Light Illumination Pattern

## MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

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

**Note:**
**For the diagnostic procedure, refer to Combination Meter section. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Warning Light Illumination Pattern

## MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF

**Diagnosis:**
The malfunction indicator light circuit is shorted.
**Trouble symptom:**
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor or general scan tool display.

### 1. CHECK DTC.

Read the DTC of [Engine] and LAN system using the Subaru Select Monitor or a general scan tool. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Engine] or LAN system displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Check the combination meter system. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure. |

## OPERATION

**Note:**
- **For detailed operation procedures, refer to "Common (Diagnostics)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
- **For details on the data monitor, refer to the list. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.**



## LIST

**Note:**
**Some items are not displayed according to the specifications.**

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Engine Speed | Value calculated from crankshaft position sensor output value. | 707 | rpm |
| Mass Air Flow | Value calculated from air flow sensor output value. | 3.8 or 0.5 | g/s or lb/min |
| Mass Air Flow Average | Value calculated from air flow sensor output value. | 3.8 or 0.5 | g/s or lb/min |
| Vehicle Speed | Value calculated from vehicle speed sensor output value. | 0 | km/h or MPH |
| Throttle Opening Angle | Throttle valve opening angle (in percentage) calculated from throttle position sensor output value. | 14 | % |
| Accel. Opening Angle | Accelerator pedal opening angle (in percentage) calculated from accelerator pedal position sensor output value. | 0 | % |
| A/F Sensor #1 | Actual lambda value calculated from the front oxygen (A/F) sensor output value. | 0.99 | — |
| Ignition timing adv. #1 | Ignition timing control value for No. 1 cylinder.<br>Calculated from rotation speed, manifold pressure, intake air temperature, water temperature, and data from knock sensor etc. | −3 | ° |
| Coolant Temp. | Value calculated from engine coolant temperature sensor output value. | 91 or 196 | °C or °F |
| Fuel Injection #1 Pulse | Control value of fuel injection time for the RH bank by ECM. | 1.54 | ms |
| Short term fuel trim B1 | Air fuel ratio correction control value for the front oxygen (A/F) sensor. | 0 | % |
| Long term fuel trim B1 | Air fuel ratio learning control value for the front oxygen (A/F) sensor. | −7 | % |
| Learned Ignition Timing | Ignition timing learning value.<br>Advance angle amount or retard angle amount when knocking occurs. | 0 | deg |
| Oxygen sensor #12 | Rear oxygen sensor output voltage value. | 0.74 | V |
| VVT Adv. Ang. Amount R | AVCS advance angle amount for the RH bank on the intake side. | 0 | deg |
| VVT Advance Target Angle Amount R | AVCS target advance angle amount for the RH bank on the intake side.<br>This value is compared with the AVCS advance angle amount R to judge if the intake AVCS is operating properly.<br>Response delays during the transition time. | 0 | deg |
| VVT Adv. Ang. Amount L | AVCS advance angle amount for the LH bank on the intake side. | 0 | deg |
| VVT Advance Target Angle Amount L | AVCS target advance angle amount for the LH bank on the intake side.<br>This value is compared with the AVCS advance angle amount L to judge if the intake AVCS is operating properly.<br>Response delays during the transition time. | 0 | deg |
| Exh. VVT Retard Ang. R | AVCS retard angle amount for the RH bank on the exhaust side. | 0 | deg |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Ex VVT Retard Target Angle R | AVCS target retard angle amount for the RH bank on the exhaust side.<br>This value is compared with the AVCS retard angle amount R to judge if the exhaust AVCS is operating properly.<br>Response delays during the transition time. | 0 | deg |
| Exh. VVT Retard Ang. L | AVCS retard angle amount for the LH bank on the exhaust side. | 0 | deg |
| Ex VVT Retard Target Angle L | AVCS target retard angle amount for the LH bank on the exhaust side.<br>This value is compared with the AVCS retard angle amount L to judge if the exhaust AVCS is operating properly.<br>Response delays during the transition time. | 0 | deg |
| VVT Initial Position Learning Value #1 | AVCS initial position learning value for the RH bank on the intake side.<br>Controls the angle against a standard angle.<br>Deviation learning is performed based on this standard value. | 79.3 | °CA |
| VVT Initial Position Learning Value #2 | AVCS initial position learning value for the LH bank on the intake side.<br>Controls the angle against a standard angle.<br>Deviation learning is performed based on this standard value. | 83.1 | °CA |
| VVT Ex Initial Position Learning Value #1 | AVCS initial position learning value for the RH bank on the exhaust side.<br>Controls the angle against a standard angle.<br>Deviation learning is performed based on this standard value. | 109.5 | °CA |
| VVT Ex Initial Position Learning Value #2 | AVCS initial position learning value for the LH bank on the exhaust side.<br>Controls the angle against a standard angle.<br>Deviation learning is performed based on this standard value. | 108.3 | °CA |
| Number of Cleaning Executions for VVT Self-recovery | Number of times that the intake AVCS oil control valve cleaning is performed. | 0 | Time |
| Number of Cleaning Executions for Ex VVT Self-recovery | Number of times that the exhaust AVCS oil control valve cleaning is performed. | 0 | Time |
| Control module voltage | ECM input power supply voltage. | 14.176 | V |
| Target engine speed | ECM target engine speed. | 700 | rpm |
| Target Equivalence Ratio | Target air fuel ratio (lambda).<br>It usually becomes 1 aiming at a theoretical air fuel ratio. | 0.998 | — |
| Oil Temperature | Value calculated from the engine oil temperature sensor output value. | 96 or 205 | °C or °F |
| IAT Sensor #11 | Value calculated from the intake air temperature sensor output value of the air flow sensor. | 74 or 165 | °C or °F |
| IAT Sensor #12 | Value calculated from the intake air temperature sensor output value of the manifold pressure sensor. | 75 or 167 | °C or °F |
| Ambient Temperature | Value that ECM estimates by using input values from the engine coolant temperature sensor or the intake air temperature sensor etc. | 40 or 104 | °C or °F |
| Calculated load value | Current rate of air amount.<br>Value assuming that the air amount at the current engine speed with the throttle fully open is 100%. | 36.1 | % |
| Absolute Load Value | Percentage of current intake air amount against the maximum air intake amount of the engine. | 23.1 | % |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | For non-turbo engine, the value can be close to 95%, but will never be 100%.<br>For turbo engine, this value may exceed 100% due to a boost pressure. | | |
| Atmosphere Pressure | Value calculated from atmospheric pressure sensor output value. | 99, 742.7, 29.2, 14.4 or 397.4 | kPa, mmHg, inHg, psi or inH2O |
| Mani. Relative Pressure | Value calculated from manifold pressure sensor output value. (Absolute value)<br>(Intake manifold absolute pressure – Atmospheric pressure) | −62, −465.1, −18.3, −9 or −248.9 | kPa, mmHg, inHg, psi or inH2O |
| Electric Waste Gate Valve Position Sensor Learning Value at the Full-closed Position | Learning value of actual stroke value of electronic wastegate valve for diagnosis | 0.2 | mm |
| Electric Waste Gate Valve Request Position Value | Electronic wastegate valve stroke command value<br>Request value for desired stroke position (mm) of electronic wastegate valve | 15 | mm |
| Electric Waste Gate Valve Actual Position Value | Electronic wastegate valve current stroke position<br>Value in which stroke sensor value (voltage) is converted to mm | 15.032 | mm |
| Electric Air Bypass Valve Status | Electronic air by-pass valve open/close command value. | Close | — |
| Target Throttle Opening Angle | Target throttle opening angle calculated by ECM. | 4 | deg |
| Actual Throttle Opening Angle | Actual throttle opening angle.<br>Calculated by ECM based on the throttle sensor input value. | 4 | deg |
| Target Throttle Opening Angle | Control value of the target throttle opening angle calculated by ECM.<br>Target value of opening angle in percentage when 0% means fully closed and 100% means fully open. | 5.9 | % |
| Relative Throttle Pos. | Current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value.<br>The value will be approx. 70% at full open. | 3.9 | % |
| Throttle Motor Voltage | Power supply voltage of the throttle motor.<br>Input value to ECM. | 13.8 | V |
| Main-Throttle Sensor | Voltage value of the main throttle position sensor.<br>Input value to ECM. | 0.7 | V |
| Sub-Throttle Sensor | Voltage value of the sub throttle position sensor.<br>Input value to ECM. | 0.7 | V |
| Throttle Motor Duty | Throttle motor control duty ratio.<br>ECM output value. | −26 | % |
| Main-Accelerator Sensor | Voltage value of the main accelerator pedal position sensor.<br>Input value to ECM. | 0.68 | V |
| Sub-Accelerator Sensor | Voltage value of the sub accelerator pedal position sensor.<br>Input value to ECM. | 0.68 | V |
| Idle Mass Air Flow | Air volume correction value to maintain the target rotation speed in each water temperature.<br>Corrects air volume when the water temperature changes.<br>It includes values of the feedback correction amount and the learning value. | 5.1 or 0.7 | g/s or lb/min |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Idle Mass Air Flow Feedback correct | Air volume compensation value of ISC as a feedback correction to stabilize the idling speed. | 0.1 or 0.01 | g/s or lb/min |
| ISC Learning Value | Learning control value of ISC.<br>After warming up, learning control is executed to reduce the ISC feedback correction to zero, in order to stabilize the engine speed. | 0.3 or 0.04 | g/s or lb/min |
| Idle A/C load correct | Air volume correction value when the air conditioner is turned on.<br>ECM corrects the air volume against the target rotation speed when the air conditioner is turned ON. | 0 | g/s or lb/min |
| Electric Load Feedback Val | Air volume correction value when an electric load is turned on.<br>ECM corrects the air volume against the set target rotation speed when the electric load is turned ON. | 0 | g/s or lb/min |
| Idle dirty throttle correct | Calculates the ISC learning values on a long-term basis, and judges as an ISC dirty throttle correction when the learning value increases gradually.<br>When carbon or other dirt accumulates on the ISC throttle and make the throttle dirty, air volume decreases when the throttle is fully closed.<br>The ECM increases the amount of compensation air to keep the rotation speed. | 0.2 or 0.03 | g/s or lb/min |
| Fuel Rail Pressure A | Fuel pressure sensor output value set to the high pressure fuel line.<br>Input value to ECM. | 2290, 17179.3, 676.3, 332 or 9193.2 | kPa, mmHg, inHg, psi or inH2O |
| Fuel Rail Pressure B | Fuel pressure sensor output value set to the high pressure fuel line.<br>Input value to ECM. | 2490, 18679.7, 735.4, 361 or 9996.1 | kPa, mmHg, inHg, psi or inH2O |
| Commanded Fuel Rail Pressure A | Target fuel pressure for high pressure fuel line calculated by ECM. | 2470, 18529.6, 729.5, 358.1 or 9915.8 | kPa, mmHg, inHg, psi or inH2O |
| Commanded Fuel Rail Pressure B | Target fuel pressure for high pressure fuel line calculated by ECM. | 2490, 18679.7, 735.4, 361 or 9996.1 | kPa, mmHg, inHg, psi or inH2O |
| Fuel Level | Fuel level sensor output value.<br>Input value to ECM.<br>Total value of main and sub. | 20 | % |
| Fuel level resistance | Fuel level sensor resistance value.<br>Input value to ECM. | 337.5 | ohm |
| Fuel Pump Duty | Fuel pump duty ratio.<br>Supply voltage to the fuel pump is under a duty control by the ECM. This value shows the duty ratio.<br>While the amount of fuel supply is small, such as during idling, the duty value is lowered to decrease the supply voltage. | 75 | % |
| Fuel Increase 1 at the High Temperature Restart | Fuel injection compensation coefficient at restarting with high coolant temperature. | 0 | — |
| Commanded Evap Purge | Evaporative purge rate displayed by the OBD. | 0 | % |
| CPC Valve Duty Ratio | Purge control solenoid valve control duty ratio.<br>ECM output value. | 0 | % |
| Purge Density Learn Value | Leaning value of the evaporation gas density purged from the canister.<br>ECM displays the estimated leaning value. | 0 | % |
| Evap Purge Flow | Purge ratio when the evaporation gas is purged from the canister. | 0 | % |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | ECM performs a duty drive to the purge solenoid valve.<br>The amount of gas actually purged will vary depending on the vacuum pressure difference before/after the solenoid valve.<br>Purge ratio displayed here shows current purge amount in percentage against the maximum purge amount when the maximum vacuum pressure is applied. | | |
| Purge Line Pressure | Pressure physical value read by CPC pressure sensor.<br>Input signal from CPC pressure sensor.<br>CPC pressure sensor output A/D value converted to physical value. | 97.66 , 732.63, 28.84, 14.16 or 392.05 | kPa, mmHg, inHg, psi or inH2O |
| ALT Duty | Value of duty ratio converted from command voltage value sent from ECM to generator. | 69 | % |
| Alternator control mode | Control mode of the electric power generation voltage by the alternator.<br>[Low]: Mode that controls the battery charge<br>[Mid]: Mode where the battery is not charged and discharged<br>[High]: Mode that fixes the voltage when the battery is charged or when an electric load is turned on<br>[ExHigh]: Mode where the battery is charged during deceleration<br>[Smart]: Mode that inhibits the excessive charging while retaining target SOC | High, Mid or Smart | — |
| Battery Terminal Voltage | Voltage value between battery terminals input from the battery sensor. | 14 | V |
| Battery Charge/Discharge Current | Battery charge/discharge current value input from the battery sensor.<br>When the value is positive: The current flows to a direction that the battery is charged.<br>When the value is negative: The current flows to a direction that the battery is discharged. | 3.6 | A |
| Estimated Battery Temperature | Battery temperature input from the battery sensor. | 45 or 113 | °C or °F |
| Remaining Battery Capacity | Remaining amount of battery estimated by ECM. | 89 | % |
| Knocking Correction | Retard angle amount when knocking occurs.<br>Partially learning value of ignition timing learning value. | 0 | deg |
| A/F Sensor #1 Current | Front oxygen (A/F) sensor output current value.<br>Input value to ECM. | 0 | mA |
| A/F Sensor #1 Resistance | Value calculated from the front oxygen (A/F) sensor output value. | 155 | ohm |
| A/F Correction #3 | Sub correction value of A/F feedback control. | −1.56 | % |
| Front O2 Heater #1 | Current value controlling the front oxygen (A/F) sensor heater.<br>ECM output value. | 0 | A |
| Rear O2 Heater Current | Current value controlling the rear oxygen sensor heater.<br>ECM output value. | 0 | A |
| Rear O2 Sensor Input Voltage | Rear oxygen sensor (+) output voltage value.<br>Input value to ECM. | 2.74 | V |
| Rear O2 Sensor Offset Voltage | Rear oxygen sensor (−) output voltage value.<br>Input value to ECM. | 1.995 | V |
| No. of EGR steps | Number of EGR valve steps.<br>Number of stepping motor steps.<br>ECM output value. | 0 | STEP |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Commanded EGR | Target value as EGR setting value calculated by ECM. | 0 | % |
| EGR Error | Percentage of the difference in actual EGR steps as compared to the target EGR steps. Both a positive value and a negative value mean that it doesn't fulfill the target. When the value is positive: It opens more than the target value. When the value is negative: It opens smaller than the target value. | 0 | % |
| TGV Position Sensor R | Tumble generator valve position sensor RH output value. Input value to ECM. | 1.12 | V |
| TGV Position Sensor L | Tumble generator valve position sensor LH output value. Input value to ECM. | 1.04 | V |
| TGV Output | Drive signal to tumble generator valve motor. Set to [ON] when the tumble generator valve is activated (when the duty output is other than 0%). ECM output value. | OFF | — |
| TGV Drive | Tumble generator valve drive status. Set to [Open] when the tumble generator valve is open. ECM control status. | Close | — |
| OCV Duty R | Control duty ratio of the intake side oil control solenoid on the RH bank. ECM output value. | 40 — 60 | % |
| OCV Duty L | Control duty ratio of the intake side oil control solenoid on the LH bank. ECM output value. | 40 — 60 | % |
| OCV Current R | Actual current value of the intake side oil control solenoid on the RH bank. Input value to ECM. | 550 — 850 | mA |
| OCV Current L | Actual current value of the intake side oil control solenoid on the LH bank. Input value to ECM. | 550 — 850 | mA |
| Exh. OCV Duty R | Control duty ratio of the exhaust side oil control solenoid on the RH bank. ECM output value. | 30 — 50 | % |
| Exh. OCV Duty L | Control duty ratio of the exhaust side oil control solenoid on the LH bank. ECM output value. | 30 — 50 | % |
| Exh. OCV Current R | Actual current value of the exhaust side oil control solenoid on the RH bank. Input value to ECM. | 400 — 700 | mA |
| Exh. OCV Current L | Actual current value of the exhaust side oil control solenoid on the LH bank. Input value to ECM. | 400 — 700 | mA |
| Roughness Monitor #1 | #1 cylinder roughness monitor count value. | 0 | — |
| Roughness Monitor #2 | #2 cylinder roughness monitor count value. | 0 | — |
| Roughness Monitor #3 | #3 cylinder roughness monitor count value. | 0 | — |
| Roughness Monitor #4 | #4 cylinder roughness monitor count value. | 0 | — |
| Cylinder Monitor #1 | Calculates the rotation speed between certain angles on the #1 cylinder. If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | 711.25 | rpm |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Cylinder Monitor #2 | Calculates the rotation speed between certain angles on the #2 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | 711.5 | rpm |
| Cylinder Monitor #3 | Calculates the rotation speed between certain angles on the #3 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | 711.25 | rpm |
| Cylinder Monitor #4 | Calculates the rotation speed between certain angles on the #4 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | 710 | rpm |
| Completed Flag of Cylinder Discrimination | Flag for completion of cylinder judgment.<br>If this flag is not ON, it is possible to judge that the crankshaft position sensor and camshaft position sensor are faulty. | Completed | — |
| Trip Count | Time stamp information.<br>Number of times the ignition is ON since the vehicle was manufactured.<br>The number of ignition ON is also recorded when a trouble code is recorded, so the comparison with that number will show you how many times the ignition has turned on since the diagnostic code was recorded. | 5770 | Time |
| Count | Time stamp information.<br>Each unit individually counts the elapsed time since the ignition is turned to ON.<br>Master central gateway CM and ECM synchronize with the master time.<br>When synchronized: [Common]<br>When not synchronized: [Originally] | Common | — |
| Time Count | Time stamp information.<br>Elapsed time after ignition ON.<br>When a trouble code is recorded, the elapsed time after ignition ON is also recorded. | 628500 | ms |
| Time Since Engine Start | Elapsed time after starting the engine. | 628 | sec |
| Elapsed Time After Engine Run | Elapsed time after starting the engine.<br>This value is used for control. | 627 | sec |
| Accumulation Time After Engine Run | Cumulative time after starting the engine.<br>For models with Auto Start Stop, cumulative time after the first engine start.<br>Time is not accumulated while the engine stops due to the Auto Start Stop system. | 627 | sec |
| Initial Engine Oil Temp. | Oil temperature when starting the engine, which is input to ECM from the oil temperature sensor. | 90 or 194 | °C or °F |
| Initial Engine Coolant Temp. | Water temperature when starting the engine, which is input to ECM from the engine coolant temperature sensor. | 90 or 194 | °C or °F |
| Initial Intake Air Temp. | Intake air temperature when starting the engine, which is input to ECM from the intake air temperature sensor. | 51 or 123.8 | °C or °F |
| Engine Starting Time | Time needed since the cranking started till the judgment of engine start is complete. | 670 | ms |
| Engine Startup Mode | Mode at engine starting.<br>00 = Initial start, 01 = Normal restart, 02 = Short term engine stall restart, 03 = Auto Start Stop restart, 04 = Change mind restart | 0 | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| IG OFF Elapsed Time | The time the vehicle has been left since the engine stopped.<br>This value can be used to check how long the vehicle has been left with the ignition switch ON after the engine stopped. | 10 | sec |
| Meter since DTC(s) cleared | Travel distance after DTC clear. | 86 or 53.4 | km or mile |
| Time while MIL lighted | Engine operating time from when the malfunction indicator light illuminated till when it went off. | 0 | min |
| Time since DTC(s) cleared | Elapsed time after DTC clear. | 183 | min |
| Number of warm-ups | Number of warm ups after DTC clear.<br>1 cycle is the time from the cold start till warmed up and stop. (Engine start after a warm-up is not counted.) | 1 | Time |
| Lighted MI lamp history | Travel distance after the warning light illuminated. | 0 | km or mile |
| Odometer | Value of the total cumulative travel distance that ECM calculates from the vehicle speed separately from the odometer in the combination meter.<br>Small difference from the odometer will be possible, but if there is a big difference, ECM or the combination meter may need to be replaced. | 9312 or 5786 | km or mile |
| Maximum Engine Speed at the time of Misfire detection caused by out of Fuel | Maximum engine speed during fuel cut by a fuel run-out judgment. | 0 | rpm |
| Maximum Intake Air Amount at the time of Misfire detection caused by out of Fuel | Maximum air amount during fuel cut by a fuel run-out judgment. | 0 | g/s or lb/min |
| Number of Misfire detection caused by out of Fuel | Number of the occurrences of fuel run-out judgment. | 0 | Time |
| Estimated Total Mileage at the time of first Misfire detection caused by out of Fuel | Estimated cumulative travel distance during fuel cut by a fuel run-out judgment. | 0 | km or mile |
| Engine Speed at the time of Detection to avoid Preignition caused by out of Fuel | Engine speed at the time of pre-ignition avoidance judgment when the fuel runs out. | 0 | rpm |
| Intake Air Mass at the time of Detection to avoid Preignition caused by out of Fuel | Amount of air at the time of pre-ignition avoidance judgment when the fuel runs out. | 0 | g/s or lb/min |
| Number of Preignition Detection caused by out of Fuel | Number of the occurrences of pre-ignition avoidance judgment when the fuel runs out. | 0 | Time |
| Estimated Total Mileage at the time of first Detection to avoid Preignition caused by out of Fuel | Estimated cumulative travel distance at the time of the first pre-ignition avoidance judgment when the fuel runs out. | 0 | km or mile |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Status of Control to avoid Pre-Ignition caused by Continuous Knocking | Operation judgment of pre-ignition countermeasure control due to continuous knocking occurrence. | OFF | — |
| Pre-Ignition Control (Detection) Operating Status | Operation judgment of countermeasure control at pre-ignition detection. | OFF | — |
| Estimated Total Mileage of Detection to avoid Pre-Ignition caused by Continuous Knocking | Travel distance during a pre-ignition countermeasure control operation due to continuous knocking occurrence. | 0 | km or mile |
| Estimated Total Mileage Since Pre-Ignition Control (Detection) Operating | Estimated cumulative travel distance at pre-ignition detection. | 0 | km or mile |
| Number of Pre-Ignition Control (Prediction) Operating | Operation count of pre-ignition prediction control. | 0 | Time |
| Number of Pre-Ignition Control (Detection) Operating | Operation count of pre-ignition detection control. | 0 | Time |
| Number of Pre-Ignition Control (Continuous Knock) Operation | Operation count of pre-ignition countermeasure control due to continuous knocking occurrence. | 0 | Time |
| Number of Pre-Ignition Control (LSPI) Operation | Operation count of torque guard at low speed pre-ignition detection. | 0 | Time |
| Cruise Control System Setting Condition | Cruise control set status. | OFF | — |
| Cruise Control System Request Torque | Torque request by cruise control. | 0 | Nm |
| Driver Request Torque | Torque request by accelerator pedal operation. | 15.775 | Nm |
| Fuel Cut Elapsed Time | Elapsed time after experienced high rotation speed. | 0 | sec |
| Memorized Cruise Speed | Cruise control system target vehicle speed. (Set speed) | 0 | km/h or MPH |
| Catalyst Temperature #11 | Estimated temperature of the front catalytic converter. | 501.5 or 934.7 | °C or °F |
| Type of fuel | Fuel information recorded in the ECM.<br>Not the fuel information currently used. | GAS | — |
| AT drive status | Neutral condition. (CVT model)<br>Information input from the inhibitor switch. | NEUT | — |
| MT gear status | Neutral condition. (MT model)<br>Information input from the neutral switch. | NEUT | — |
| Absolute Evap System Vapor Pressure | Evaporative emission control system pressure value.<br>Pressure sensor output value. | 98.69, 740.4, 29.1, 14.3 or 396.2 | kPa, mmHg, inHg, psi or inH2O |
| SI Drive mode(Display) * | SI-DRIVE mode status.<br>ECM output value.<br>Displayed only on models with SI-DRIVE. | I, S or S# | — |
| Neutral Position Switch | Neutral switch signal.<br>P or N range signal for AT.<br>Input value to ECM. | Neutral | — |
| ETC Motor Relay | Drive signal to the electronic throttle motor relay.<br>Set to [ON] when the drive signal is output. | ON | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | ECM output value. | | |
| Clutch Switch | Clutch switch signal. (MT model)<br>Set to [ON] when the clutch switch is ON.<br>Input value to ECM. | OFF | — |
| Clutch Start SW | Clutch start switch status. (MT model)<br>[ON] = Clutch depressed status [OFF] = Clutch not depressed status | OFF | — |
| Stop Light Switch | Stop light switch signal.<br>Set to [ON] when the stop light illuminates.<br>Input value to ECM. | OFF | — |
| Brake Switch | Brake switch signal.<br>Set to [ON] when the brake pedal is depressed.<br>Input value to ECM. | OFF | — |
| Idle Switch Signal | Idle signal.<br>Set to [Idle] while idling. | Idle | — |
| Ignition Switch | Ignition switch signal.<br>Set to [ON] when the ignition switch is ON. | ON | — |
| A/C Compressor Signal | A/C compressor drive signal.<br>Set to [ON] when the drive signal is output.<br>ECM output value. | OFF | — |
| Radiator Fan Control | Duty ratio used for the radiator fan duty control.<br>ECM output value. | 99 | % |
| Radiator Fan1 Monitor Duty | Output duty of radiator fan motor 1.<br>Input value to ECM. | 100 | % |
| Radiator Fan2 Monitor Duty | Output duty of radiator fan motor 2.<br>Input value to ECM. | 100 | % |
| A/C Switch | Air conditioner switch signal.<br>Set to [ON] when the air conditioner switch of the heater control is ON.<br>Input value to ECM. | OFF | — |
| Variable Load Compressor Torque Value | Load value of the variable capacity air compressor.<br>The value that the air conditioner CM estimates and outputs. | 0 | Nm |
| Starter Switch | Starter switch signal.<br>Set to [ON] when the starter is ON.<br>Input value to ECM. | OFF | — |
| Rear Defogger SW | Rear defogger switch input signal.<br>Set to [ON] when the switch is ON.<br>Input value to ECM. | OFF | — |
| Blower Fan SW | Blower fan switch input signal.<br>Set to [ON] when the switch is ON.<br>Input value to ECM. | OFF | — |
| Light Switch | Light switch input signal.<br>Set to [ON] when the switch is ON.<br>Input value to ECM. | OFF | — |
| Wiper Switch | Wiper switch input signal.<br>Set to [ON] when the switch is ON.<br>Input value to ECM. | OFF | — |
| Delivery Mode Connector | Delivery mode terminal fuse installation status.<br>Shows the status of delivery mode. | OFF | — |
| Rear O2 Rich Signal | Rear oxygen sensor output value.<br>Displays [Rich] when the air fuel ratio of rear oxygen sensor is rich.<br>Displays [Lean] when the air fuel ratio of rear oxygen sensor is lean. | Rich | — |
| Knocking Signal | Knock sensor output signal.<br>Judges if a knocking occurs or not.<br>Input value to ECM. | OFF | — |
| Crankshaft Position Sig. | Crankshaft position sensor output signal.<br>Set to [ON] when the engine is running. | ON | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | Input value to ECM. | | |
| Camshaft Position Sig. | Camshaft position sensor output signal.<br>Set to [ON] when the engine is running.<br>Input value to ECM. | ON | — |
| Ban of Torque Down | Torque down prohibition notification signal to the vehicle dynamics control (VDC) module.<br>Set to [OFF] when the prohibition signal is output.<br>ECM output value. | ON | — |
| Request Torque Down VDC | Torque down request signal transmitted from the vehicle dynamics control (VDC) module.<br>Set to [ON] when the request signal is sent.<br>Input value to vehicle dynamics control (VDC) module. | OFF | — |
| Torque Permission Signal | Torque down permission notification signal to the transmission control module.<br>Set to [ON] when the permission signal is output.<br>ECM output value. | ON | — |
| SET/COAST Switch | Cruise control system SET/COAST SW signal.<br>Set to [ON] when the switch is operated.<br>Input value to ECM. | OFF | — |
| RESUME/ACCEL Switch | Cruise control system RESUME/ACCEL SW signal.<br>Set to [ON] when the switch is operated.<br>Input value to ECM. | OFF | — |
| Main Switch | Cruise control system main switch signal.<br>Set to [ON] when the switch is operated.<br>Input value to ECM. | OFF | — |
| CC Cancel SW | Cruise control cancel switch signal of the cruise control system.<br>Set to [ON] when the switch is operated.<br>Input value to ECM. | OFF | — |
| All Cylinders Fuel cut | Status under the fuel injection amount control where the fuel injection is cut off in all cylinders. | OFF | — |
| Immobilizer Fuel Cut Status | Status where the fuel injection is cut off by the command from immobilizer. | OFF | — |
| Shift Pattern Demand for Low Water Temperature | Shift pattern request sent from ECM to the transmission CM. (CVT model)<br>When the water temperature is low, shift pattern change to the low speed side is requested to raise the catalyst temperature faster. | OFF | — |
| Oil level switch | Oil level switch signal.<br>Set to [LOW level] when the amount of engine oil decreases.<br>Input value to ECM. | HIGH level | — |
| ELCM switching valve | Leak check valve assembly switching valve drive signal.<br>Set to [Close] when closing the switching valve.<br>ECM output value. | Open | — |
| ELCM pump | Leak check valve assembly pump drive signal.<br>Set to [ON] when the leak check valve assembly decompression pump is activated.<br>ECM output value. | OFF | — |
| AT turbine speed | Turbine rotation speed of the transmission. (CVT model)<br>Turbine rotation speed is input from the transmission CM via CAN. | 681 | rpm |
| Lock up status | Lock-up status of the transmission. (CVT model) | OPEN | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | Lock up status is input from the transmission CM via CAN. | | |
| Current Gear Position | Gear status.<br>00 = P, N range 14 = R range 13 = Auto neutral status 06 = 6th 05 = 5th 04 = 4th 03 = 3rd 02 = 2nd 01 = 1st | 0 | — |
| P/N Signal | P/N status of the transmission. (CVT model) P/N range status is input from the transmission CM via CAN. | ON | — |
| Blow-by leak Connector | PCV hose assembly diagnosis signal. | Connect | — |
| Ignition Control Check 1 | Detailed status of the engine ignition control information. | 90 | — |
| Ignition Control Check 2 | Detailed status of the engine ignition control information. | 31 | — |
| Alternator control check 1 | Detailed status of charge control. | 91 | — |
| Alternator control check 2 | Detailed status of charge control. | 90.1 | — |
| Alternator control check 3 | Detailed status of charge control. | 10.35 | — |
| Alternator control check 4 | Detailed status of charge control. | 8.97 | — |
| Alternator control check 6 | Detailed status of charge control. | 0 | — |
| Alternator control check 7 | Detailed status of charge control. | 14.2 | — |
| Alternator control check 8 | Detailed status of charge control. | 64 | — |
| Alternator control check 9 | Detailed status of charge control. | 0 | — |
| Alternator control check 10 | Detailed status of charge control. | 2 | — |
| Alternator Control Check 11 | Detailed status of charge control. | — | — |
| Alternator Control Check 12 | Detailed status of charge control. | — | — |
| Alternator Control Check 13 | Detailed status of charge control. | 2.71 | — |
| Alternator Control Check 14 | Detailed status of charge control. | 9552 | — |
| Alternator Mechanical Error Status | Status where alternator is judged as having mechanical trouble. | OFF | — |
| Alternator Electrical Output Error Status | Status where alternator is judged as having electric abnormality. | OFF | — |
| Alternator High Temperature Error Status | Status where alternator is judged as having high temperature malfunction. | OFF | — |
| Alternator Communication Error Status | Status where alternator is judged as having communication failure. | OFF | — |
| Regulator Temperature | Generator regulator temperature value. | — | °C or °F |
| Analytical Engine Speed | Data for analysis | 933 | rpm |
| Analytical Load Value 2 | Data for analysis | 39 | — |
| Analytical Engine Coolant Temperature | Data for analysis | 91 or 195.8 | °C or °F |
| Analytical Ambient Temperature | Data for analysis | 37.5 or 99.5 | °C or °F |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Analytical Barometric Pressure | Data for analysis | 101, 757.7, 29.8, 14.6 or 405.5 | kPa, mmHg, inHg, psi or inH2O |
| Analytical Manifold Relative Pressure | Data for analysis | −44, −330.1, −13, −6.4 or −176.6 | kPa, mmHg, inHg, psi or inH2O |
| Analytical Ignition Timing Advance for #1 Cylinder | Data for analysis | −0.5 | °CA |
| Analytical Vehicle Speed | Data for analysis | 0 | km/h or MPH |
| Analytical Estimated Total Mileage | Data for analysis | 12 or 7.5 | km or mile |
| Analytical A/C Compressor Signal | Data for analysis | OFF | — |
| Analytical Maximum Number of Ignition Timing Advance | Data for analysis | 0 | Time |
| Analytical Number of Ignition Timing Advance | Data for analysis | 0 | Time |
| Analytical Minimum Manifold Negative Pressure | Data for analysis | 11, 82.5, 3.2, 1.6 or 44.2 | kPa, mmHg, inHg, psi or inH2O |
| Analytical Number of Brake Booster Pressure | Data for analysis | 255 | Time |
| Analytical Ignition Control Check 2 | Data for analysis | 0.31 | — |
| Analytical Ignition Control Check 1 | Data for analysis | 0 | — |
| Analytical Knocking Correction | Data for analysis | 0 | deg |
| Analytical Intake Air Temperature | Data for analysis | 55 or 131 | °C or °F |
| Analytical ISC Learning Value | Data for analysis | 0 | g/s or lb/min |
| Analytical Idle dirty throttle correct | Data for analysis | 0 | g/s or lb/min |
| Analytical VVT Advance Angle Amount R | Data for analysis | −1 | °CA |
| Analytical Exhaust VVT Retard Angle R | Data for analysis | −1 | °CA |
| Analytical TGV Drive | Data for analysis | Close | — |
| Analytical Idle Mass Air Flow | Data for analysis | 12.4 or 1.6 | g/s or lb/min |
| Analytical Brake Booster Relative Pressure | Data for analysis | 11, 82.5, 3.2, 1.6 or 44.2 | kPa, mmHg, inHg, psi or inH2O |
| Analytical Fuel Rail Pressure | Data for analysis | 2390, 17929.5, 705.9, 346.5 or 9594.6 | kPa, mmHg, inHg, psi or inH2O |
| Analytical A/F Sensor #1 | Data for analysis | 0.99 | — |
| ETC Functional Safety Check 1 | ETC malfunction information memory 1 | 0 | — |
| ETC Functional Safety Check 2 | ETC malfunction information memory 2 | 0 | — |
| ETC Functional Safety Check 3 | ETC malfunction information memory 3 | 127 | — |
| Functional Safety Check 1 | Function safety/malfunction information memory 1 | 253 | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Functional Safety Check 2 | Function safety/malfunction information memory 2 | 0 | — |
| Functional Safety Check 3 | Function safety/malfunction information memory 3 | 0 | — |
| Functional Safety Check 4 | Function safety/malfunction information memory 4 | 119 | — |
| Functional Safety Check 5 | Function safety/malfunction information memory 5 | 0 | — |
| Functional Safety Check 6 | Function safety/malfunction information memory 6 | 255 | — |
| Functional Safety Check 7 | Function safety/malfunction information memory 7 | 0 | — |
| Robust Check 1 | Execution judgment for engine stall avoidance control. | OFF | — |
| Robust Check 2 | Operation count of engine stall avoidance control. | 0 | Time |
| Robust Check 3 | Success count of engine stall avoidance control. | 0 | Time |
| Crush Detection Signal | Collision detection signal input value to ECM.<br>[ON] = Collision detected<br>[OFF] = Collision not detected | OFF | — |
| MIL Status | Malfunction indicator light illumination status.<br>When judged as abnormal, an illumination command signal is sent from ECM to the combination meter. | OFF | — |
| Number of Diag. Code: | The number of trouble codes recorded in the ECM. | 0 | — |
| O2 Sensor #11 | Installation status of the front oxygen (A/F) sensor. | Supported | — |
| O2 Sensor #12 | Installation status of the rear oxygen sensor. | Supported | — |
| Short term fuel trim #12 | Air fuel ratio correction control value of the rear oxygen sensor. | 0 | % |
| A/F Sensor #11 | Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda) | 0.996 | — |
| A/F Sensor #11 | Front oxygen (A/F) sensor output voltage. | 2.242 | V |
| A/F Sensor #11 | Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda) | 0.996 | — |
| A/F Sensor #11 | Front oxygen (A/F) sensor current value. | −0.05 | mA |
| Absolute Throttle Pos.#2 | Shows the sub throttle sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | 14.1 | % |
| Accelerator Pedal Pos.#1 | Shows the main accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | 13.7 | % |
| Accelerator Pedal Pos.#2 | Shows the sub accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | 14.1 | % |
| Relative Accelerator Pos. | Accelerator opening angle with a full close point learning value taken into consideration. | 0 | % |
| Misfire monitoring(Supp) | Support status of the misfire diagnosis. | YES | — |
| Misfire monitoring(Rdy) | Status of the misfire diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| Fuel system monitoring(Supp) | Support status of the fuel system diagnosis. | YES | — |
| Fuel system monitoring(Rdy) | Status of the fuel system diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Component monitoring(Supp) | Support status of the component diagnosis. | YES | — |
| Component monitoring(Rdy) | Status of the component diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| Catalyst Diagnosis(Supp) | Support status of the catalyst diagnosis. | YES | — |
| Catalyst Diagnosis(Rdy) | Status of the catalyst diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| Heated catalyst(Supp) | Support status of the heated catalyst diagnosis. | NO | — |
| Heated catalyst(Rdy) | Status of the heated catalyst diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |
| Evaporative purge system(Supp) | Support status of the evaporative purge system diagnosis. | YES | — |
| Evaporative purge system(Rdy) | Status of the evaporative purge system diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| Secondary air system(Supp) | Support status of the secondary air system diagnosis. | NO | — |
| Secondary air system(Rdy) | Status of the secondary air system diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |
| A/C system refrigerant(Supp) | Support status of the A/C system refrigerant diagnosis. | NO | — |
| A/C system refrigerant(Rdy) | Status of the A/C system refrigerant diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |
| Oxygen sensor(Supp) | Support status of the oxygen sensor diagnosis. | YES | — |
| Oxygen sensor(Rdy) | Status of the oxygen sensor diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| O2 Heater Diagnosis(Supp) | Support status of the oxygen sensor heater diagnosis. | YES | — |
| O2 Heater Diagnosis(Rdy) | Status of the oxygen sensor heater diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| EGR system(Supp) | Support status of the EGR diagnosis. | YES | — |
| EGR system(Rdy) | Status of the EGR diagnosis.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| Misfire monitoring(Enable) | Shows whether or not the execution condition of misfire diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| Misfire monitoring(Comp) | Shows whether or not the continuous misfire diagnosis is completed. | YES | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| | [YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | | |
| Fuel system monitoring(Enable) | Shows whether or not the execution condition of fuel system diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| Fuel system monitoring(Comp) | Shows whether or not the fuel system diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| Component monitoring(Enable) | Shows whether or not the execution condition of component diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| Component monitoring(Comp) | Shows whether or not the component diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| Catalyst Diagnosis(Enable) | Shows whether or not the execution condition of catalyst diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| Catalyst Diagnosis(Comp) | Shows whether or not the catalyst diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| Heated catalyst(Enable) | Shows whether or not the execution condition of heated catalyst diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | N/A | — |
| Heated catalyst(Comp) | Shows whether or not the heated catalyst diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |
| Evaporative purge system(Enable) | Shows whether or not the execution condition of evaporative purge system diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | NO | — |
| Evaporative purge system(Comp) | Shows whether or not the evaporative purge system diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| Secondary air system(Enable) | Shows whether or not the execution condition of the secondary air system diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | N/A | — |
| Secondary air system(Comp) | Shows whether or not the secondary air system diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| A/C system refrigerant(Enable) | Shows whether or not the execution condition of A/C system refrigerant diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | N/A | — |
| A/C system refrigerant(Comp) | Shows whether or not the A/C system refrigerant diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | N/A | — |
| Oxygen sensor(Enable) | Shows whether or not the execution condition of oxygen sensor diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| Oxygen sensor(Comp) | Shows whether or not the oxygen sensor diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| O2 Heater Diagnosis(Enable) | Shows whether or not the execution condition of oxygen heater diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| O2 Heater Diagnosis(Comp) | Shows whether or not the oxygen heater diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | YES | — |
| EGR system(Enable) | Shows whether or not the execution condition of EGR diagnosis is met.<br>[YES]: Diagnosis can be executed.<br>[NO] or [N/A]: Diagnosis cannot be executed or is not supported. | YES | — |
| EGR system(Comp) | Shows whether or not the EGR diagnosis is completed.<br>[YES] or [N/A]: Diagnosis is completed or not supported.<br>[NO]: Diagnosis is not completed. | NO | — |
| OBD System | Shows the OBD regulation to be followed. This is the information recorded in the ECM, and it does not mean that the unit automatically judges the compliance to the OBD regulations. | OBD/OBD2 | — |
| Target Wastegate A Position | Target opening angle of the electronic wastegate valve calculated by ECM. | 100 | % |
| Wastegate A Position | Actual opening angle calculated based on the opening angle sensor voltage of the electronic wastegate valve. | 100 | % |
| #1 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #1 cylinder. | OFF | — |
| #2 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #2 cylinder. | OFF | — |
| #3 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #3 cylinder. | OFF | — |
| #4 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #4 cylinder. | OFF | — |
| #1 Cylinder Parameter For | For analysis. | 0 | — |

| Item | Contents | Note (at idling) | Unit |
|---|---|---|---|
| Preignition Detection | | | |
| #2 Cylinder Parameter For Preignition Detection | For analysis. | 0 | — |
| #3 Cylinder Parameter For Preignition Detection | For analysis. | 0 | — |
| #4 Cylinder Parameter For Preignition Detection | For analysis. | 0 | — |
| Engine rpm Total Time | When the engine speed is out of standard, the count-up is performed. | 0 | ms |
| Vehicle Speed Total Time | When the vehicle speed is out of standard, the count-up is performed. | 0 | ms |
| Boost Pressure Total Time | When the boost pressure is out of standard, the count-up is performed. | 0 | ms |
| Mani. Absolute Pressure | Value calculated from manifold pressure sensor output value. | 37, 277.6, 10.9, 5.4 or 148.5 | kPa, mmHg, inHg, psi or inH2O |

*: For the relationship between user selection results of the drive select mode, Subaru Select Monitor 4 indication, and control, refer to the following table.

| User selection | Comfort | Normal | Sport | Sport+ | Individual |
|---|---|---|---|---|---|
| Subaru Select Monitor indication (engine) | I | I | S | S# | I, S or S# |
| Engine control | I | I | S | S | I or S |

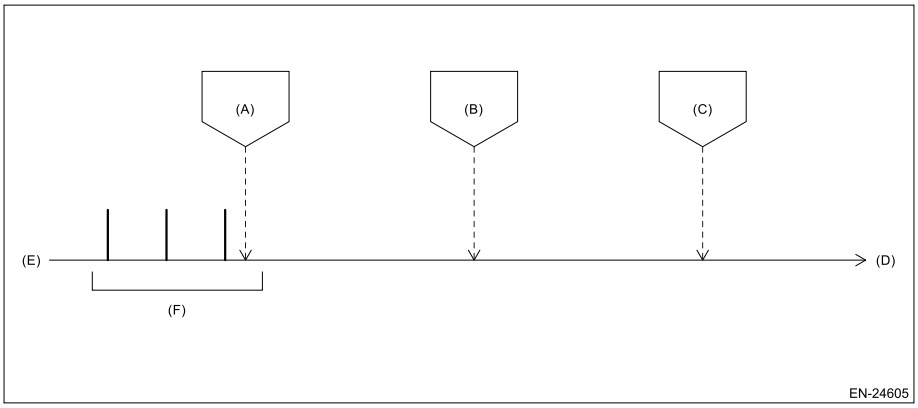
## NOTE

### 1. FREEZE FRAME DATA

ECM records the engine status at detection when it detects DTCs. (Freeze frame data)
Freeze frame data is recorded on up to a second detected DTC, and not recorded on a third detected DTC and later.

**Note:**

- **As the freeze frame data is recorded with DTC detected, permanent monitoring cannot be performed.**
- **For the first detected DTC, time series freeze frame data is recorded. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Freeze Frame Data>NOTE > TIME SERIES FREEZE FRAME DATA.**
- **When performing diagnosis, you can utilize the freeze frame data to guess the vehicle status when the DTC was detected.**
- **For detailed operation procedures, refer to "Common (Diagnostics)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**



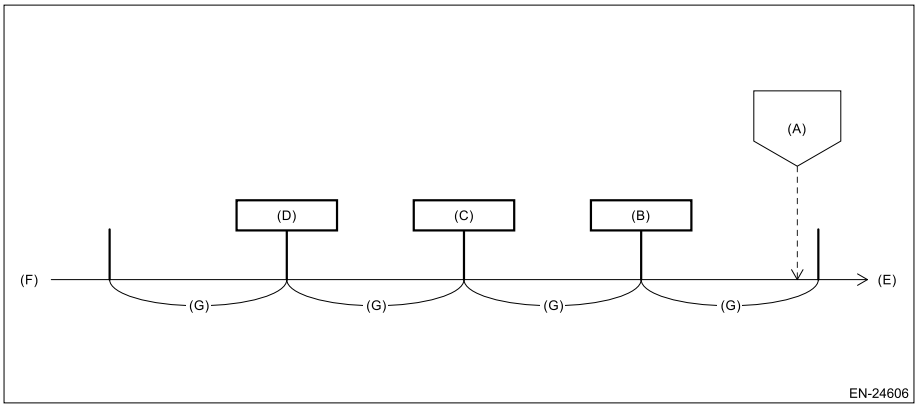

(A) First detected DTC
(B) Second detected DTC
(C) Third detected DTC or later
(D) Current
(E) Past
(F) Time series freeze frame data

### 2. TIME SERIES FREEZE FRAME DATA

ECM obtains freeze frame data every 0.5 seconds. When DTC is detected, freeze frame data of [Detect], [1 before], [History2] and [History3] is saved. (Time series freeze frame data)

**Note:**

- **You can utilize the time series freeze frame data for diagnosis by checking the status of data changes three times earlier than the DTC was detected.**
- **For detailed operation procedures, refer to "Common (Diagnostics)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**




(A) [Detect]
(B) [1 before]
(C) [History2]
(D) [History3]
(E) Current
(F) Past
(G) 0.5 sec.



## OPERATION

**Note:**

- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**
- **For details on freeze frame data, refer to the list. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Freeze Frame Data>LIST.**
- **For the number of storing counts, see the reference. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Freeze Frame Data>NOTE.**

## LIST

**Note:**
**Some items are not displayed according to the specifications.**

| Item | Contents | Unit |
|---|---|---|
| Engine Speed | Value calculated from crankshaft position sensor output value. | rpm |
| Mass Air Flow | Value calculated from air flow sensor output value. | g/s or lb/min |
| Mass Air Flow Average | Value calculated from air flow sensor output value. | g/s or lb/min |
| Vehicle Speed | Value calculated from vehicle speed sensor output value. | km/h or MPH |
| Throttle Opening Angle | Throttle valve opening angle (in percentage) calculated from throttle position sensor output value. | % |
| Accel. Opening Angle | Accelerator pedal opening angle (in percentage) calculated from accelerator pedal position sensor output value. | % |
| A/F Sensor #1 | Actual lambda value calculated from the front oxygen (A/F) sensor output value. | — |
| Ignition timing adv. #1 | Ignition timing control value for No. 1 cylinder. Calculated from rotation speed, manifold pressure, intake air temperature, water temperature, and data from knock sensor etc. | ° |
| Coolant Temp. | Value calculated from engine coolant temperature sensor output value. | °C or °F |
| Fuel Injection #1 Pulse | Control value of fuel injection time for the RH bank by ECM. | ms |
| Short term fuel trim B1 | Air fuel ratio correction control value for the front oxygen (A/F) sensor. | % |
| Long term fuel trim B1 | Air fuel ratio learning control value for the front oxygen (A/F) sensor. | % |
| Oxygen sensor #12 | Rear oxygen sensor output voltage value. | V |
| VVT Adv. Ang. Amount R | AVCS advance angle amount for the RH bank on the intake side. | deg |
| VVT Advance Target Angle Amount R | AVCS target advance angle amount for the RH bank on the intake side.<br>This value is compared with the AVCS advance angle amount R to judge if the intake AVCS is operating properly.<br>Response delays during the transition time. | deg |
| VVT Adv. Ang. Amount L | AVCS advance angle amount for the LH bank on the intake side. | deg |
| VVT Advance Target Angle Amount L | AVCS target advance angle amount for the LH bank on the intake side.<br>This value is compared with the AVCS advance angle amount L to judge if the intake AVCS is operating properly.<br>Response delays during the transition time. | deg |
| Exh. VVT Retard Ang. R | AVCS retard angle amount for the RH bank on the exhaust side. | deg |
| Ex VVT Retard Target Angle R | AVCS target retard angle amount for the RH bank on the exhaust side.<br>This value is compared with the AVCS retard angle amount R to judge if the exhaust AVCS is operating properly.<br>Response delays during the transition time. | deg |
| Exh. VVT Retard Ang. L | AVCS retard angle amount for the LH bank on the exhaust side. | deg |
| Ex VVT Retard Target Angle L | AVCS target retard angle amount for the LH bank on the exhaust side.<br>This value is compared with the AVCS retard angle amount L to judge if the exhaust AVCS is operating properly.<br>Response delays during the transition time. | deg |
| Number of Cleaning Executions for VVT Self-recovery | Number of times that the intake AVCS oil control valve cleaning is performed. | Time |

| Item | Contents | Unit |
|---|---|---|
| Number of Cleaning Executions for Ex VVT Self-recovery | Number of times that the exhaust AVCS oil control valve cleaning is performed. | Time |
| Control module voltage | ECM input power supply voltage. | V |
| Target Equivalence Ratio | Target air fuel ratio (lambda).<br>It usually becomes 1 aiming at a theoretical air fuel ratio. | — |
| Oil Temperature | Value calculated from the engine oil temperature sensor output value. | °C or °F |
| IAT Sensor #11 | Value calculated from the intake air temperature sensor output value of the air flow sensor. | °C or °F |
| IAT Sensor #12 | Value calculated from the intake air temperature sensor output value of the manifold pressure sensor. | °C or °F |
| Ambient Temperature | Value that ECM estimates by using input values from the engine coolant temperature sensor or the intake air temperature sensor etc. | °C or °F |
| Calculated load value | Current rate of air amount.<br>Value assuming that the air amount at the current engine speed with the throttle fully open is 100%. | % |
| Absolute Load Value | Percentage of current intake air amount against the maximum air intake amount of the engine.<br>For non-turbo engine, the value can be close to 95%, but will never be 100%.<br>For turbo engine, this value may exceed 100% due to a boost pressure. | % |
| Atmosphere Pressure | Value calculated from atmospheric pressure sensor output value. | kPa, mmHg, inHg, psi or inH2O |
| Electric Waste Gate Valve Position Sensor Learning Value at the Full-closed Position | Learning value of actual stroke value of electronic wastegate valve for diagnosis | mm |
| Actual Throttle Opening Angle | Actual throttle opening angle.<br>Calculated by ECM based on the throttle sensor input value. | deg |
| Target Throttle Opening Angle | Control value of the target throttle opening angle calculated by ECM.<br>Target value of opening angle in percentage when 0% means fully closed and 100% means fully open. | % |
| Relative Throttle Pos. | Current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value.<br>The value will be approx. 70% at full open. | % |
| Idle Mass Air Flow | Air volume correction value to maintain the target rotation speed in each water temperature.<br>Corrects air volume when the water temperature changes.<br>It includes values of the feedback correction amount and the learning value. | g/s or lb/min |
| Idle Mass Air Flow Feedback correct | Air volume compensation value of ISC as a feedback correction to stabilize the idling speed. | g/s or lb/min |
| ISC Learning Value | Learning control value of ISC.<br>After warming up, learning control is executed to reduce the ISC feedback correction to zero, in order to stabilize the engine speed. | g/s or lb/min |
| Idle A/C load correct | Air volume correction value when the air conditioner is turned on.<br>ECM corrects the air volume against the target rotation speed when the air conditioner is turned ON. | g/s or lb/min |
| Electric Load Feedback Val | Air volume correction value when an electric load is turned on.<br>ECM corrects the air volume against the set target rotation speed when the electric load is turned ON. | g/s or lb/min |
| Idle dirty throttle correct | Calculates the ISC learning values on a long-term basis, and judges as an ISC dirty throttle correction | g/s or lb/min |

| Item | Contents | Unit |
|---|---|---|
| | when the learning value increases gradually.<br>When carbon or other dirt accumulates on the ISC throttle and make the throttle dirty, air volume decreases when the throttle is fully closed.<br>The ECM increases the amount of compensation air to keep the rotation speed. | |
| Fuel Rail Pressure A | Fuel pressure sensor output value set to the high pressure fuel line.<br>Input value to ECM. | kPa, mmHg, inHg, psi or inH2O |
| Fuel Rail Pressure B | Fuel pressure sensor output value set to the high pressure fuel line.<br>Input value to ECM. | kPa, mmHg, inHg, psi or inH2O |
| Commanded Fuel Rail Pressure A | Target fuel pressure for high pressure fuel line calculated by ECM. | kPa, mmHg, inHg, psi or inH2O |
| Commanded Fuel Rail Pressure B | Target fuel pressure for high pressure fuel line calculated by ECM. | kPa, mmHg, inHg, psi or inH2O |
| Fuel Level | Fuel level sensor output value.<br>Input value to ECM.<br>Total value of main and sub. | % |
| Fuel level resistance | Fuel level sensor resistance value.<br>Input value to ECM. | ohm |
| Fuel Pump Duty | Fuel pump duty ratio.<br>Supply voltage to the fuel pump is under a duty control by the ECM. This value shows the duty ratio.<br>While the amount of fuel supply is small, such as during idling, the duty value is lowered to decrease the supply voltage. | % |
| Fuel Increase 1 at the High Temperature Restart | Fuel injection compensation coefficient at restarting with high coolant temperature. | — |
| Commanded Evap Purge | Evaporative purge rate displayed by the OBD. | % |
| Purge Density Learn Value | Leaning value of the evaporation gas density purged from the canister.<br>ECM displays the estimated leaning value. | % |
| Evap Purge Flow | Purge ratio when the evaporation gas is purged from the canister.<br>ECM performs a duty drive to the purge solenoid valve.<br>The amount of gas actually purged will vary depending on the vacuum pressure difference before/after the solenoid valve.<br>Purge ratio displayed here shows current purge amount in percentage against the maximum purge amount when the maximum vacuum pressure is applied. | % |
| Purge Line Pressure | Pressure physical value read by CPC pressure sensor.<br>Input signal from CPC pressure sensor.<br>CPC pressure sensor output A/D value converted to physical value. | kPa, mmHg, inHg, psi or inH2O |
| ALT Duty | Value of duty ratio converted from command voltage value sent from ECM to generator. | % |
| Alternator control mode | Control mode of the electric power generation voltage by the alternator.<br>[Low]: Mode that controls the battery charge<br>[Mid]: Mode where the battery is not charged and discharged<br>[High]: Mode that fixes the voltage when the battery is charged or when an electric load is turned on<br>[ExHigh]: Mode where the battery is charged during deceleration<br>[Smart]: Mode that inhibits the excessive charging while retaining target SOC | — |
| Battery Terminal Voltage | Voltage value between battery terminals input from the battery sensor. | V |

| Item | Contents | Unit |
|---|---|---|
| Battery Charge/Discharge Current | Battery charge/discharge current value input from the battery sensor.<br>When the value is positive: The current flows to a direction that the battery is charged.<br>When the value is negative: The current flows to a direction that the battery is discharged. | A |
| Estimated Battery Temperature | Battery temperature input from the battery sensor. | °C or °F |
| Remaining Battery Capacity | Remaining amount of battery estimated by ECM. | % |
| A/F Sensor #1 Resistance | Value calculated from the front oxygen (A/F) sensor output value. | ohm |
| Rear O2 Sensor Input Voltage | Rear oxygen sensor (+) output voltage value.<br>Input value to ECM. | V |
| Rear O2 Sensor Offset Voltage | Rear oxygen sensor (−) output voltage value.<br>Input value to ECM. | V |
| No. of EGR steps | Number of EGR valve steps.<br>Number of stepping motor steps.<br>ECM output value. | STEP |
| Commanded EGR | Target value as EGR setting value calculated by ECM. | % |
| EGR Error | Percentage of the difference in actual EGR steps as compared to the target EGR steps.<br>Both a positive value and a negative value mean that it doesn’t fulfill the target.<br>When the value is positive: It opens more than the target value.<br>When the value is negative: It opens smaller than the target value. | % |
| TGV Drive | Tumble generator valve drive status.<br>Set to [Open] when the tumble generator valve is open.<br>ECM control status. | — |
| Cylinder Monitor #1 | Calculates the rotation speed between certain angles on the #1 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | rpm |
| Cylinder Monitor #2 | Calculates the rotation speed between certain angles on the #2 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | rpm |
| Cylinder Monitor #3 | Calculates the rotation speed between certain angles on the #3 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | rpm |
| Cylinder Monitor #4 | Calculates the rotation speed between certain angles on the #4 cylinder.<br>If the rotation speed is low compared to monitor values of other cylinders, it means that the combustion is not ideal in that cylinder. | rpm |
| Completed Flag of Cylinder Discrimination | Flag for completion of cylinder judgment.<br>If this flag is not ON, it is possible to judge that the crankshaft position sensor and camshaft position sensor are faulty. | — |
| Trip Count | Time stamp information.<br>Number of times the ignition is ON since the vehicle was manufactured.<br>The number of ignition ON is also recorded when a trouble code is recorded, so the comparison with that number will show you how many times the ignition has turned on since the diagnostic code was recorded. | Time |
| Count | Time stamp information.<br>Each unit individually counts the elapsed time since the ignition is turned to ON. | — |

| Item | Contents | Unit |
|---|---|---|
| | Master central gateway CM and ECM synchronize with the master time.<br>When synchronized: [Common]<br>When not synchronized: [Originally] | |
| Time Count | Time stamp information.<br>Elapsed time after ignition ON.<br>When a trouble code is recorded, the elapsed time after ignition ON is also recorded. | ms |
| Time Since Engine Start | Elapsed time after starting the engine. | sec |
| Initial Engine Oil Temp. | Oil temperature when starting the engine, which is input to ECM from the oil temperature sensor. | °C or °F |
| Initial Engine Coolant Temp. | Water temperature when starting the engine, which is input to ECM from the engine coolant temperature sensor. | °C or °F |
| Initial Intake Air Temp. | Intake air temperature when starting the engine, which is input to ECM from the intake air temperature sensor. | °C or °F |
| Engine Starting Time | Time needed since the cranking started till the judgment of engine start is complete. | ms |
| Engine Startup Mode | Mode at engine starting.<br>00 = initial start 01 = Normal restart 02 = Short term engine stall restart 03 = Idling stop restart 04 = Change mind restart | — |
| IG OFF Elapsed Time | The time the vehicle has been left since the engine stopped.<br>This value can be used to check how long the vehicle has been left with the ignition switch ON after the engine stopped. | sec |
| Maximum Engine Speed at the time of Misfire detection caused by out of Fuel | Maximum engine speed during fuel cut by a fuel run-out judgment. | rpm |
| Maximum Intake Air Amount at the time of Misfire detection caused by out of Fuel | Maximum air amount during fuel cut by a fuel run-out judgment. | g/s or lb/min |
| Number of Misfire detection caused by out of Fuel | Number of the occurrences of fuel run-out judgment. | Time |
| Estimated Total Mileage at the time of first Misfire detection caused by out of Fuel | Estimated cumulative travel distance during fuel cut by a fuel run-out judgment. | km or mile |
| Engine Speed at the time of Detection to avoid Preignition caused by out of Fuel | Engine speed at the time of pre-ignition avoidance judgment when the fuel runs out. | rpm |
| Intake Air Mass at the time of Detection to avoid Preignition caused by out of Fuel | Amount of air at the time of pre-ignition avoidance judgment when the fuel runs out. | g/s or lb/min |
| Number of Preignition Detection caused by out of Fuel | Number of the occurrences of pre-ignition avoidance judgment when the fuel runs out. | Time |
| Estimated Total Mileage at the time of first Detection to avoid Preignition caused by out of Fuel | Estimated cumulative travel distance at the time of the first pre-ignition avoidance judgment when the fuel runs out. | km or mile |
| Status of Control to avoid Pre-Ignition caused by Continuous Knocking | Operation judgment of pre-ignition countermeasure control due to continuous knocking occurrence. | — |
| Pre-Ignition Control (Detection) Operating Status | Operation judgment of countermeasure control at pre-ignition detection. | — |

| Item | Contents | Unit |
|---|---|---|
| Estimated Total Mileage of Detection to avoid Pre-Ignition caused by Continuous Knocking | Travel distance during a pre-ignition countermeasure control operation due to continuous knocking occurrence. | km or mile |
| Estimated Total Mileage Since Pre-Ignition Control (Detection) Operating | Estimated cumulative travel distance at pre-ignition detection. | km or mile |
| Number of Pre-Ignition Control (Prediction) Operating | Operation count of pre-ignition prediction control. | Time |
| Number of Pre-Ignition Control (Detection) Operating | Operation count of pre-ignition detection control. | Time |
| Number of Pre-Ignition Control (Continuous Knock) Operation | Operation count of pre-ignition countermeasure control due to continuous knocking occurrence. | Time |
| Number of Pre-Ignition Control (LSPI) Operation | Operation count of torque guard at low speed pre-ignition detection. | Time |
| Cruise Control System Setting Condition | Cruise control set status. | — |
| Cruise Control System Request Torque | Torque request by cruise control. | Nm |
| Driver Request Torque | Torque request by accelerator pedal operation. | Nm |
| Fuel Cut Elapsed Time | Elapsed time after experienced high rotation speed. | sec |
| Catalyst Temperature #11 | Estimated temperature of the front catalytic converter. | °C or °F |
| AT drive status | Neutral condition. (CVT model)<br>Information input from the inhibitor switch. | — |
| MT gear status | Neutral condition. (MT model)<br>Information input from the neutral switch. | — |
| SI Drive mode(Display) | SI-DRIVE mode status.<br>ECM output value.<br>Displayed only on models with SI-DRIVE. | — |
| Clutch Switch | Clutch switch signal. (MT model)<br>Set to [ON] when the clutch switch is ON.<br>Input value to ECM. | — |
| Clutch Start SW | Clutch start switch status. (MT model)<br>[ON] = Clutch depressed status [OFF] = Clutch not depressed status | — |
| Stop Light Switch | Stop light switch signal.<br>Set to [ON] when the stop light illuminates.<br>Input value to ECM. | — |
| Idle Switch Signal | Idle signal.<br>Set to [Idle] while idling. | — |
| Ignition Switch | Ignition switch signal.<br>Set to [ON] when the ignition switch is ON. | — |
| A/C Compressor Signal | A/C compressor drive signal.<br>Set to [ON] when the drive signal is output.<br>ECM output value. | — |
| Radiator Fan1 Monitor Duty | Output duty of radiator fan motor 1.<br>Input value to ECM. | % |
| Radiator Fan2 Monitor Duty | Output duty of radiator fan motor 2.<br>Input value to ECM. | % |
| Variable Load Compressor Torque Value | Load value of the variable capacity air compressor.<br>The value that the air conditioner CM estimates and outputs. | Nm |
| Starter Switch | Starter switch signal.<br>Set to [ON] when the starter is ON.<br>Input value to ECM. | — |
| AT turbine speed | Turbine rotation speed of the transmission. (CVT model)<br>Turbine rotation speed is input from the transmission CM via CAN. | rpm |
| Lock up status | Lock-up status of the transmission. (CVT model) | — |

| Item | Contents | Unit |
|---|---|---|
| | Lock up status is input from the transmission CM via CAN. | |
| Current Gear Position | Gear status.<br>00 = P, N range 14 = R range 13 = Auto neutral status 06 = 6th 05 = 5th 04 = 4th 03 = 3rd 02 = 2nd 01 = 1st | — |
| P/N Signal | P/N status of the transmission. (CVT model)<br>P/N range status is input from the transmission CM via CAN. | — |
| Alternator Control Check 13 | Detailed status of charge control. | — |
| Alternator Mechanical Error Status | Status where alternator is judged as having mechanical trouble. | — |
| Alternator Electrical Output Error Status | Status where alternator is judged as having electric abnormality. | — |
| Alternator High Temperature Error Status | Status where alternator is judged as having high temperature malfunction. | — |
| Alternator Communication Error Status | Status where alternator is judged as having communication failure. | — |
| Regulator Temperature | Generator regulator temperature value. | °C or °F |
| Robust Check 1 | Execution judgment for engine stall avoidance control. | — |
| Robust Check 2 | Operation count of engine stall avoidance control. | Time |
| Robust Check 3 | Success count of engine stall avoidance control. | Time |
| Crush Detection Signal | Collision detection signal input value to ECM.<br>[ON] = Collision detected<br>[OFF] = Collision not detected | — |
| O2 Sensor #11 | Installation status of the front oxygen (A/F) sensor. | — |
| O2 Sensor #12 | Installation status of the rear oxygen sensor. | — |
| Short term fuel trim #12 | Air fuel ratio correction control value of the rear oxygen sensor. | % |
| A/F Sensor #11 | Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda) | — |
| A/F Sensor #11 | Front oxygen (A/F) sensor output voltage. | V |
| A/F Sensor #11 | Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda) | — |
| A/F Sensor #11 | Front oxygen (A/F) sensor current value. | mA |
| Absolute Throttle Pos.#2 | Shows the sub throttle sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | % |
| Accelerator Pedal Pos.#1 | Shows the main accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | % |
| Accelerator Pedal Pos.#2 | Shows the sub accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage. | % |
| Target Wastegate A Position | Target opening angle of the electronic wastegate valve calculated by ECM. | % |
| Wastegate A Position | Actual opening angle calculated based on the opening angle sensor voltage of the electronic wastegate valve. | % |
| #1 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #1 cylinder. | — |
| #2 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #2 cylinder. | — |
| #3 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #3 cylinder. | — |
| #4 Cylinder Preignition Detection | Operation judgment of pre-ignition countermeasure control (detection) for #4 cylinder. | — |
| #1 Cylinder Parameter For Preignition Detection | For analysis. | — |
| #2 Cylinder Parameter For Preignition Detection | For analysis. | — |

| Item | Contents | Unit |
|---|---|---|
| #3 Cylinder Parameter For Preignition Detection | For analysis. | — |
| #4 Cylinder Parameter For Preignition Detection | For analysis. | — |
| Engine rpm Total Time | When the engine speed is out of standard, the count-up is performed. | ms |
| Vehicle Speed Total Time | When the vehicle speed is out of standard, the count-up is performed. | ms |
| Boost Pressure Total Time | When the boost pressure is out of standard, the count-up is performed. | ms |
| Mani. Absolute Pressure | Value calculated from manifold pressure sensor output value. | kPa, mmHg, inHg, psi or inH2O |

ENGINE (DIAGNOSTICS)(H4DOTC) > Active Test

## OPERATION

**Caution:**
**After executing the active test, perform the memory clear. Ref. to COMMON (DIAGNOSTICS)>Clear memory.**

**Note:**
**For detailed operation procedures, refer to "Help" of application.**

1. On [Start] screen, select [Diagnosis].
2. On [Vehicle selection] screen, enter vehicle information and select [OK].
3. On [Main Menu] screen, select [Each System].
4. On [Select System] screen, select [Engine] and select [Next].
5. On [Select Function] screen, select [Active Test].

ENGINE (DIAGNOSTICS)(H4DOTC) > Active Test

## LIST

| Active test item | Contents | Execution condition |
|---|---|---|
| Fuel Pump Relay | ON/OFF of the fuel pump can be set. | Ignition switch ON (engine OFF) |
| CPC Solenoid Valve | ON/OFF of the purge control solenoid valve can be set. | |
| Radiator Fan Relay | ON/OFF of the radiator fan relay can be set. | |
| ELCM switching valve | ON/OFF of the leak check valve assembly switching valve can be set. | |
| ELCM pump | ON/OFF of the leak check valve assembly vacuum pump can be set. | |
| Fuel Pump Control (OFF Drive) | Fuel pump can be set to OFF. | Idling |
| Fixed Idle Ignition Timing | Idle ignition timing can be set according to engine speed. | Idling |
| Idle Speed Control | Idle speed can be set. | Idling |
| Injection Stop Mode (Injector 1)<br>Injection Stop Mode (Injector 2)<br>Injection Stop Mode (Injector 3)<br>Injection Stop Mode (Injector 4) | Injector of each cylinder can be set to stop the fuel injection. | Idling |
| Injection Quantity Control | The amount of fuel injection can be set. | Idling |
| EGR Valve Control (Step) | STEP number of the EGR control valve can be set. | Idling |
| High Pressure Fuel Inspection | High pressure fuel pipe inspection can be executed. | Idling |
| Alternator control | Alternator control mode can be set to one of the followings:<br>• Low: Mode that controls the battery charge<br>• Mid: Mode where the battery is not charged and discharged<br>• High: Mode that fixes the voltage when the battery is charged or when an electric load is turned on<br>• ExHigh * : Mode where the battery is charged during deceleration | Idling |
| Compression monitor | Compression can be measured. | • Ignition switch ON (engine OFF)<br>• Accelerator pedal is fully depressed |
| Electric Air Bypass Valve Control | Electronic air by-pass valve can be set to ON/OFF. | Idling |
| Electric Waste Gate Valve Control | Electronic wastegate valve can be opened/closed. | Idling |

*: Instruction voltage is the same as in High mode.

ENGINE (DIAGNOSTICS)(H4DOTC) > Work Support

## OPERATION

1. On [Start] screen, select [Diagnosis].
2. On [Vehicle selection] screen, enter vehicle information and select [OK].
3. On [Main Menu] screen, select [Each System].
4. On [Select System] screen, select [Engine] and select [Next].
5. On [Select Function] screen, select [Work Support].
6. On [Work Support] screen, select an appropriate function.
7. Perform the procedures shown on the display screen.

**Note:**
**For detailed operation procedures, refer to "Help" of application.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Work Support

## LIST

| Work Support item | Contents | Remarks |
|---|---|---|
| Simple Roughness Monitor | Engine speed and misfiring counter for each cylinder can be displayed. | • Calculates in range of engine speed (300 rpm to 2000 rpm)<br>• Interval of data update is 60 ms at minimum (at 2000 rpm) |
| High-Grade Roughness Monitor (without harness) | Standard deviation, engine speed, etc. can be calculated based on the pulse data of crankshaft position sensor and camshaft position sensor, and the value and graph can also be displayed. | • Calculates in range of engine speed (300 rpm to 2000 rpm)<br>• Interval of data update is 60 ms at minimum (at 2000 rpm) |
| Entry VIN | V.I.N can be registered. | Ignition switch ON (engine OFF) |
| Control Operation History | If the maximum vehicle speed, the maximum engine speed, and the maximum boost pressure are out of standard, the history data that consists of the latest data and top three data (four data in total) of each item can be displayed. (Up to 12 data)<br>The following 20 items are to be saved.<br>• Front and Back G<br>• Right and Left G<br>• Engine Speed<br>• Vehicle Speed<br>• Accel. Opening Angle<br>• Coolant Temp.<br>• Mani. Absolute Pressure<br>• Oil Temperature<br>• Intake Air Temperature<br>• Trip Count<br>• Count<br>• Time Count<br>• Neutral Position Switch<br>• Clutch Switch<br>• Brake Switch<br>• Current Gear Position<br>• Vehicle Odometer Reading<br>• Engine rpm Total Time<br>• Vehicle Speed Total Time<br>• Boost Pressure Total Time<br>**Note:**<br>**The cumulative time that exceeded the threshold value in the past is recorded in the latest time counter.** | • Data of [Detect] is saved and data of [1 before], [History2], and [History3] are saved every 0.5 seconds.<br>**Note:**<br>**Depending on the timing, displayed values of [1 before], [History2], and [History3] may be higher than that of [Detect].**<br>• To delete the history, click the operation history clear button. (Not deleted by battery removal or DTC memory clear.)<br>**Note:**<br>**If Control Operation History is recorded, perform inspection referring to the following table.** |

**If Control Operation History is recorded**

| History | Part | Main symptoms | Main faulty parts | Main factors |
|---|---|---|---|---|
| Maximum engine speed | Engine | Rough idle and engine stall<br>Low output, hesitation and poor acceleration | Crankshaft bearing | Improper shift operation<br>Vehicle modification |
| | | | Connecting rod bearing | |
| | | | Piston | |
| | | | Valve | |
| | | | Valve spring | |
| | | | Cylinder head | |
| | | | Camshaft | |
| | | | Cylinder block | |
| | CVT | Noise<br>Poor acceleration<br>Slipping<br>Vibration | Torque converter | |
| | | | Oil pump | |
| | | | Clutch | |
| | | | Variator (chain, pulley) | |
| | | | Gear | |
| | | | Bearing | |
| | MT | Noise<br>Vibration<br>Hard to shift, or does not shift.<br>Jumps to next gear. | Gear | |
| | | | Bearing | |
| | | | Synchronizer ring set | |
| | | | Shift key spring | |
| | Clutch | Slipping<br>Noise<br>Vibration<br>Improper disengagement | Clutch disc | |
| | | | Clutch cover | |
| | | | Flywheel | |
| | Diff. | Noise<br>Vibration | Gear | |
| | | | Bearing | |
| Maximum boost pressure | Engine | White smoke<br>Rough idle and engine stall<br>Low output, hesitation and poor acceleration<br>Surging<br>Start failure<br>Over-heating<br>Noise, vibration<br>Odor<br>Illumination of malfunction indicator light | Intake duct | Vehicle modification<br>Vehicle malfunction |
| | | | Turbocharger | |
| | | | Head gasket | |
| | | | Spark plug | |
| | | | Cylinder head | |
| | | | Cylinder block | |
| | | | Piston | |
| | | | Valve | |
| | | | Exhaust manifold | |
| | | | Catalytic converter | |
| | | | Crankshaft bearing | |
| | | | Connecting rod bearing | |
| | CVT | Noise<br>Poor acceleration<br>Slipping<br>Vibration | Torque converter | |
| | | | Oil pump | |
| | | | Clutch | |
| | | | Variator (chain, pulley) | |
| | | | Gear | |
| | | | Bearing | |
| | MT | Noise<br>Vibration<br>Hard to shift, or does not shift.<br>Jumps to next gear. | Gear | |
| | | | Bearing | |
| | | | Synchronizer ring set | |
| | | | Shift key spring | |
| | Clutch | Slipping<br>Noise<br>Vibration<br>Improper disengagement | Clutch disc | |
| | | | Clutch cover | |
| | | | Flywheel | |
| | Diff. | Noise<br>Vibration | Gear | |
| | | | Bearing | |
| Maximum vehicle speed | CVT | Noise<br>Poor acceleration<br>Slipping<br>Vibration | Torque converter | Vehicle modification<br>Vehicle malfunction |
| | | | Oil pump | |
| | | | Clutch | |
| | | | Variator (chain, pulley) | |
| | | | Gear | |
| | | | Bearing | |
| | MT | Noise | Gear | |

| History | Part | Main symptoms | Main faulty parts | Main factors |
|---|---|---|---|---|
| | | Vibration<br>Hard to shift, or does not shift.<br>Jumps to next gear. | Bearing | |
| | | | Synchronizer ring set | |
| | | | Shift key spring | |
| | Clutch | Slipping<br>Noise<br>Vibration<br>Improper disengagement | Clutch disc | |
| | | | Clutch cover | |
| | | | Flywheel | |
| | Diff. | Noise<br>Vibration | Gear | |
| | | | Bearing | |

## OPERATION

**Note:**

- **The readiness code shows self-diagnosis status of each DTC. The DTCs displayed here are either not yet self-diagnosed or self-diagnosed but not completed. After the self-diagnosis is complete, DTC will no longer be displayed regardless of the diagnostic result.**
- **Self-diagnosis is executed every time when the ignition switch is turned to ON. Therefore, even after the self-diagnosis is complete and nothing is displayed on the readiness code display, if you turn the ignition switch to ON again after turning it OFF, some DTCs may be displayed on the readiness code display.**
- **After you repair a DTC and perform the inspection mode, use the readiness code to check if the self-diagnosis of the DTC is completed. If the concerned DTC is displayed, the self-diagnosis of the DTC is not complete. Perform the inspection mode again.**
- **For detailed operation procedures, refer to "Help" of application.**

1. On [Start] screen, select [Diagnosis].
2. On [Vehicle selection] screen, input the target vehicle information and select [OK].
3. On [Main Menu] screen, select [Each System].
4. On [Select System] screen, select [Engine], and then select [Next].
5. On [Select Function] screen, select [DTC].
6. On [DTC] screen, select [All Readiness Diagnostic Code(s)].

## OPERATION

**Note:**

- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).**
- **For details on DTCs, refer to the list. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.**
- **Up to 11 DTCs are stored. When malfunctions exceeding the maximum number are detected, they are stored based on the priority order described in the table below.**

| Priority | Diagnosis type | MIL output | GST output | Confirmed malfunction/Temporary malfunction |
|---|---|---|---|---|
| 1 | Misfire, fuel system, sub F/B correction amount diagnosis | ON | Yes | Confirmed malfunction |
| 2 | | | | Temporary malfunction |
| 3 | Other than above | ON | Yes | Confirmed malfunction |
| 4 | | | | Temporary malfunction |
| 5 | | OFF | Yes | Confirmed malfunction |
| 6 | | | | Temporary malfunction |
| 7 | | OFF | No | Confirmed malfunction |
| 8 | | | | Temporary malfunction |

- **DTCs are cleared if the battery is removed.**



## LIST

| DTC | Description & trouble part | Reference |
|---|---|---|
| B1571 | REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM) | Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1571 REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM).<br>Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1571 REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM). |
| B1572 | IMM CIRCUIT EXCEPT ANTENNA CIRCUIT | Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1572 IMM CIRCUIT EXCEPT ANTENNA CIRCUIT.<br>Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1572 IMM CIRCUIT EXCEPT ANTENNA CIRCUIT. |
| B1576 | ECM EEPROM | Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1576 EGI CONTROL MODULE EEPROM.<br>Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1576 EGI CONTROL MODULE EEPROM. |
| B1577 | IMMOBILIZER CM EEPROM | Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1577 IMM CONTROL MODULE EEPROM.<br>Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1577 IMM CONTROL MODULE EEPROM. |
| P000A | "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P000B | "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1. |
| P000C | "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000C "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2. |
| P000D | "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000D "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2. |
| P0010 | "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1. |
| P0011 | "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1. |
| P0013 | "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0013 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1. |
| P0014 | "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1. |
| P0016 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A. |
| P0017 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B. |
| P0018 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A. |
| P0019 | CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0019 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B. |
| P0020 | "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2. |
| P0021 | "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2. |
| P0023 | "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0023 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2. |
| P0024 | "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2. |
| P0030 | A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0030 A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1. |
| P0031 | A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0031 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1. |
| P0032 | A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0032 |

| DTC | Description & trouble part | Reference |
|---|---|---|
| | SENSOR 1 | A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1. |
| P0033 | TURBOCHARGER/SUPERCHARGER BYPASS VALVE "A" CONTROL CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0033 TURBOCHARGER/SUPERCHARGER BYPASS VALVE "A" CONTROL CIRCUIT. |
| P0037 | A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0037 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2. |
| P0038 | A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0038 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2. |
| P003A | TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" POSITION EXCEEDED LEARNING LIMIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P003A TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" POSITION EXCEEDED LEARNING LIMIT. |
| P0045 | TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0045 TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" CIRCUIT/OPEN. |
| P0068 | MAP/MAF - THROTTLE POSITION CORRELATION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION. |
| P0071 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0071 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE. |
| P0072 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW. |
| P0073 | AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0073 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH. |
| P0087 | FUEL RAIL/SYSTEM PRESSURE - TOO LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0087 FUEL RAIL/SYSTEM PRESSURE - TOO LOW BANK 1. |
| P0088 | FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0088 FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1. |
| P0096 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0096 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE BANK 1. |
| P0097 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0097 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW BANK 1. |
| P0098 | INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0098 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH BANK 1. |
| P0101 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0101 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE. |
| P0102 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0102 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW. |
| P0103 | MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0103 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH. |
| P0107 | MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0107 |

| DTC | Description & trouble part | Reference |
|---|---|---|
| | PRESSURE SENSOR CIRCUIT LOW | MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW. |
| P0108 | MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH. |
| P0111 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1. |
| P0112 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1. |
| P0113 | INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1. |
| P0116 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE. |
| P0117 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0117 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW. |
| P0118 | ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0118 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH. |
| P0122 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW. |
| P0123 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH. |
| P0125 | INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL. |
| P0128 | COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE). |
| P0130 | A/F / O2 SENSOR CIRCUIT BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0130 A/F / O2 SENSOR CIRCUIT BANK 1 SENSOR 1. |
| P0131 | A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0131 A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1. |
| P0132 | A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0132 A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1. |
| P0134 | A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0134 A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1. |
| P0137 | O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2. |
| P0138 | O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P013A | O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2. |
| P013B | O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2. |
| P013E | O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2. |
| P013F | O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2. |
| P0140 | O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 2. |
| P0141 | O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0141 O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2. |
| P014C | A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1. |
| P014D | A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014D A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1. |
| P015A | A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015A A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1. |
| P015B | A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015B A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1. |
| P0171 | SYSTEM TOO LEAN BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1. |
| P0172 | SYSTEM TOO RICH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0172 SYSTEM TOO RICH BANK 1. |
| P0191 | FUEL RAIL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0191 FUEL RAIL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1. |
| P0192 | FUEL RAIL PRESSURE SENSOR CIRCUIT LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0192 FUEL RAIL PRESSURE SENSOR CIRCUIT LOW BANK 1. |
| P0193 | FUEL RAIL PRESSURE SENSOR CIRCUIT HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0193 FUEL RAIL PRESSURE SENSOR CIRCUIT HIGH BANK 1. |
| P0196 | ENGINE OIL TEMPERATURE SENSOR "A" RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0196 ENGINE OIL TEMPERATURE SENSOR "A" RANGE/PERFORMANCE. |
| P0197 | ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0197 ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT LOW. |
| P0198 | ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0198 ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT HIGH. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P0222 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW. |
| P0223 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH. |
| P0230 | FUEL PUMP PRIMARY CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0230 FUEL PUMP PRIMARY CIRCUIT. |
| P0234 | TURBOCHARGER/SUPERCHARGER "A" OVERBOOST CONDITION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0234 TURBOCHARGER/SUPERCHARGER "A" OVERBOOST CONDITION. |
| P023F | FUEL PUMP SECONDARY CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P023F FUEL PUMP SECONDARY CIRCUIT/OPEN. |
| P0244 | TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0244 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE. |
| P0299 | TURBOCHARGER/SUPERCHARGER "A" UNDERBOOST CONDITION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0299 TURBOCHARGER/SUPERCHARGER "A" UNDERBOOST CONDITION. |
| P0300 | RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED. |
| P0301 | CYLINDER 1 MISFIRE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED. |
| P0302 | CYLINDER 2 MISFIRE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0302 CYLINDER 2 MISFIRE DETECTED. |
| P0303 | CYLINDER 3 MISFIRE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0303 CYLINDER 3 MISFIRE DETECTED. |
| P0304 | CYLINDER 4 MISFIRE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED. |
| P0327 | KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0327 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR. |
| P0328 | KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0328 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR. |
| P0332 | KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT LOW BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0332 KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT LOW BANK 2. |
| P0333 | KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT HIGH BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0333 KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT HIGH BANK 2. |
| P0335 | CRANKSHAFT POSITION SENSOR "A" CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT. |
| P0336 | CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P0340 | CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR. |
| P0341 | CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR. |
| P0345 | CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2. |
| P0346 | CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2. |
| P0351 | IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN. |
| P0352 | IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0352 IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN. |
| P0353 | IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0353 IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN. |
| P0354 | IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0354 IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN. |
| P0365 | CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1. |
| P0366 | CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1. |
| P0390 | CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2. |
| P0391 | CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0391 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2. |
| P0401 | EGR ABNORMAL (EGR AMOUNT TOO SMALL) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0401 EGR ABNORMAL (EGR AMOUNT TOO SMALL). |
| P0402 | EGR "A" FLOW EXCESSIVE DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0402 EGR "A" FLOW EXCESSIVE DETECTED. |
| P0420 | CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1. |
| P0441 | EVAP SYSTEM (CPC) INCORRECT PURGE FLOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0441 EVAP SYSTEM (CPC) INCORRECT PURGE FLOW. |
| P0455 | EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK). |
| P0456 | EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0456 EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK). |
| P0458 | EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0458 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW. |
| P0459 | EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0459 |

| DTC | Description & trouble part | Reference |
|---|---|---|
| | HIGH | EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH. |
| P0480 | FAN 1 CONTROL CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0480 FAN 1 CONTROL CIRCUIT. |
| P0481 | FAN 2 CONTROL CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0481 FAN 2 CONTROL CIRCUIT. |
| P04AE | EVAP SYSTEM PURGE CONTROL VALVE "B" PERFORMANCE/STUCK OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04AE EVAP SYSTEM PURGE CONTROL VALVE "B" PERFORMANCE/STUCK OPEN. |
| P04DB | CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04DB CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED. |
| P04F0 | EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04F0 EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE. |
| P04F1 | EVAP SYSTEM LOW PRESSURE PURGE LINE PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04F1 EVAP SYSTEM LOW PRESSURE PURGE LINE PERFORMANCE. |
| P0500 | VEHICLE SPEED SENSOR "A" CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0500 VEHICLE SPEED SENSOR "A" CIRCUIT. |
| P0506 | IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0506 IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED. |
| P0507 | IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0507 IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED. |
| P050A | COLD START IDLE CONTROL SYSTEM PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE. |
| P050B | COLD START IGNITION TIMING PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050B COLD START IGNITION TIMING PERFORMANCE. |
| P0512 | STARTER (SWITCH) REQUEST CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0512 STARTER (SWITCH) REQUEST CIRCUIT. |
| P0560 | SYSTEM VOLTAGE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0560 SYSTEM VOLTAGE. |
| P0562 | SYSTEM VOLTAGE LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0562 SYSTEM VOLTAGE LOW. |
| P0563 | SYSTEM VOLTAGE HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0563 SYSTEM VOLTAGE HIGH. |
| P0604 | INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR. |
| P0605 | INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR. |
| P0606 | CONTROL MODULE PROCESSOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR. |
| P060A | INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P060B | INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE. |
| P0616 | STARTER RELAY "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0616 STARTER RELAY "A" CIRCUIT LOW. |
| P0617 | STARTER RELAY "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0617 STARTER RELAY "A" CIRCUIT HIGH. |
| P062D | FUEL INJECTOR DRIVER CIRCUIT PERFORMANCE BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P062D FUEL INJECTOR DRIVER CIRCUIT PERFORMANCE BANK 1. |
| P062F | INTERNAL CONTROL MODULE EEPROM ERROR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR. |
| P065A | GENERATOR/ALTERNATOR SYSTEM PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P065A GENERATOR/ALTERNATOR SYSTEM PERFORMANCE. |
| P0685 | ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN. |
| P06B1 | SENSOR POWER SUPPLY "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| P06B2 | SENSOR POWER SUPPLY "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| P06B4 | SENSOR POWER SUPPLY "B" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| P06B5 | SENSOR POWER SUPPLY "B" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| P0700 | TRANSMISSION CONTROL SYSTEM (MIL REQUEST) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST). |
| P081A | STARTER DISABLE CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P081A STARTER DISABLE CIRCUIT LOW. |
| P0851 | PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW. |
| P0852 | PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH. |
| P0A3B | GENERATOR/ALTERNATOR OVER TEMPERATURE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0A3B GENERATOR/ALTERNATOR OVER TEMPERATURE. |
| P100A | AVCS SYSTEM STUCK | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P100A AVCS SYSTEM STUCK. |
| P1134 | A/F / O2 SENSOR BANK1 SENSOR1 SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1134 A/F / O2 SENSOR BANK1 SENSOR1 SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION. |
| P1160 | THROTTLE RETURN SPRING | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1160 THROTTLE RETURN SPRING. |
| P1192 | FUEL RAIL PRESSURE SENSOR "B" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1192 FUEL RAIL PRESSURE SENSOR "B" CIRCUIT LOW. |
| P1193 | FUEL RAIL PRESSURE SENSOR "B" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1193 FUEL RAIL PRESSURE SENSOR "B" CIRCUIT HIGH. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P1236 | FUEL INJECTOR DRIVER SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1236 FUEL INJECTOR DRIVER SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION. |
| P1261 | CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1261 CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN. |
| P1262 | CYLINDER 2 DIRECT FUEL INJECTOR CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1262 CYLINDER 2 DIRECT FUEL INJECTOR CIRCUIT/OPEN. |
| P1263 | CYLINDER 3 DIRECT FUEL INJECTOR CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1263 CYLINDER 3 DIRECT FUEL INJECTOR CIRCUIT/OPEN. |
| P1264 | CYLINDER 4 DIRECT FUEL INJECTOR CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1264 CYLINDER 4 DIRECT FUEL INJECTOR CIRCUIT/OPEN. |
| P1378 | PRE-IGNITION DETECTED | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1378 PRE-IGNITION DETECTED. |
| P1449 | EVAP SYSTEM CLOG DETECTED (AIR FILTER) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1449 EVAP SYSTEM CLOG DETECTED (AIR FILTER). |
| P1451 | EVAP SYSTEM CLOG DETECTED (PIPE) | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1451 EVAP SYSTEM CLOG DETECTED (PIPE). |
| P1492 | COIL 1 EGR "A" CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1492 COIL 1 EGR "A" CONTROL CIRCUIT LOW. |
| P1493 | COIL 1 EGR "A" CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1493 COIL 1 EGR "A" CONTROL CIRCUIT HIGH. |
| P1494 | COIL 2 EGR "A" CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1494 COIL 2 EGR "A" CONTROL CIRCUIT LOW. |
| P1495 | COIL 2 EGR "A" CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1495 COIL 2 EGR "A" CONTROL CIRCUIT HIGH. |
| P1496 | COIL 3 EGR "A" CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1496 COIL 3 EGR "A" CONTROL CIRCUIT LOW. |
| P1497 | COIL 3 EGR "A" CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1497 COIL 3 EGR "A" CONTROL CIRCUIT HIGH. |
| P1498 | COIL 4 EGR "A" CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1498 COIL 4 EGR "A" CONTROL CIRCUIT LOW. |
| P1499 | COIL 4 EGR "A" CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1499 COIL 4 EGR "A" CONTROL CIRCUIT HIGH. |
| P1603 | ENGINE STALL HISTORY | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1603 ENGINE STALL HISTORY. |
| P1604 | STARTABILITY MALFUNCTION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1604 STARTABILITY MALFUNCTION. |
| P162A | STARTER INTERLOCK INTERNAL CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P162A STARTER INTERLOCK INTERNAL CIRCUIT. |
| P1C00 | BATTERY MONITOR MODULE "A" PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1C00 BATTERY MONITOR MODULE "A" PERFORMANCE. |
| P1E00 | REGISTRATION FAULT OF AUTHENTICATION UNIT | Ref. to CENTRAL GATEWAY (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1E00 REGISTRATION FAULT OF AUTHENTICATION UNIT. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P2004 | TGV CONTROL STUCK OPEN BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2004 TGV CONTROL STUCK OPEN BANK 1. |
| P2005 | TGV CONTROL STUCK OPEN BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2005 TGV CONTROL STUCK OPEN BANK 2. |
| P2006 | TGV CONTROL STUCK CLOSED BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2006 TGV CONTROL STUCK CLOSED BANK 1. |
| P2007 | TGV CONTROL STUCK CLOSED BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2007 TGV CONTROL STUCK CLOSED BANK 2. |
| P2009 | TGV CONTROL CIRCUIT LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2009 TGV CONTROL CIRCUIT LOW BANK 1. |
| P2012 | TGV CONTROL CIRCUIT LOW BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2012 TGV CONTROL CIRCUIT LOW BANK 2. |
| P2016 | TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2016 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1. |
| P2017 | TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2017 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1. |
| P2021 | TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2021 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2. |
| P2022 | TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2022 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2. |
| P2096 | POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1. |
| P2097 | POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1. |
| P2101 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE. |
| P2102 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2102 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW. |
| P2103 | THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2103 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH. |
| P2109 | THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE. |
| P2119 | THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2119 THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE. |
| P2122 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW. |
| P2123 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH. |
| P2127 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2127 |

| DTC | Description & trouble part | Reference |
|---|---|---|
| | | THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW. |
| P2128 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH. |
| P2135 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION. |
| P2138 | THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION. |
| P2146 | FUEL INJECTOR GROUP "A" SUPPLY VOLTAGE CIRCUIT/OPEN | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2146 FUEL INJECTOR GROUP "A" SUPPLY VOLTAGE CIRCUIT/OPEN. |
| P2195 | A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2195 A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1. |
| P2196 | A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2196 A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1. |
| P219A | BANK 1 AIR-FUEL RATIO IMBALANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE. |
| P2226 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2226 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT . |
| P2227 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2227 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE. |
| P2228 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2228 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT LOW. |
| P2229 | BAROMETRIC PRESSURE SENSOR "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2229 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT HIGH. |
| P226B | TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P226B TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL. |
| P2270 | O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2. |
| P2271 | O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2 | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2. |
| P2401 | EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2401 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW. |
| P2402 | EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2402 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH. |
| P2404 | EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2404 EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| P2419 | EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2419 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW. |
| P2420 | EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2420 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH. |
| P24B9 | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24B9 EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE. |
| P24BA | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24BA EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW. |
| P24BB | EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24BB EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH. |
| P24D6 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT RANGE/PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24D6 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT RANGE/PERFORMANCE. |
| P24D7 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24D7 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT LOW. |
| P24D8 | EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24D8 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT HIGH. |
| P2530 | IGNITION SWITCH RUN POSITION CIRCUIT | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT. |
| P2564 | TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT LOW | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2564 TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT LOW. |
| P2565 | TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT HIGH | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2565 TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT HIGH. |
| P2610 | ECM/PCM ENGINE OFF TIMER PERFORMANCE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2610 ECM/PCM ENGINE OFF TIMER PERFORMANCE. |
| U0073 | CONTROL MODULE COMMUNICATION BUS OFF | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF. |
| U0077 | LIN COMMUNICATION BUS "ECM/PCM" OFF | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0077 LIN COMMUNICATION BUS "ECM/PCM" OFF. |
| U007B | CONTROL MODULE COMMUNICATION BUS "I" OFF | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U007B CONTROL MODULE COMMUNICATION BUS "I" OFF. |
| U0101 | LOST COMMUNICATION WITH TCM | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0101 LOST COMMUNICATION WITH TCM. |
| U0122 | LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE. |
| U0131 | LOST COMMUNICATION WITH POWER STEERING CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0131 LOST COMMUNICATION WITH POWER STEERING CONTROL MODULE. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| U0140 | LOST COMMUNICATION WITH BODY CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0140 LOST COMMUNICATION WITH BODY CONTROL MODULE. |
| U0146 | LOST COMMUNICATION WITH SERIAL DATA GATEWAY MODULE "A" | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0146 LOST COMMUNICATION WITH SERIAL DATA GATEWAY MODULE "A". |
| U0151 | LOST COMMUNICATION WITH RESTRAINTS CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0151 LOST COMMUNICATION WITH RESTRAINTS CONTROL MODULE. |
| U0155 | LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE. |
| U0162 | LOST COMMUNICATION WITH AUDIO VISUAL NAVIGATION DISPLAY MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0162 LOST COMMUNICATION WITH AUDIO VISUAL NAVIGATION DISPLAY MODULE. |
| U0164 | LOST COMMUNICATION WITH HVAC CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0164 LOST COMMUNICATION WITH HVAC CONTROL MODULE. |
| U0402 | INVALID DATA RECEIVED FROM TCM | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0402 INVALID DATA RECEIVED FROM TCM. |
| U0416 | INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE. |
| U0420 | INVALID DATA RECEIVED FROM POWER STEERING CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0420 INVALID DATA RECEIVED FROM POWER STEERING CONTROL MODULE. |
| U0422 | INVALID DATA RECEIVED FROM BODY CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0422 INVALID DATA RECEIVED FROM BODY CONTROL MODULE. |
| U0423 | INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE. |
| U0424 | INVALID DATA RECEIVED FROM HVAC CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0424 INVALID DATA RECEIVED FROM HVAC CONTROL MODULE. |
| U0452 | INVALID DATA RECEIVED FROM RESTRAINTS CONTROL MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0452 INVALID DATA RECEIVED FROM RESTRAINTS CONTROL MODULE. |
| U0463 | INVALID DATA RECEIVED FROM NAVIGATION DISPLAY MODULE | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0463 INVALID DATA RECEIVED FROM NAVIGATION DISPLAY MODULE. |
| U1129 | LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE PU-CAN | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1129 LOST COMMUNICATION WITH BRAKE SYSTEM CONTROL MODULE PU-CAN. |
| U1235 | LOST COMMUNICATION WITH EyeSight | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1235 LOST COMMUNICATION WITH EyeSight. |
| U1418 | INVALID DATA RECEIVED FROM BRAKE SYSTEM CONTROL MODULE PU-CAN | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1418 INVALID DATA RECEIVED FROM BRAKE SYSTEM CONTROL MODULE PU-CAN. |
| U1433 | INVALID DATA RECEIVED FROM EyeSight | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1433 INVALID DATA RECEIVED FROM EyeSight. |

| DTC | Description & trouble part | Reference |
|---|---|---|
| U1712 | LOST LIN COMMUNICATION WITH BATTERY "1" MONITOR MODULE | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1712 LOST LIN COMMUNICATION WITH BATTERY "1" MONITOR MODULE. |
| U171F | LOST LIN COMMUNICATION WITH GENERATOR | Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U171F LOST LIN COMMUNICATION WITH GENERATOR. |
| U1C00 | INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1C00 INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY. |
| U1C08 | INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1C08 INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS. |
| U1C0C | INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1C0C INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS. |
| U1D00 | CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1D00 CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM GATEWAY. |
| U1D08 | INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1D08 INVALID AUTHENTICATION DATA RECEIVED FROM VDC PU-BUS. |
| U1D0C | CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1D0C CONTINUINGLY INVALID AUTHENTICATION DATA RECEIVED FROM EYESIGHT PU-BUS. |
| U1E00 | LOST COMMUNICATION OF AUTHENTICATION DATA WITH GATEWAY "A" PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1E00 LOST COMMUNICATION OF AUTHENTICATION DATA WITH GATEWAY "A" PU-BUS. |
| U1E08 | LOST COMMUNICATION OF AUTHENTICATION DATA WITH VDC PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1E08 LOST COMMUNICATION OF AUTHENTICATION DATA WITH VDC PU-BUS. |
| U1E0C | LOST COMMUNICATION OF AUTHENTICATION DATA WITH EYESIGHT PU-BUS | Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U1E0C LOST COMMUNICATION OF AUTHENTICATION DATA WITH EYESIGHT PU-BUS. |

## DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1

**Note:**
**For the diagnostic procedure, refer to DTC P0011. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.**

### 1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
Judge NG when the amount of AVCS actual timing advance does not approach to the amount of AVCS target timing advance.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| AVCS control | In operation |
| \|Target timing advance change amount (per 80 ms)\| | Less than 4°CA |
| \|VVT target angle\| | 12.5 °CA or more |
| Ambient air temperature | 7°C (44.6°F) or more |

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while AVCS is operating.

### 4. DIAGNOSTIC METHOD

When the differences of target timing advance amount and actual timing advance amount is calculated during AVCS control, and the difference per predetermined time is the specified value or larger.
Judge as NG when the following conditions are established within the predetermined time.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Σ(Target position − Actual position) | More than 4000°CA<br>Or,<br>Less than −4000°CA |

**Time needed for diagnosis:** 25 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1

**Note:**
**For the diagnostic procedure, refer to DTC P0014. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.**

### 1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.
Judge NG when the amount of exhaust AVCS actual timing advance does not approach the amount of exhaust AVCS target timing advance.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Exhaust AVCS control | In operation |
| \|Target timing advance change amount (per 80 ms)\| | Less than 4°CA |
| \|VVT target angle\| | 14°CA or more |
| Ambient air temperature | 7°C (44.6°F) or more |

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while exhaust AVCS is operating.

### 4. DIAGNOSTIC METHOD

When the differences of target timing advance amount and actual timing advance amount is calculated during exhaust AVCS control, and the difference per predetermined time is the specified value or larger.
Judge as NG when the following conditions are established within the predetermined time.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Σ(Target position − Actual position) | More than 4500°CA |

| Malfunction Criteria | Threshold Value |
|---|---|
| | Or,<br>Less than −4500°CA |

**Time needed for diagnosis:** 25 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P000C "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2

**Note:**
- **For the diagnostic procedure, refer to DTC P0021. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.**
- **For the detection standard, refer to DTC P000A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

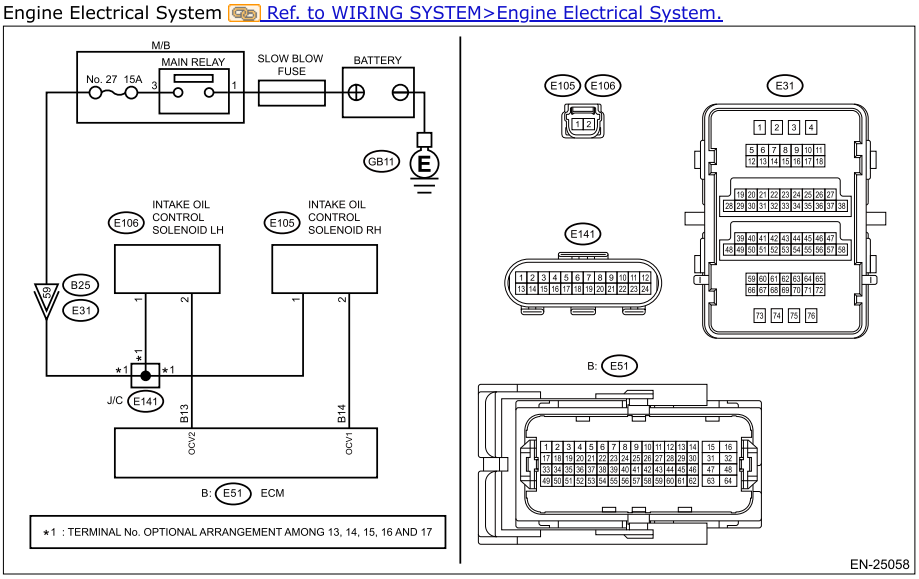
## DTC P000D "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2

**Note:**
- **For the diagnostic procedure, refer to DTC P0024. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.**
- **For the detection standard, refer to DTC P000B. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1.**

# DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK OUTPUT SIGNAL OF ECM. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY. | yes | Go to 4. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID CONNECTOR RH (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 6. |

4. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
→ no → Perform the instructed procedures.

yes ↓

5. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
→ no → Perform the instructed procedures.

yes ↓

6. CHECK INTAKE OIL CONTROL SOLENOID RH.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 14 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 3.

No — Go to 2.

### 2. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.

Measure the voltage between intake oil control solenoid RH connector and engine ground.
**Connector & terminal**
(E105) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.

- Open circuit or short circuit to ground in harness between M/B and intake oil control solenoid RH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID CONNECTOR RH (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid RH.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 14 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and intake oil control solenoid RH connector. |
| No | Go to 6. |

### 4. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid RH.
4. Measure the resistance between intake oil control solenoid RH connector and engine ground.

**Connector & terminal**

(E105) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid RH connector. |

### 5. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and intake oil control solenoid RH connector.

**Connector & terminal**

(E51) No. 14 — (E105) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and intake oil control solenoid RH connector. |

### 6. CHECK INTAKE OIL CONTROL SOLENOID RH.

Check the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of intake oil control solenoid RH connector. |
| No | Replace the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open/short circuit of oil control solenoid valve.

Judge as NG when the current is small even though the duty signal is large, or when the current is large even though the duty signal is small.

**EXECUTION CONDITION**

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Oil control solenoid control duty | 94.9% or more |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Oil control solenoid control duty | Less than 12.3% |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Oil control solenoid control current | Less than 0.306 A |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Oil control solenoid control current | 0.306 A or more |

**Time needed for diagnosis:** 2000 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1

### 1. —

**DTC detecting condition:**

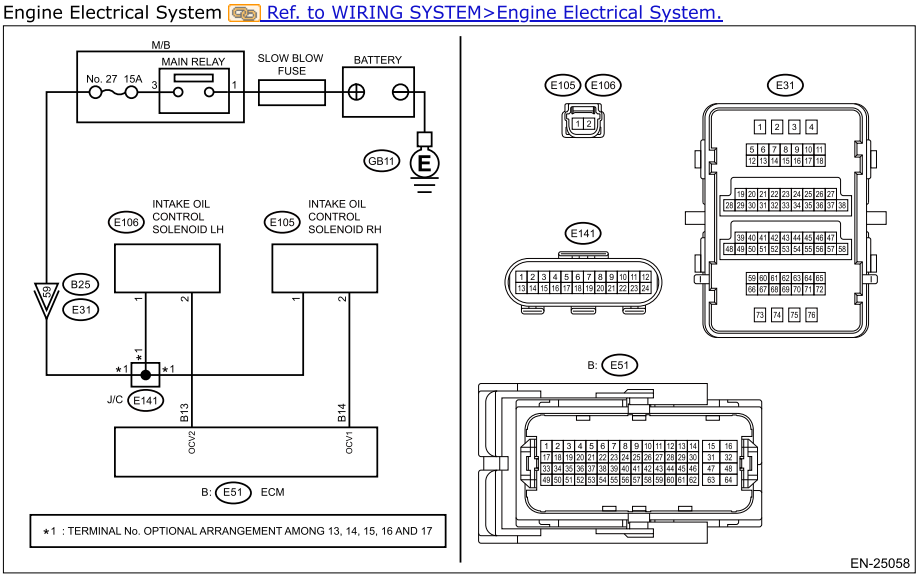
Detected when two consecutive driving cycles with fault occur.

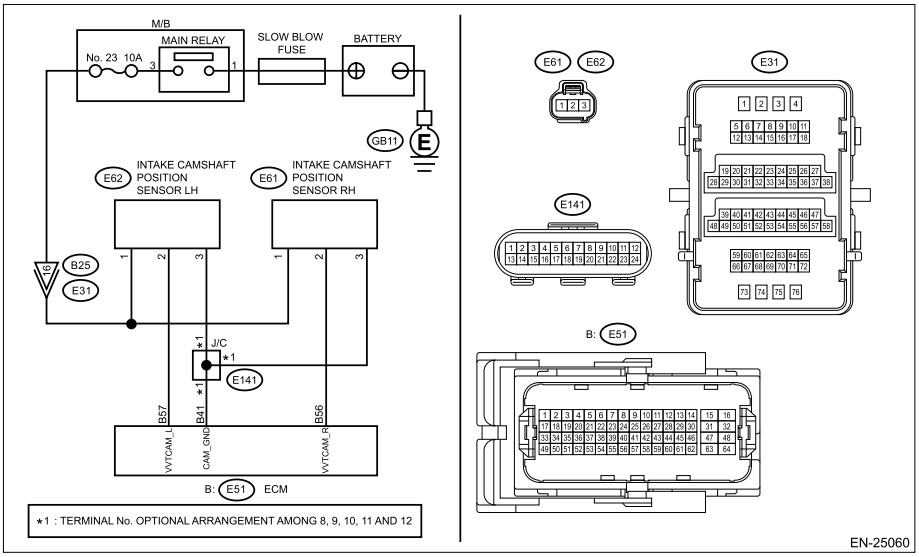
**Trouble symptom:**

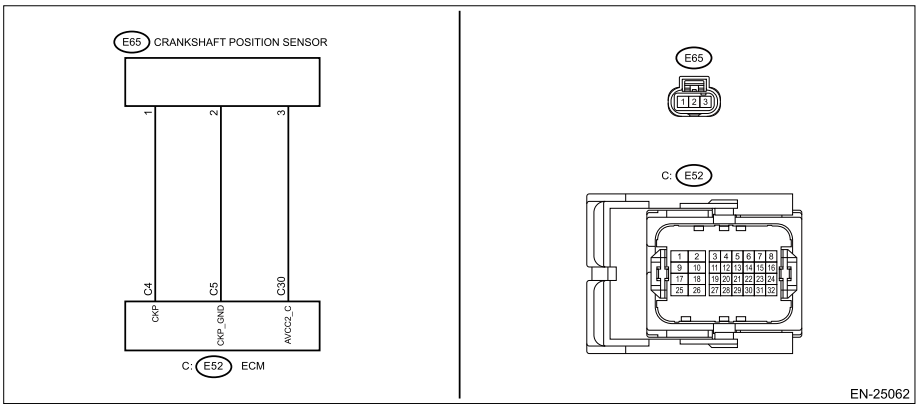
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.






**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK OUTPUT SIGNAL OF ECM. | no | Go to 4. |
| yes | | |
| 3. CHECK FOR POOR CONTACT. | yes | Go to 5. |
| | no | Perform the instructed procedures. |
| 4. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY. | no | Perform the instructed procedures. |

yes

5. CHECK ENGINE OIL CONDITION.

no → Go to 6.

yes

6. CHECK ON-BOARD MONITOR TEST RESULT.

yes → Go to 8.

no → Go to 7.

7. CHECK ON-BOARD MONITOR TEST RESULT.

no → Go to 17.

yes

8. CHECK HARNESS AND CONNECTOR.

no → Go to 9.

yes

9. CHECK HARNESS AND CONNECTOR (OPEN).

no → Go to 17.

yes

10. CHECK HARNESS AND CONNECTOR (OPEN).

no → Go to 17.

yes

11. CHECK HARNESS AND CONNECTOR (OPEN).

no → Go to 17.

yes

12. CHECK ENGINE OIL PRESSURE.

yes → Go to 14.

no → Go to 13.

13. CHECK OIL STRAINER.

no → Go to 15.

yes

14. CHECK OIL PATH OF CHAIN COVER.

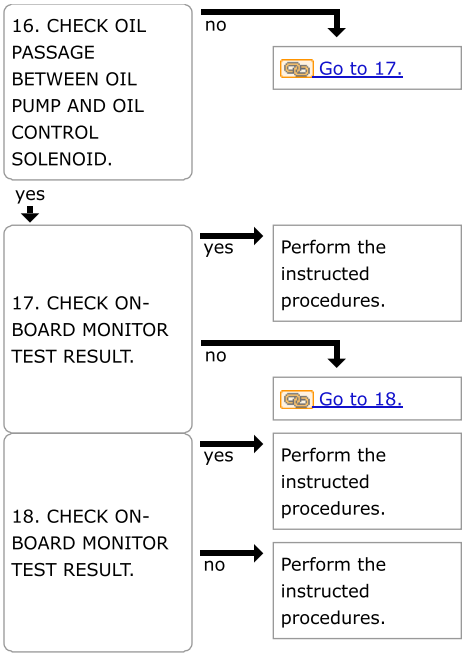
no → Go to 15.

yes

15. CHECK CAMSHAFT.

no → Go to 16.

yes




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P000A and P0011 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.<br>Go to 2. |

### 2. CHECK OUTPUT SIGNAL OF ECM.

Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 14 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 4. |

### 3. CHECK FOR POOR CONTACT.

Check the ECM connector and harness.

**Note:**
**Check the following items.**
- **Poor contact of ECM connector**
- **Temporary open or short circuit of harness**
- **Contamination, corrosion or looseness of engine ground terminal**

Is the check result OK?

Yes — Go to 5.

No — Repair or replace faulty parts.

### 4. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.

Measure the voltage between intake oil control solenoid RH connector and engine ground.

**Connector & terminal**

(E105) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and intake oil control solenoid RH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 5. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 6.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 6.

## 6. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to OFF.
2. Replace the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
3. Turn the ignition switch to ON.
4. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
5. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
6. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

7. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] for the replaced oil control solenoid 1000 or more?

Yes — Go to 8.

No — Go to 7.

## 7. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 6.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

Yes — Go to 8.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 17.

## 8. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 9.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 9.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid RH.
4. Measure the resistance in harness between intake oil control solenoid RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 14 — (E105) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid RH connector.
Go to 17.

### 10. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the intake camshaft position sensor RH.
2. Measure the resistance in harness between the intake camshaft position sensor RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 56 — (E61) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 11.

No — Repair the open circuit in the harness between ECM connector and intake camshaft position sensor RH connector.
Go to 17.

### 11. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 12.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 17.

### 12. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Go to 13.

## 13. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

Yes

Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.
Go to 14.

No

Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Caution:**
**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**

Go to 15.

## 14. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

Yes

Go to 15.

No

Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.
Go to 15.

## 15. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 1) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 2).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

Yes

Go to 16.

No

Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft.
Go to 16.

## 16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.

- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes

Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 17.

No

Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 17.

## 17. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

   **Warning:**
   - **Performing inspection mode needs a driver along with a checker who should check the data.**
   - **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

   **Note:**
   - **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
   - **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**
5. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] 1000 or more?

Yes

Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No

Go to 18.

### 18. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 17.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | End. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the AVCS system malfunction.
Judge as NG when the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues.

**EXECUTION CONDITION**

**Normal**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| AVCS control | In operation |
| \|VVT target angle\| | More than 10°CA |
| Ambient air temperature | 7°C (44.6°F) or more |

**Intermediate lock**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Engine speed | 500 rpm or more |
| Elapsed time after starting the engine | 500 ms or more<br>and<br>Value of Map or less |

**Map**

| Engine coolant temperature (°C (°F)) | −40 (−40) | −30 (−22) | −20 (−4) | −10 (14) | 0 (32) | 10 (50) | 20 (68) | 30 (86) |
|---|---|---|---|---|---|---|---|---|
| Elapsed time after starting the engine (s) | 10 | 10 | 10 | 8 | 5 | 3.5 | 2.8 | 2.8 |

| Engine coolant temperature (°C (°F)) | 40 (104) | 50 (122) | 60 (140) | 70 (158) | 80 (176) | 90 (194) | 100 (212) | 110 (230) |
|---|---|---|---|---|---|---|---|---|
| Elapsed time after starting the engine (s) | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously while AVCS is operating. (Normal)
Perform the diagnosis when the AVCS is carrying out the intermediate lock control at the engine start. (Intermediate lock)

**DIAGNOSTIC METHOD**

When the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

**Judgment value (normal)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Target position − Actual position)\| | More than 10°CA |

**Judgment value (intermediate lock)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Target position − Actual position)\| | More than 10°CA |

**Time needed for diagnosis**

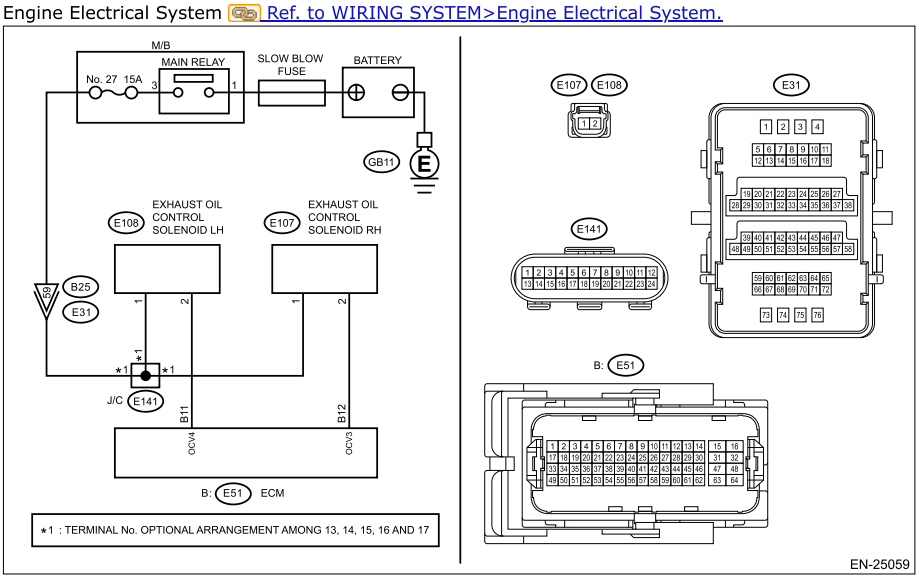
**Normal:** 5000 ms
**Intermediate lock:** 2000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0013 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK OUTPUT SIGNAL OF ECM. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY. | yes | Go to 4. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 6. |

4. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
→ no → Perform the instructed procedures.

yes ↓

5. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
→ no → Perform the instructed procedures.

yes ↓

6. CHECK EXHAUST OIL CONTROL SOLENOID RH.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 12 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 3.

No — Go to 2.

### 2. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.

Measure the voltage between exhaust oil control solenoid RH connector and engine ground.
**Connector & terminal**
(E107) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and exhaust oil control solenoid RH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid RH.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 12 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and exhaust oil control solenoid RH connector. |
| No | Go to 6. |

### 4. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid RH.
4. Measure the resistance between exhaust oil control solenoid RH connector and engine ground.
   **Connector & terminal**
   (E107) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid RH connector. |

### 5. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and exhaust oil control solenoid RH connector.
**Connector & terminal**
(E51) No. 12 — (E107) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and exhaust oil control solenoid RH connector. |

### 6. CHECK EXHAUST OIL CONTROL SOLENOID RH.

Check the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of exhaust oil control solenoid RH connector. |
| No | Replace the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open/short circuit of oil control solenoid valve.
Judge as NG when the current is small even though the duty signal is large, or when the current is large even though the duty signal is small.

**EXECUTION CONDITION**
**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Oil control solenoid control duty | 94.9 % or more |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Oil control solenoid control duty | Less than 12.3 % |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Oil control solenoid control current | Less than 0.306 A |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Oil control solenoid control current | 0.306 A or more |

**Time needed for diagnosis:** 2000 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1

## 1. —

**DTC detecting condition:**

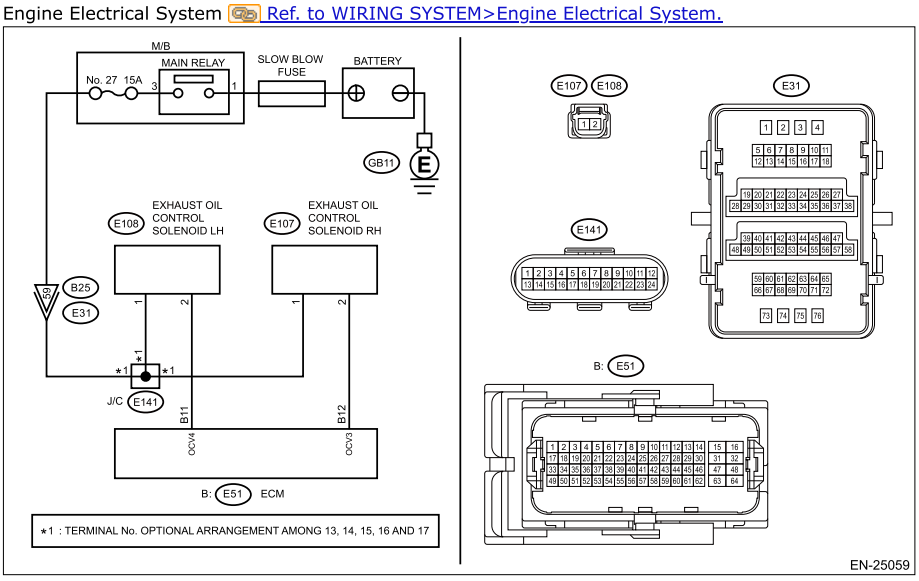
Detected when two consecutive driving cycles with fault occur.

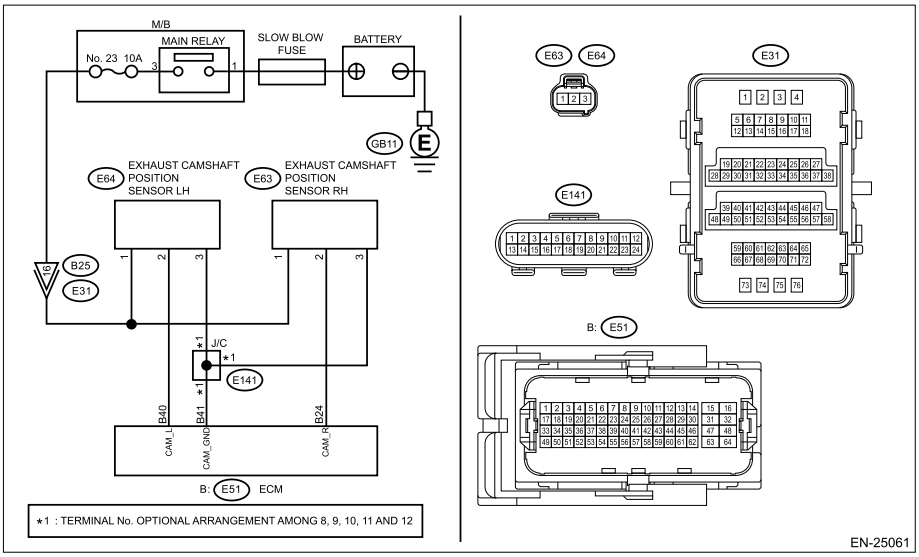
**Trouble symptom:**

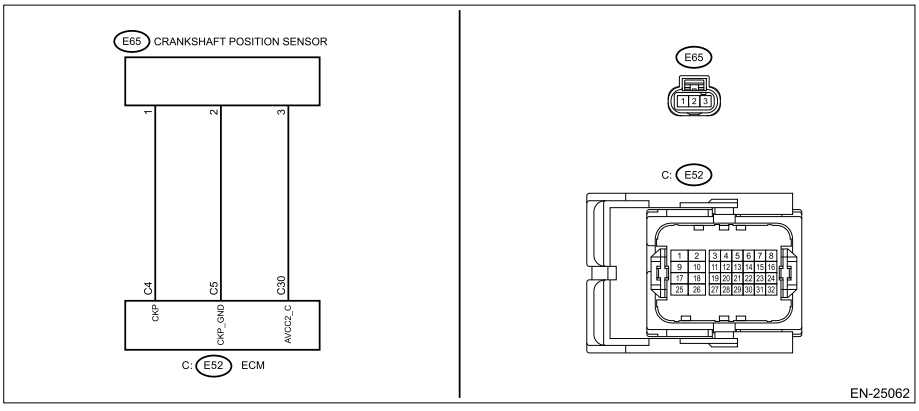
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



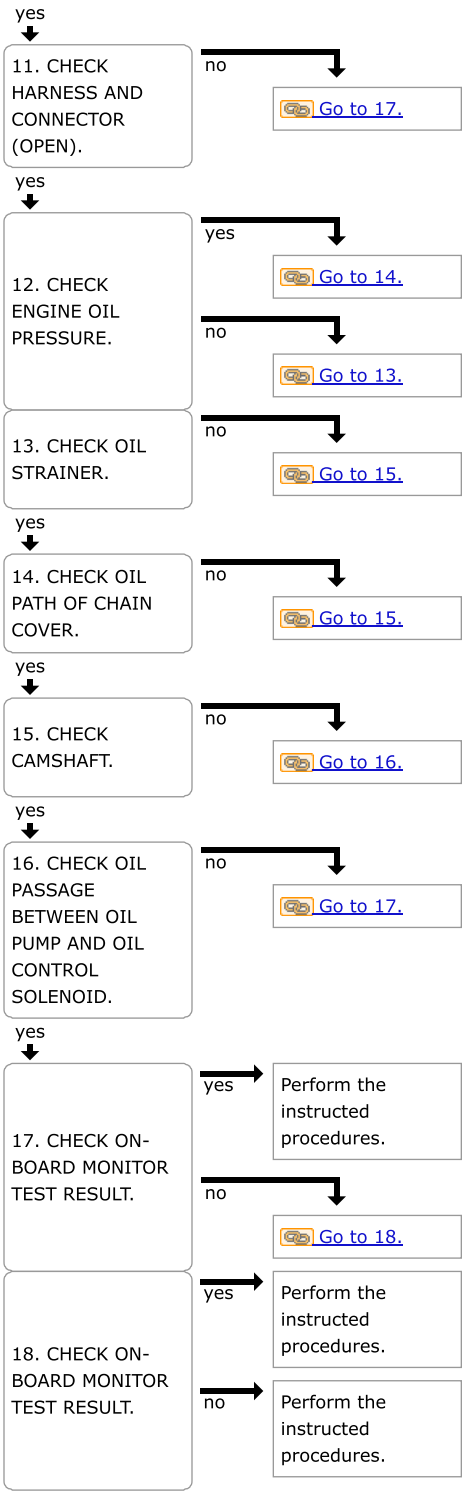
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK OUTPUT SIGNAL OF ECM.
   - no → Go to 4.
   - yes ↓
3. CHECK FOR POOR CONTACT.
   - yes → Go to 5.
   - no → Perform the instructed procedures.
4. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.
   - no → Perform the instructed procedures.
   - yes ↓
5. CHECK ENGINE OIL CONDITION.
   - no → Go to 6.
   - yes ↓
6. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 8.
   - no → Go to 7.
7. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 17.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR.
   - no → Go to 9.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 17.
   - yes ↓
10. CHECK HARNESS AND CONNECTOR (OPEN).
    - no → Go to 17.


yes
11. CHECK HARNESS AND CONNECTOR (OPEN).
no
Go to 17.
yes
12. CHECK ENGINE OIL PRESSURE.
yes
Go to 14.
no
Go to 13.
13. CHECK OIL STRAINER.
no
Go to 15.
yes
14. CHECK OIL PATH OF CHAIN COVER.
no
Go to 15.
yes
15. CHECK CAMSHAFT.
no
Go to 16.
yes
16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.
no
Go to 17.
yes
17. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Go to 18.
18. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P000B and P0014 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.<br>Go to 2. |

### 2. CHECK OUTPUT SIGNAL OF ECM.

Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 12 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 4. |

### 3. CHECK FOR POOR CONTACT.

Check the ECM connector and harness.

**Note:**

**Check the following items.**

- **Poor contact of ECM connector**
- **Temporary open or short circuit of harness**
- **Contamination, corrosion or looseness of engine ground terminal**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair or replace faulty parts. |

### 4. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.

Measure the voltage between exhaust oil control solenoid RH connector and engine ground.

**Connector & terminal**

(E107) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B and exhaust oil control solenoid RH connector<br>• Blown out of fuse<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

### 5. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 6.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 6.

### 6. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to OFF.
2. Replace the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
3. Turn the ignition switch to ON.
4. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
5. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
6. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

   **Warning:**
   - **Performing inspection mode needs a driver along with a checker who should check the data.**
   - **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

   **Note:**
   - **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
   - **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**
7. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] for the replaced oil control solenoid 1000 or more?

Yes — Go to 8.

No — Go to 7.

### 7. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 6.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

Yes — Go to 8.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 17.

## 8. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 9.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 9.

## 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid RH.
4. Measure the resistance in harness between exhaust oil control solenoid RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 12 — (E107) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid RH connector.
Go to 17.

## 10. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the exhaust camshaft position sensor RH.
2. Measure the resistance in harness between the exhaust camshaft position sensor RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 24 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 11.

No — Repair the open circuit in the harness between ECM connector and exhaust camshaft position sensor RH connector.
Go to 17.

### 11. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 12.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 17.

### 12. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Go to 13.

### 13. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.
Go to 14.

No — Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Caution:**
**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**

Go to 15.

### 14. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

Yes — Go to 15.

No — Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.
Go to 15.

## 15. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 1) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 2).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

Yes — Go to 16.

No — Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft. Go to 16.

## 16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes — Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 17.

No — Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 17.

### 17. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

5. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] 1000 or more?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Go to 18.

### 18. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 17.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — End.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the exhaust AVCS system malfunction.
Judge as NG when the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Exhaust AVCS control | In operation |
| \|VVT target angle\| | More than 10°CA |
| Ambient air temperature | 7°C (44.6°F) or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously while exhaust AVCS is operating.

**DIAGNOSTIC METHOD**

When the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Target position − Actual position)\| | More than 10°CA |

**Time needed for diagnosis:** 5000 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A

## 1. —

**DTC detecting condition:**

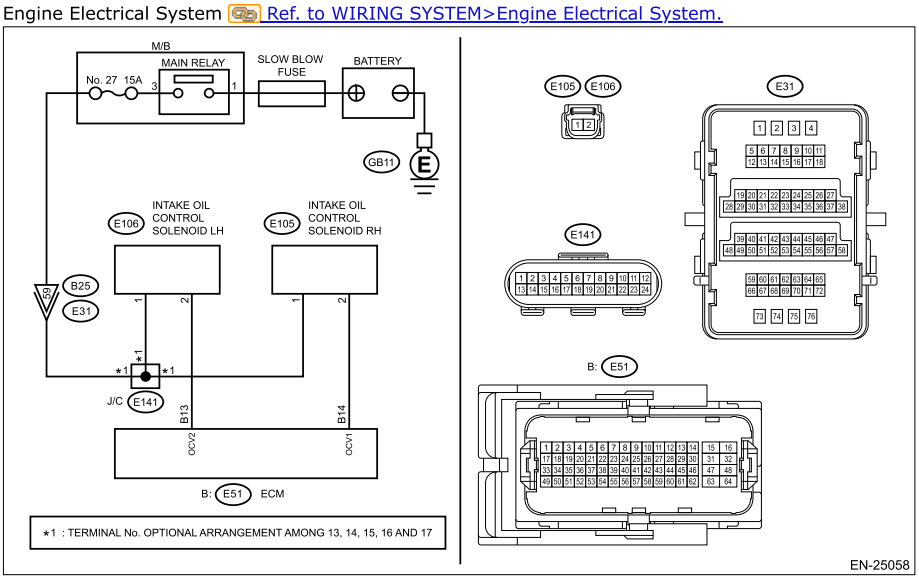
Detected when two consecutive driving cycles with fault occur.

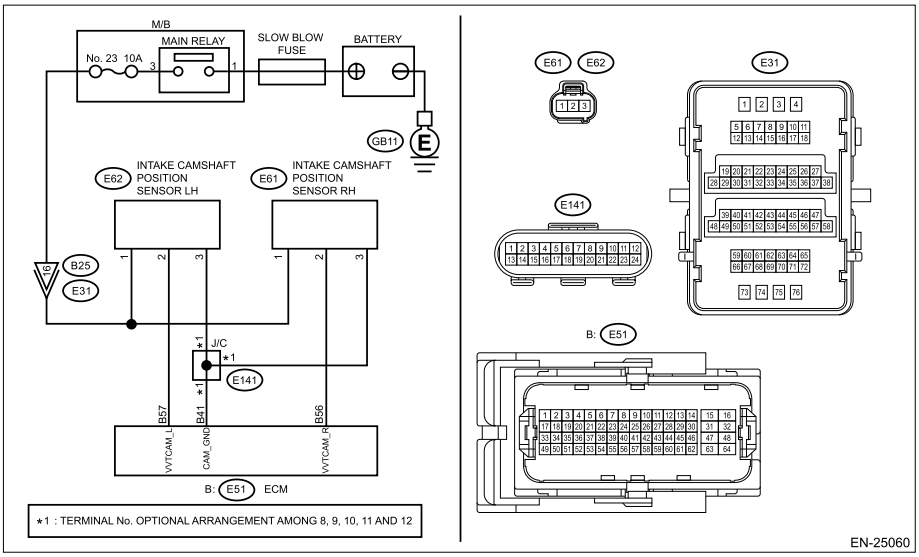
**Trouble symptom:**

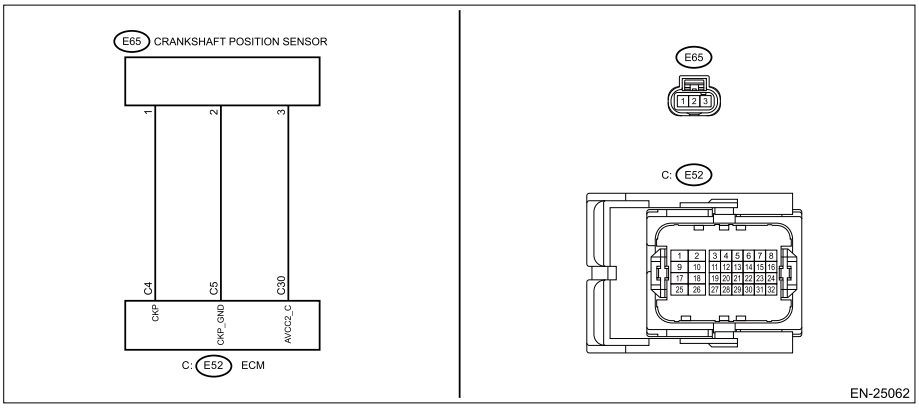
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



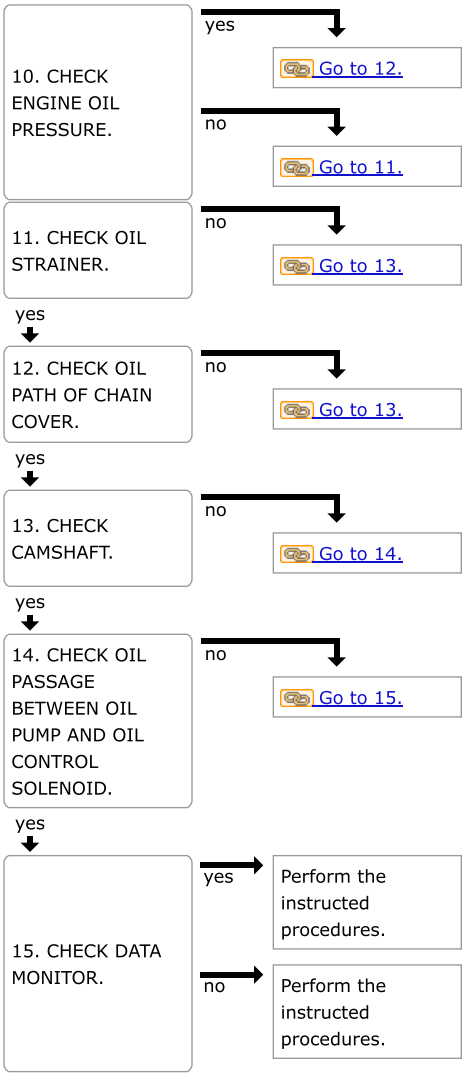
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK ENGINE OIL CONDITION.
   - no → Go to 3.
   - yes ↓
3. CHECK TIMING CHAIN.
   - yes → Go to 15.
   - no → Go to 4.
4. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 6.
   - no → Go to 5.
5. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 15.
   - yes ↓
6. CHECK HARNESS AND CONNECTOR.
   - no → Go to 7.
   - yes ↓
7. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0016 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data. Go to 2. |

## 2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 3.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 3.

## 3. CHECK TIMING CHAIN.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Disconnect the connector of the intake oil control solenoid RH. (DTC will be set but this will not affect the inspection)
5. Turn the ignition switch to ON.
6. Start monitoring of [VVT Adv. Ang. Amount R] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

7. Start the engine.
8. Read the value of [VVT Adv. Ang. Amount R] within 10 seconds after engine is started.

**Note:**
**The display will indicate [0] by judging the position as standard after 10 seconds elapse since the engine was started.**

9. Record the readings [VVT Adv. Ang. Amount R].
10. Stop the engine.

Is [VVT Adv. Ang. Amount R] out of standard (0 [deg]) by ±10 [deg] or more within 10 seconds after starting?

Yes — Repair the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
Go to 15.

No — Go to 4.

## 4. CHECK ON-BOARD MONITOR TEST RESULT.

1. Replace the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
4. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
5. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

6. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] for the replaced oil control solenoid 1000 or more?

Yes — Go to 6.

No — Go to 5.

## 5. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 4.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

Yes — Go to 6.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 15.

## 6. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 7.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 7.

### 7. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid RH.
4. Measure the resistance in harness between intake oil control solenoid RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 14 — (E105) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid RH connector.
Go to 15.

### 8. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the intake camshaft position sensor RH.
2. Measure the resistance in harness between the intake camshaft position sensor RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 56 — (E61) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the open circuit in the harness between ECM connector and intake camshaft position sensor RH connector.
Go to 15.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 15.

### 10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Go to 11.

### 11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

| | |
|---|---|
| Yes | Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.<br>Go to 12. |
| No | Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>**Caution:**<br>**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**<br>Go to 13. |

### 12. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 13. |
| No | Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>Go to 13. |

### 13. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 1) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 2).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 14. |
| No | Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft.<br>Go to 14. |

### 14. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes — Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 15.

No — Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 15.

### 15. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Using the Subaru Select Monitor, read the value in [VVT Initial Position Learning Value #1].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
4. Find the sum value of read [VVT Initial Position Learning Value #1] and [VVT Adv. Ang. Amount R] recorded in step 3.

Is the sum value within standard?
Standard:
65.2 — 95.2

Yes — ECM is good; finish the diagnosis.

No — Replace the ECM and perform the corresponding inspection mode. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode. When DTC is not displayed, end the diagnosis.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

**Note:**
**Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing chain derails suddenly in process or because wrong assembly occurs during servicing.**

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| AVCS position learning | In operation |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously after starting engine and while AVCS is not operating.

**DIAGNOSTIC METHOD**

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Crankshaft position when camshaft position sensor signal is input − Learning value\| | More than 10°CA |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Camshaft position sensor signal input position (bank 1) | Less than 50.8 °CA<br>Or,<br>More than 109.9 °CA |
| Camshaft position sensor signal input position (bank 2) | Less than 52.3 °CA<br>Or,<br>More than 110.4 °CA |

**Time needed for diagnosis:** 1000 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B

## 1. —

**DTC detecting condition:**

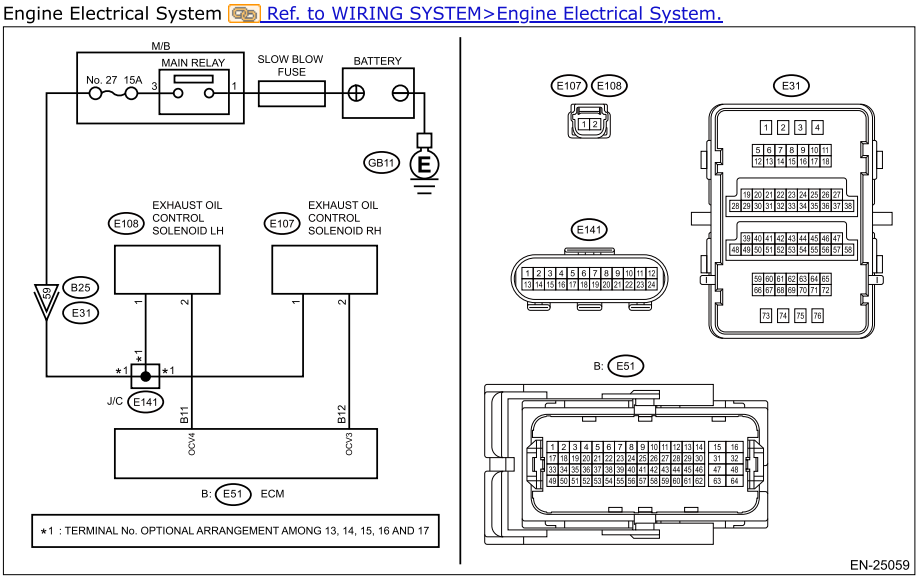
Detected when two consecutive driving cycles with fault occur.

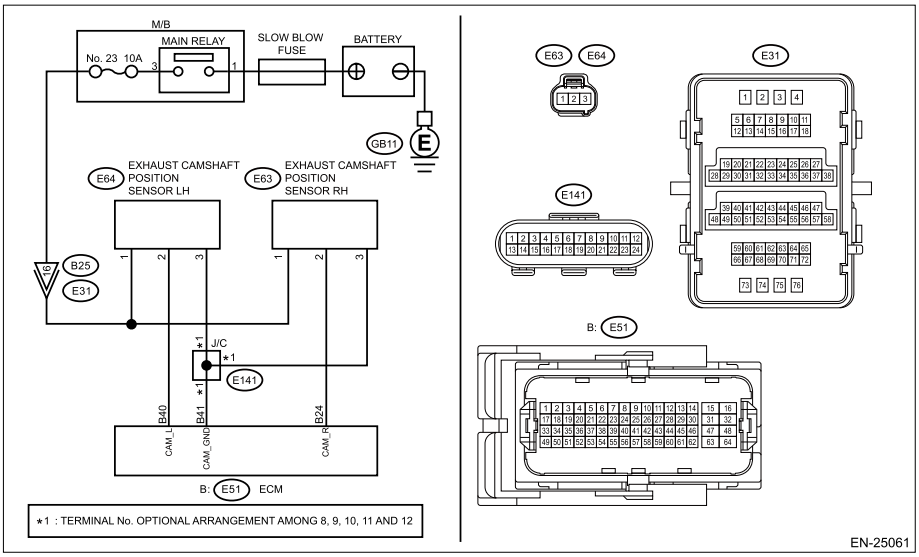
**Trouble symptom:**

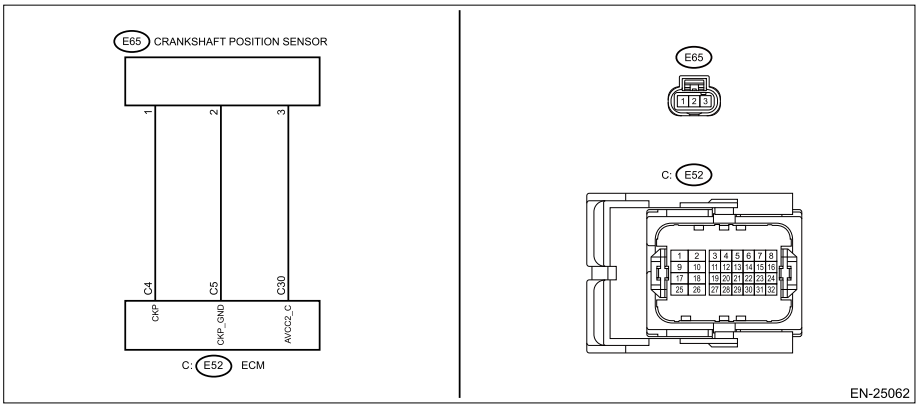
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



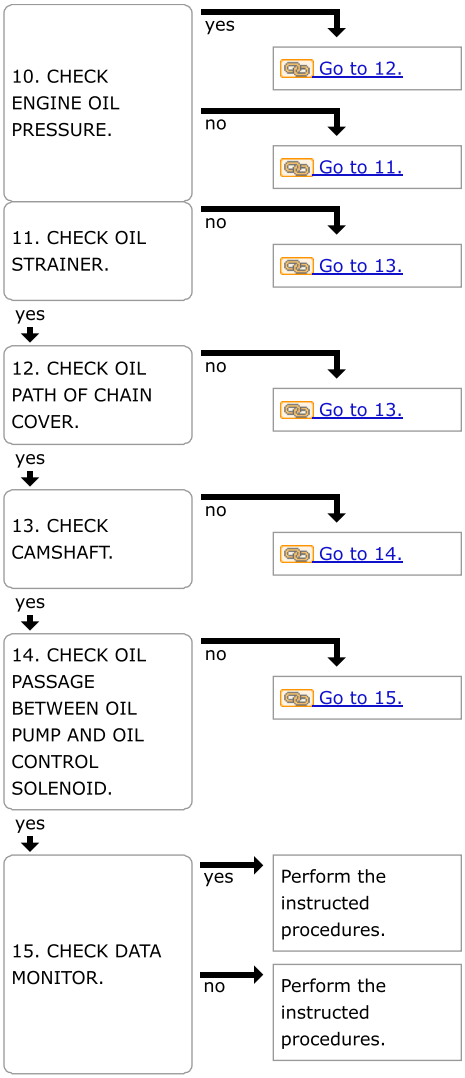
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK ENGINE OIL CONDITION.
   - no → Go to 3.
   - yes ↓
3. CHECK TIMING CHAIN.
   - yes → Go to 15.
   - no → Go to 4.
4. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 6.
   - no → Go to 5.
5. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 15.
   - yes ↓
6. CHECK HARNESS AND CONNECTOR.
   - no → Go to 7.
   - yes ↓
7. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0017 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data. Go to 2. |

## 2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 3.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 3.

## 3. CHECK TIMING CHAIN.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Disconnect the connector of the exhaust oil control solenoid RH. (DTC will be set but this will not affect the inspection)
5. Turn the ignition switch to ON.
6. Start monitoring of [Exh. VVT Retard Ang. R] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

7. Start the engine.
8. Read the value of [Exh. VVT Retard Ang. R] within 10 seconds after engine is started.

**Note:**
**The display will indicate [0] by judging the position as standard after 10 seconds elapse since the engine was started.**

9. Record the readings [Exh. VVT Retard Ang. R].
10. Stop the engine.

Is [Exh. VVT Retard Ang. R] out of standard (0 [deg]) by ±10 [deg] or more within 10 seconds after starting?

Yes — Repair the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
Go to 15.

No — Go to 4.

### 4. CHECK ON-BOARD MONITOR TEST RESULT.

1. Replace the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
4. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
5. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

6. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 1] for the replaced oil control solenoid 1000 or more?

Yes — Go to 6.

No — Go to 5.

### 5. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 4.

Is the value of [VVT Monitor Bank 1] 1000 or less and more than (the value of [VVT Monitor Bank 2] × 1.5 + 100) compared with the value of [VVT Monitor Bank 2]?

Yes — Go to 6.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 15.

### 6. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 7.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 7.

### 7. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid RH.
4. Measure the resistance in harness between exhaust oil control solenoid RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 12 — (E107) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid RH connector.
Go to 15.

### 8. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the exhaust camshaft position sensor RH.
2. Measure the resistance in harness between the exhaust camshaft position sensor RH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 24 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the open circuit in the harness between ECM connector and exhaust camshaft position sensor RH connector.
Go to 15.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 15.

### 10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Go to 11.

## 11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

| | |
|---|---|
| Yes | Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.<br>Go to 12. |
| No | Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>**Caution:**<br>**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**<br>Go to 13. |

## 12. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 13. |
| No | Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>Go to 13. |

## 13. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 1) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 2).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 14. |
| No | Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft.<br>Go to 14. |

### 14. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes — Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 15.

No — Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 15.

### 15. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Using the Subaru Select Monitor, read the value in [VVT Ex Initial Position Learning Value #1].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
4. Find the sum value of read [VVT Ex Initial Position Learning Value #1] and [Exh. VVT Retard Ang. R] recorded in step 3.

Is the sum value within standard?
Standard:
93 — 124

Yes — ECM is good; finish the diagnosis.

No — Replace the ECM and perform the corresponding inspection mode. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode. When DTC is not displayed, end the diagnosis.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the exhaust AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

**Note:**
**Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing chain derails suddenly in process or because wrong assembly occurs during servicing.**

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Exhaust AVCS position learning | In operation |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously while the exhaust AVCS is not operating after warming up.

**DIAGNOSTIC METHOD**

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Crankshaft position when camshaft position sensor signal is input − Learning value\| | More than 10°CA |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Camshaft position sensor signal input position (bank 1) | Less than 81.5 °CA<br>Or,<br>More than 138.3 °CA |
| Camshaft position sensor signal input position (bank 2) | Less than 79.7 °CA<br>Or,<br>More than 137.4 °CA |

**Time needed for diagnosis:** 5 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A

## 1. —

**DTC detecting condition:**

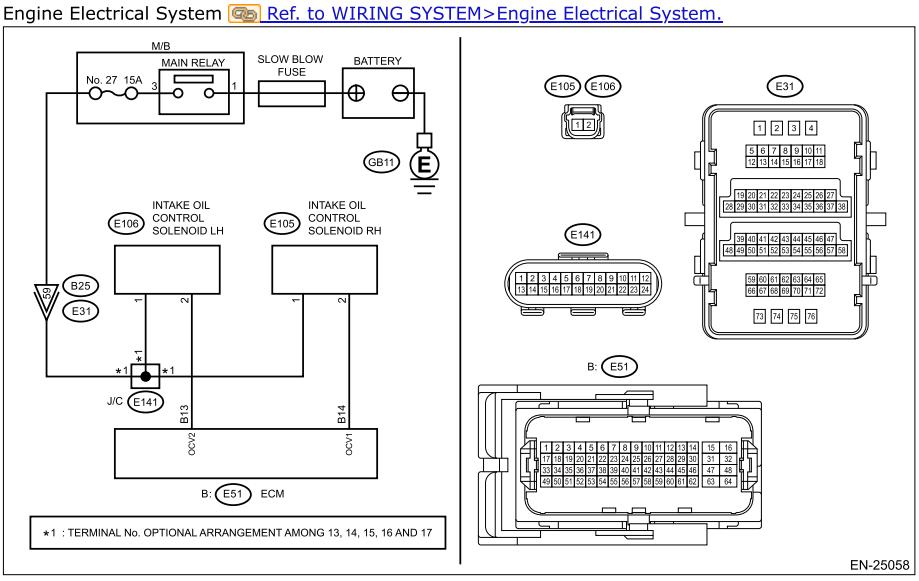
Detected when two consecutive driving cycles with fault occur.

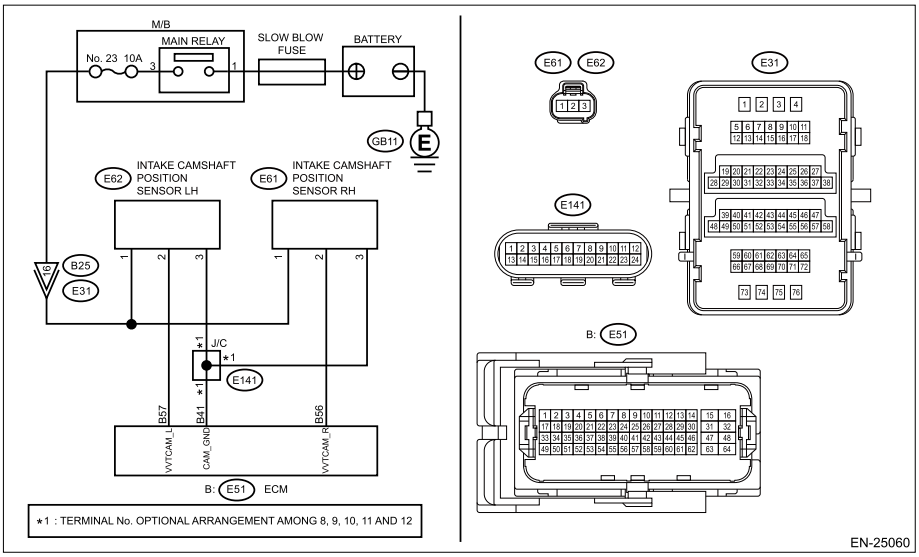
**Trouble symptom:**

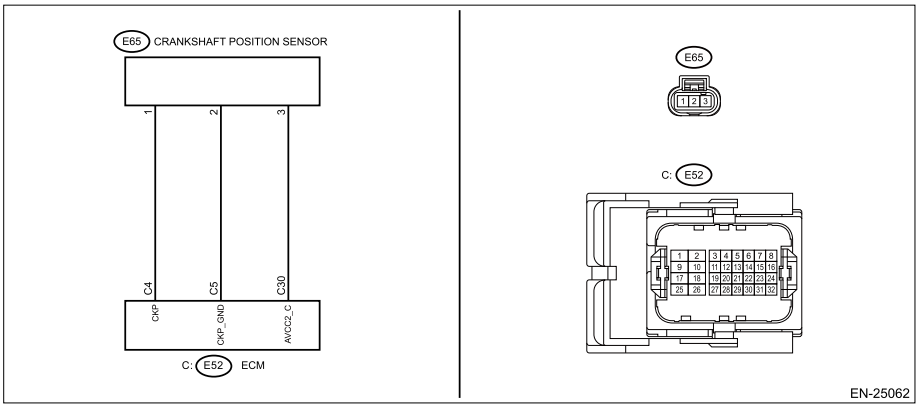
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



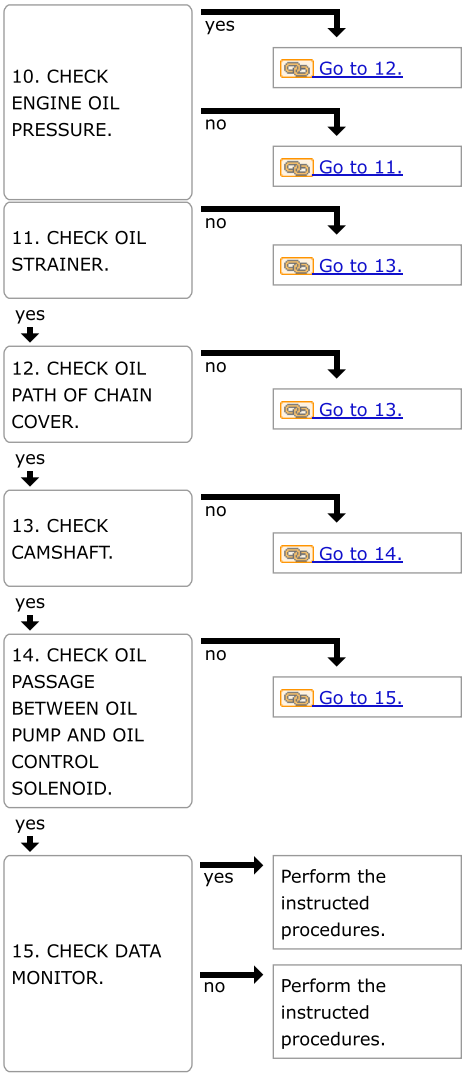
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK ENGINE OIL CONDITION.
   - no → Go to 3.
   - yes ↓
3. CHECK TIMING CHAIN.
   - yes → Go to 15.
   - no → Go to 4.
4. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 6.
   - no → Go to 5.
5. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 15.
   - yes ↓
6. CHECK HARNESS AND CONNECTOR.
   - no → Go to 7.
   - yes ↓
7. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0018 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data. Go to 2. |

## 2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 3.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 3.

## 3. CHECK TIMING CHAIN.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Disconnect the connector of the intake oil control solenoid LH. (DTC will be set but this will not affect the inspection)
5. Turn the ignition switch to ON.
6. Start monitoring of [VVT Adv. Ang. Amount L] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

7. Start the engine.
8. Read the value of [VVT Adv. Ang. Amount L] within 10 seconds after engine is started.

**Note:**
**The display will indicate [0] by judging the position as standard after 10 seconds elapse since the engine was started.**

9. Record the readings [VVT Adv. Ang. Amount L].
10. Stop the engine.

Is [VVT Adv. Ang. Amount L] out of standard (0 [deg]) by ±10 [deg] or more within 10 seconds after starting?

Yes — Repair the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
Go to 15.

No — Go to 4.

## 4. CHECK ON-BOARD MONITOR TEST RESULT.

1. Replace the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
4. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
5. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

6. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] for the replaced oil control solenoid 1000 or more?

Yes — Go to 6.

No — Go to 5.

## 5. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 4.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

Yes — Go to 6.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 15.

## 6. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 7.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 7.

### 7. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid LH.
4. Measure the resistance in harness between intake oil control solenoid LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 13 — (E106) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid LH connector.
Go to 15.

### 8. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from intake camshaft position sensor LH.
2. Measure the resistance in harness between the intake camshaft position sensor LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 57 — (E62) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the open circuit in the harness between ECM connector and intake camshaft position sensor LH connector.
Go to 15.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 15.

### 10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Go to 11.

### 11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

| | |
|---|---|
| Yes | Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.<br>Go to 12. |
| No | Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>**Caution:**<br>**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**<br>Go to 13. |

### 12. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 13. |
| No | Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.<br>Go to 13. |

### 13. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 2) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 1).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 14. |
| No | Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft.<br>Go to 14. |

### 14. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes

Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 15.

No

Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 15.

### 15. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Using the Subaru Select Monitor, read the value in [VVT Initial Position Learning Value #2].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
4. Find the sum value of read [VVT Initial Position Learning Value #2] and [VVT Adv. Ang. Amount L] recorded in step 3.

Is the sum value within standard?
Standard:
65.2 — 95.2

Yes

ECM is good; finish the diagnosis.

No

Replace the ECM and perform the corresponding inspection mode. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode. When DTC is not displayed, end the diagnosis.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0016. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A.**

# DTC P0019 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B

## 1. —

**DTC detecting condition:**

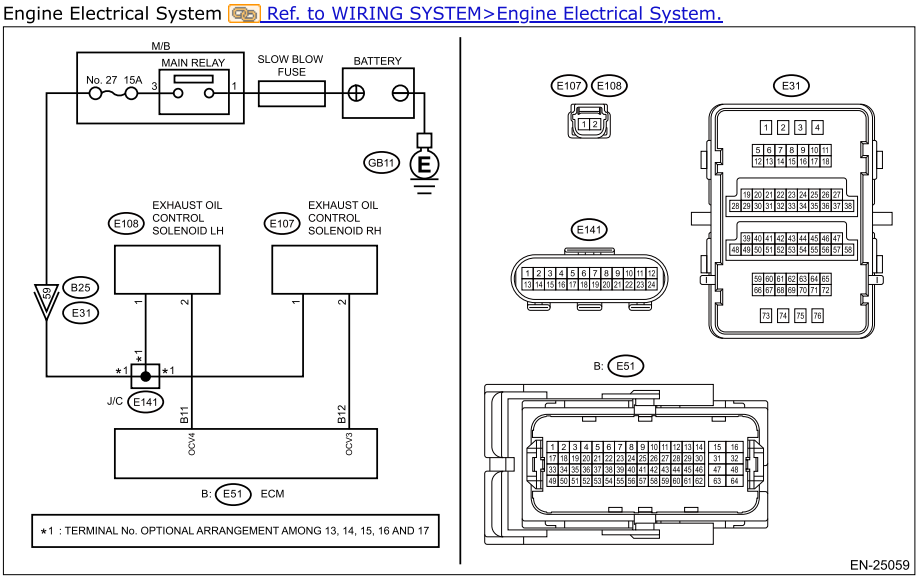
Detected when two consecutive driving cycles with fault occur.

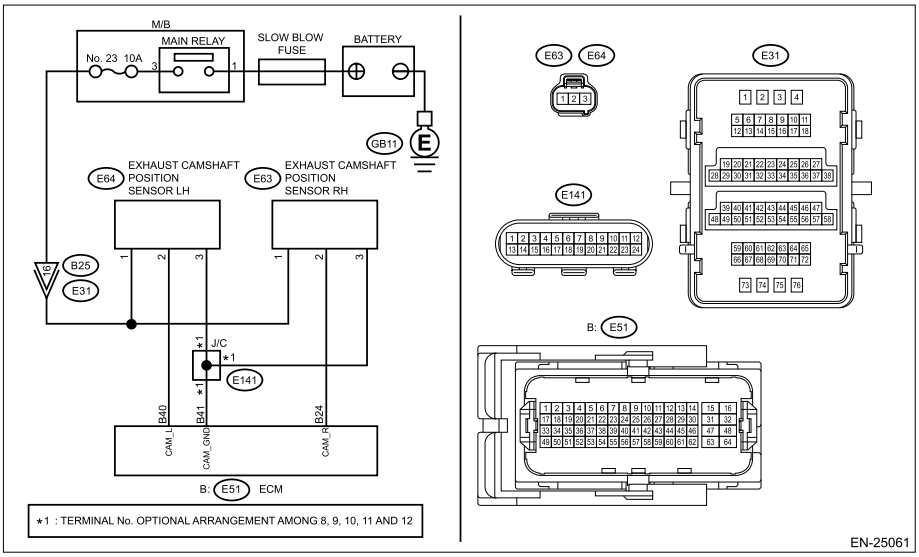
**Trouble symptom:**

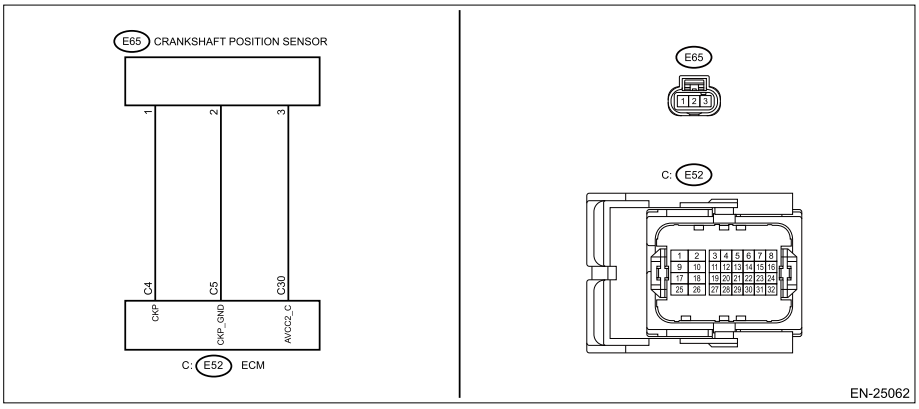
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



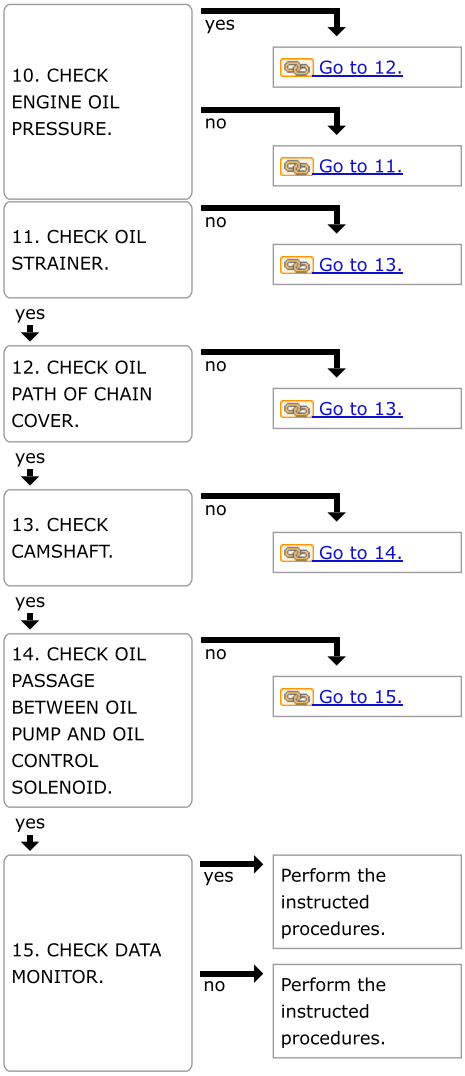
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK ENGINE OIL CONDITION.
   - no → Go to 3.
   - yes ↓
3. CHECK TIMING CHAIN.
   - yes → Go to 15.
   - no → Go to 4.
4. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 6.
   - no → Go to 5.
5. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 15.
   - yes ↓
6. CHECK HARNESS AND CONNECTOR.
   - no → Go to 7.
   - yes ↓
7. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 15.
   - yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0019 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data. Go to 2. |

## 2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 3.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 3.

## 3. CHECK TIMING CHAIN.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Disconnect the connector of the exhaust oil control solenoid LH. (DTC will be set but this will not affect the inspection)
5. Turn the ignition switch to ON.
6. Start monitoring of [Exh. VVT Retard Ang. L] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

7. Start the engine.
8. Read the value of [Exh. VVT Retard Ang. L] within 10 seconds after engine is started.

**Note:**
**The display will indicate [0] by judging the position as standard after 10 seconds elapse since the engine was started.**

9. Record the readings [Exh. VVT Retard Ang. L].
10. Stop the engine.

Is [Exh. VVT Retard Ang. L] out of standard (0 [deg]) by ±10 [deg] or more within 10 seconds after starting?

Yes — Repair the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
Go to 15.

No — Go to 4.

### 4. CHECK ON-BOARD MONITOR TEST RESULT.

1. Replace the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
4. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
5. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

6. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] for the replaced oil control solenoid 1000 or more?

Yes — Go to 6.

No — Go to 5.

### 5. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 4.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

Yes — Go to 6.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 15.

### 6. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 7.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 7.

### 7. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid LH.
4. Measure the resistance in harness between exhaust oil control solenoid LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 11 — (E108) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid LH connector.
Go to 15.

### 8. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from exhaust camshaft position sensor LH.
2. Measure the resistance in harness between the exhaust camshaft position sensor LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 40 — (E64) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the open circuit in the harness between ECM connector and exhaust camshaft position sensor LH connector.
Go to 15.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 15.

### 10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Go to 11.

## 11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

Yes

Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.
Go to 12.

No

Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Caution:**
**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**

Go to 13.

## 12. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

Yes

Go to 13.

No

Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.
Go to 13.

## 13. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 2) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 1).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

Yes

Go to 14.

No

Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft.
Go to 14.

### 14. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes

Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 15.

No

Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 15.

### 15. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Using the Subaru Select Monitor, read the value in [VVT Ex Initial Position Learning Value #2].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
4. Find the sum value of read [VVT Ex Initial Position Learning Value #2] and [Exh. VVT Retard Ang. L] recorded in step 3.

Is the sum value within standard?
Standard:
93 — 124

Yes

ECM is good; finish the diagnosis.

No

Replace the ECM and perform the corresponding inspection mode. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode. When DTC is not displayed, end the diagnosis.

## GENERAL DESCRIPTION

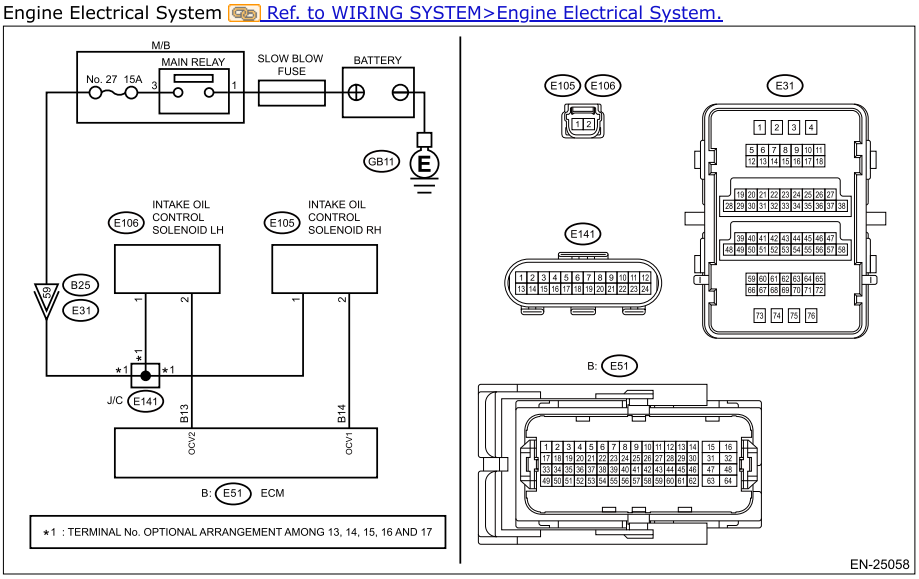
**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0017. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B.**

# DTC P0020 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2

## 1. —

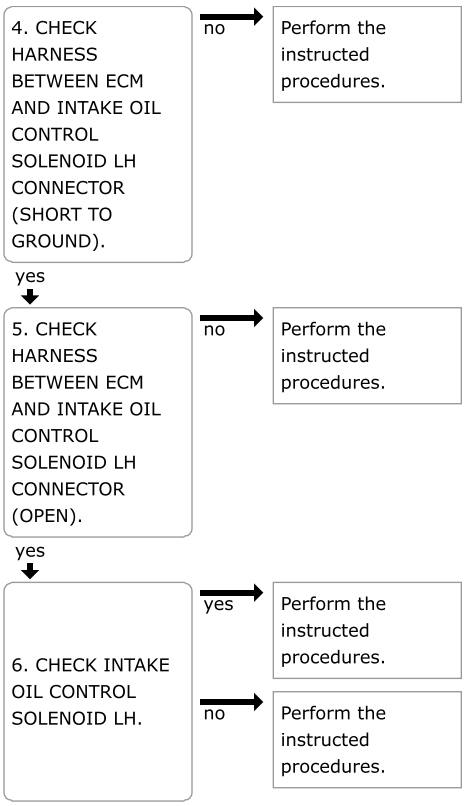
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK OUTPUT SIGNAL OF ECM. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY. | yes | Go to 4. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 6. |




### 1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 13 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 2. |

### 2. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.

Measure the voltage between intake oil control solenoid LH connector and engine ground.
**Connector & terminal**
(E106) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B and intake oil control solenoid LH connector<br>• Blown out of fuse<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

### 3. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid LH.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 13 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and intake oil control solenoid LH connector. |
| No | Go to 6. |

### 4. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid LH.
4. Measure the resistance between intake oil control solenoid LH connector and engine ground.

**Connector & terminal**

(E106) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid LH connector. |

### 5. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and intake oil control solenoid LH connector.

**Connector & terminal**

(E51) No. 13 — (E106) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and intake oil control solenoid LH connector. |

### 6. CHECK INTAKE OIL CONTROL SOLENOID LH.

Check the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of intake oil control solenoid LH connector. |
| No | Replace the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0010. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0010 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1.**

# DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2

## 1. —

**DTC detecting condition:**

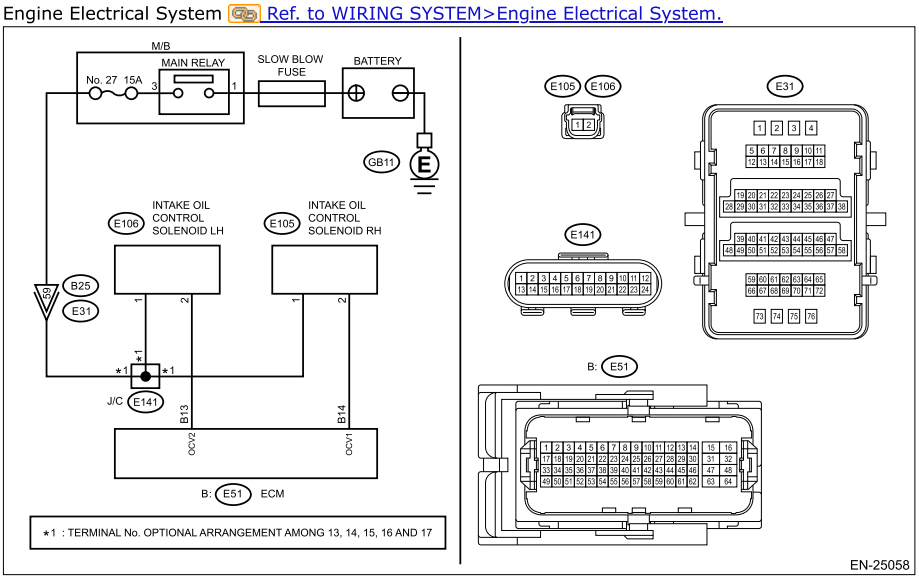
Detected when two consecutive driving cycles with fault occur.

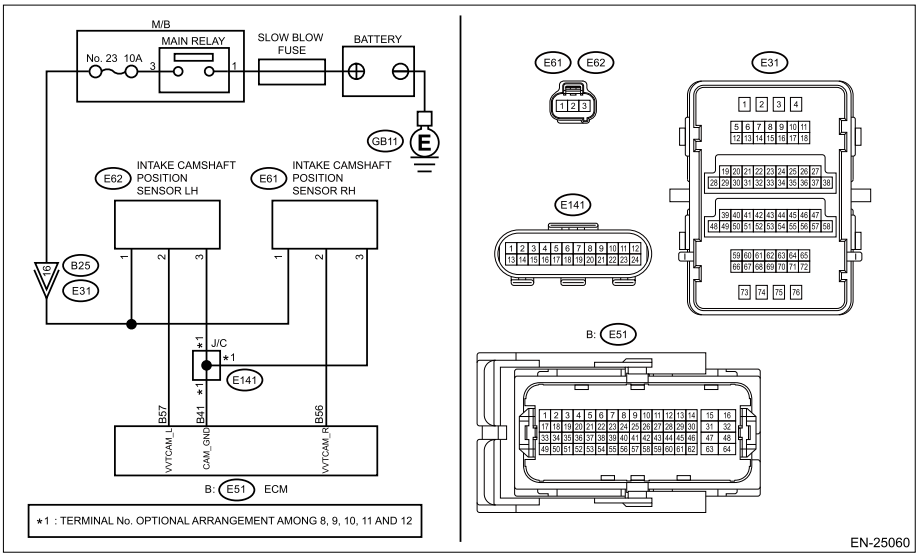
**Trouble symptom:**

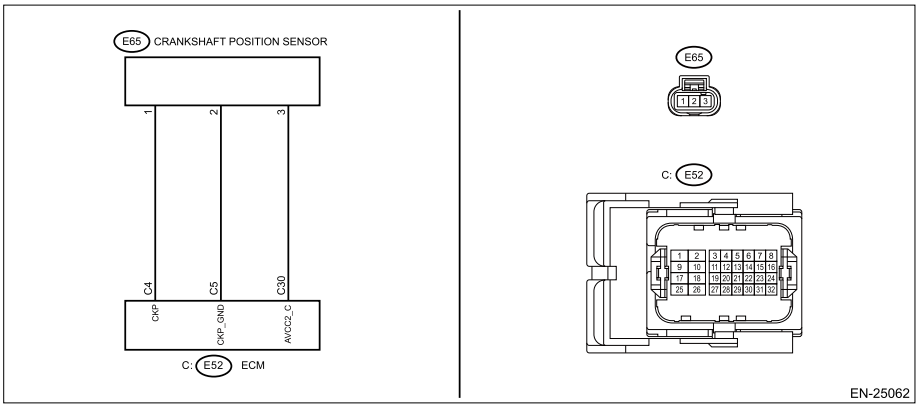
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



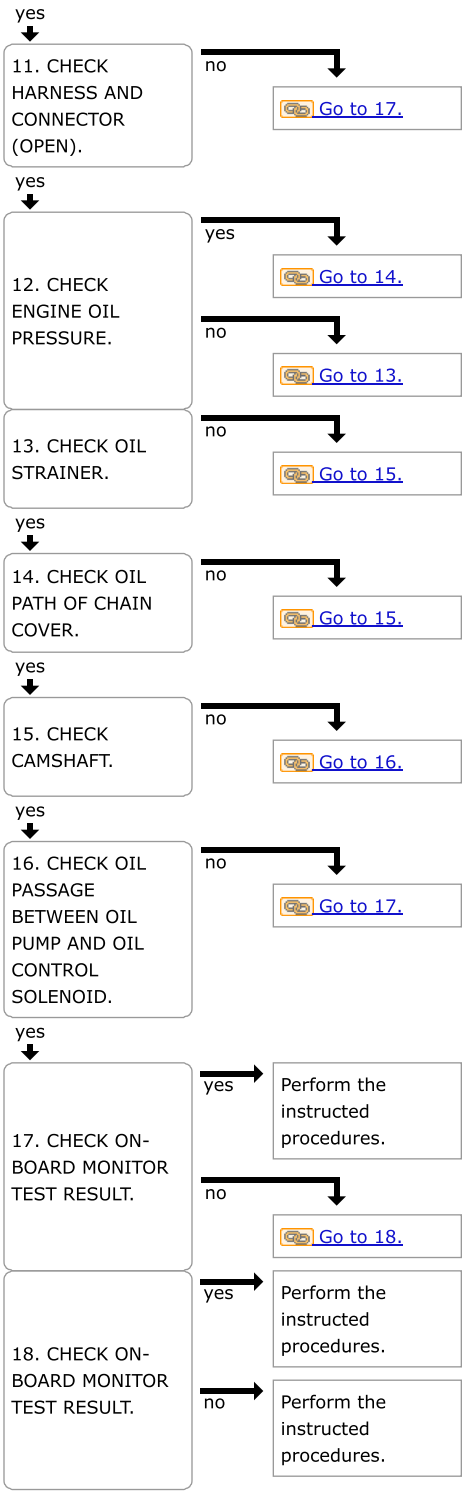
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK OUTPUT SIGNAL OF ECM.
   - no → Go to 4.
   - yes ↓
3. CHECK FOR POOR CONTACT.
   - yes → Go to 5.
   - no → Perform the instructed procedures.
4. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.
   - no → Perform the instructed procedures.
   - yes ↓
5. CHECK ENGINE OIL CONDITION.
   - no → Go to 6.
   - yes ↓
6. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 8.
   - no → Go to 7.
7. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 17.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR.
   - no → Go to 9.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 17.
   - yes ↓
10. CHECK HARNESS AND CONNECTOR (OPEN).
    - no → Go to 17.


yes
11. CHECK HARNESS AND CONNECTOR (OPEN).
no
Go to 17.
yes
12. CHECK ENGINE OIL PRESSURE.
yes
Go to 14.
no
Go to 13.
13. CHECK OIL STRAINER.
no
Go to 15.
yes
14. CHECK OIL PATH OF CHAIN COVER.
no
Go to 15.
yes
15. CHECK CAMSHAFT.
no
Go to 16.
yes
16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.
no
Go to 17.
yes
17. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Go to 18.
18. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

## 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P000C and P0021 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.
Go to 2.

## 2. CHECK OUTPUT SIGNAL OF ECM.

Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 13 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 3.

No — Go to 4.

## 3. CHECK FOR POOR CONTACT.

Check the ECM connector and harness.

**Note:**
**Check the following items.**
- **Poor contact of ECM connector**
- **Temporary open or short circuit of harness**
- **Contamination, corrosion or looseness of engine ground terminal**

Is the check result OK?

Yes — Go to 5.

No — Repair or replace faulty parts.

## 4. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.

Measure the voltage between intake oil control solenoid LH connector and engine ground.

**Connector & terminal**

(E106) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and intake oil control solenoid LH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

## 5. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 6.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 6.

## 6. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to OFF.
2. Replace the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
3. Turn the ignition switch to ON.
4. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
5. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
6. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

   **Warning:**
   - **Performing inspection mode needs a driver along with a checker who should check the data.**
   - **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

   **Note:**
   - **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
   - **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**
7. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] for the replaced oil control solenoid 1000 or more?

Yes — Go to 8.

No — Go to 7.

## 7. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 6.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

Yes — Go to 8.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 17.

## 8. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 9.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 9.

## 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil control solenoid LH.
4. Measure the resistance in harness between intake oil control solenoid LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 13 — (E106) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid LH connector.
Go to 17.

## 10. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from intake camshaft position sensor LH.
2. Measure the resistance in harness between the intake camshaft position sensor LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 57 — (E62) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 11.

No — Repair the open circuit in the harness between ECM connector and intake camshaft position sensor LH connector.
Go to 17.

### 11. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 12.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 17.

### 12. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Go to 13.

### 13. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.
Go to 14.

No — Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Caution:**
**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**

Go to 15.

### 14. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

Yes — Go to 15.

No — Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.
Go to 15.

## 15. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 2) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 1).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

Yes — Go to 16.

No — Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft. Go to 16.

## 16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes — Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 17.

No — Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 17.

### 17. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

5. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] 1000 or more?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Go to 18. |

### 18. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 17.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | End. |

## GENERAL DESCRIPTION

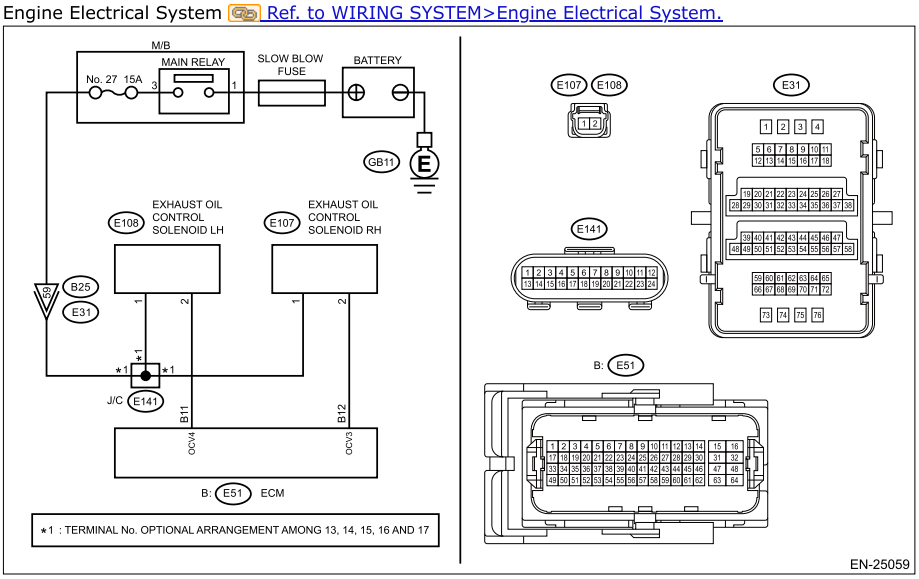
**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0011. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.**

# DTC P0023 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 2

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK OUTPUT SIGNAL OF ECM. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY. | yes | Go to 4. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 6. |

4. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).
→ no → Perform the instructed procedures.
yes ↓

5. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).
→ no → Perform the instructed procedures.
yes ↓

6. CHECK EXHAUST OIL CONTROL SOLENOID LH.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 11 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 3.

No — Go to 2.

### 2. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.

Measure the voltage between exhaust oil control solenoid LH connector and engine ground.
**Connector & terminal**
(E108) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.

- Open circuit or short circuit to ground in harness between M/B and exhaust oil control solenoid LH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid LH.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 11 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and exhaust oil control solenoid LH connector. |
| No | Go to 6. |

### 4. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid LH.
4. Measure the resistance between exhaust oil control solenoid LH connector and engine ground.

**Connector & terminal**

(E108) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid LH connector. |

### 5. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and exhaust oil control solenoid LH connector.

**Connector & terminal**

(E51) No. 11 — (E108) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and exhaust oil control solenoid LH connector. |

### 6. CHECK EXHAUST OIL CONTROL SOLENOID LH.

Check the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of exhaust oil control solenoid LH connector. |
| No | Replace the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0013. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0013 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT/OPEN BANK 1.**

# DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2

## 1. —

**DTC detecting condition:**

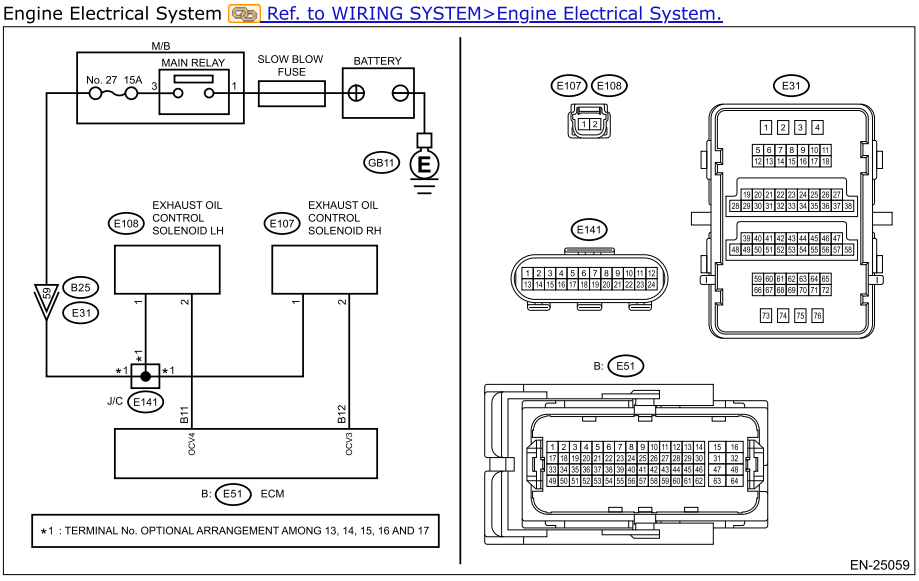
Detected when two consecutive driving cycles with fault occur.

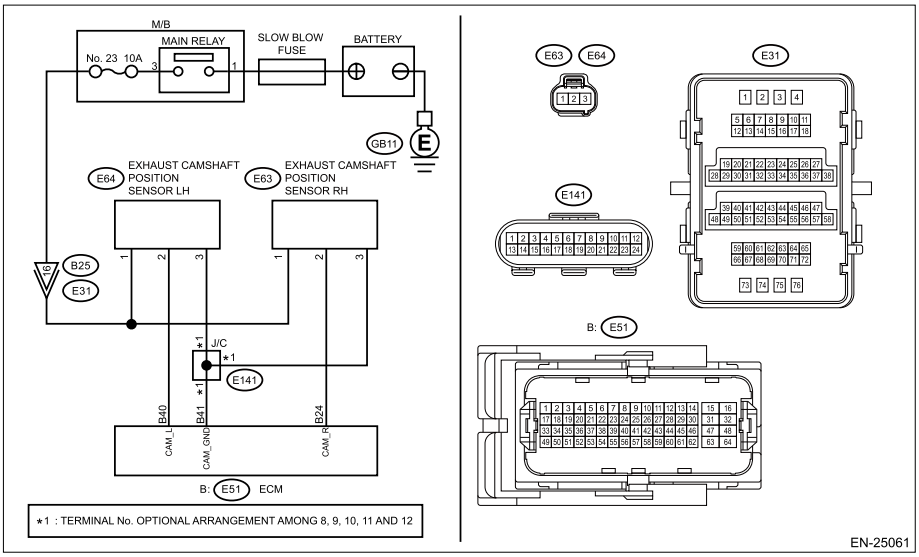
**Trouble symptom:**

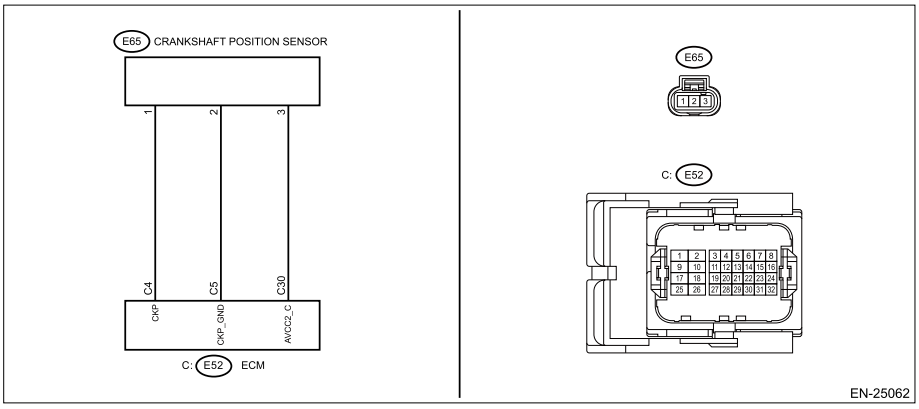
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



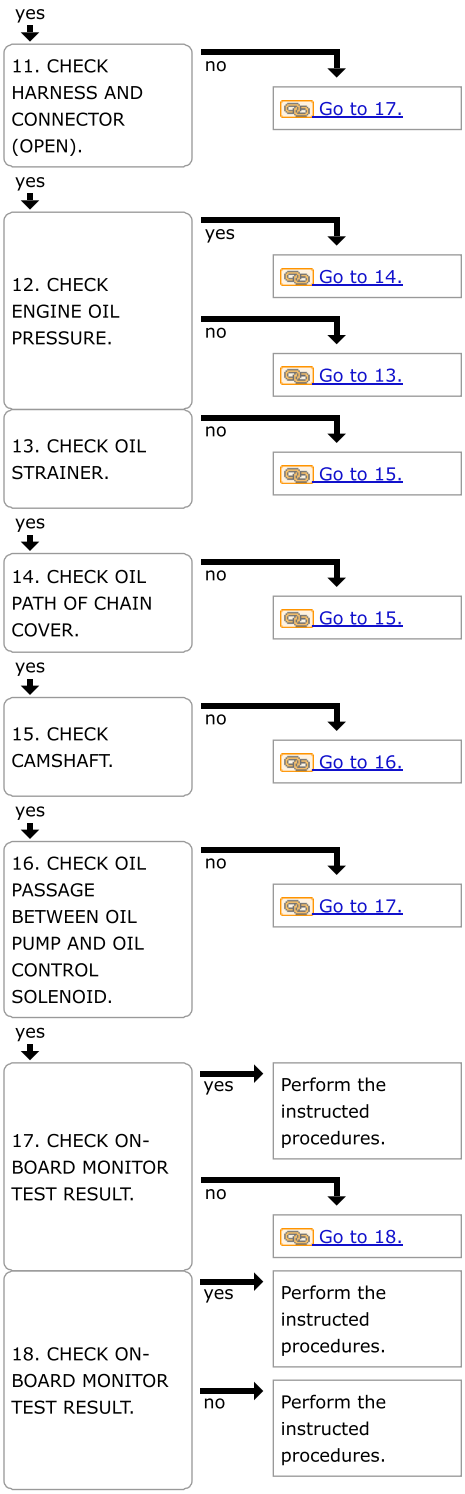
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK OUTPUT SIGNAL OF ECM.
   - no → Go to 4.
   - yes ↓
3. CHECK FOR POOR CONTACT.
   - yes → Go to 5.
   - no → Perform the instructed procedures.
4. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.
   - no → Perform the instructed procedures.
   - yes ↓
5. CHECK ENGINE OIL CONDITION.
   - no → Go to 6.
   - yes ↓
6. CHECK ON-BOARD MONITOR TEST RESULT.
   - yes → Go to 8.
   - no → Go to 7.
7. CHECK ON-BOARD MONITOR TEST RESULT.
   - no → Go to 17.
   - yes ↓
8. CHECK HARNESS AND CONNECTOR.
   - no → Go to 9.
   - yes ↓
9. CHECK HARNESS AND CONNECTOR (OPEN).
   - no → Go to 17.
   - yes ↓
10. CHECK HARNESS AND CONNECTOR (OPEN).
    - no → Go to 17.


yes
11. CHECK HARNESS AND CONNECTOR (OPEN).
no
Go to 17.
yes
12. CHECK ENGINE OIL PRESSURE.
yes
Go to 14.
no
Go to 13.
13. CHECK OIL STRAINER.
no
Go to 15.
yes
14. CHECK OIL PATH OF CHAIN COVER.
no
Go to 15.
yes
15. CHECK CAMSHAFT.
no
Go to 16.
yes
16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.
no
Go to 17.
yes
17. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Go to 18.
18. CHECK ON-BOARD MONITOR TEST RESULT.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

## 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P000D and P0024 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Save the freeze frame data. Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.<br>Go to 2. |

## 2. CHECK OUTPUT SIGNAL OF ECM.

Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 11 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 4. |

## 3. CHECK FOR POOR CONTACT.

Check the ECM connector and harness.

**Note:**

**Check the following items.**

- **Poor contact of ECM connector**
- **Temporary open or short circuit of harness**
- **Contamination, corrosion or looseness of engine ground terminal**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair or replace faulty parts. |

## 4. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.

Measure the voltage between exhaust oil control solenoid LH connector and engine ground.

**Connector & terminal**

(E108) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B and exhaust oil control solenoid LH connector<br>• Blown out of fuse<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

## 5. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

**Note:**
**Check the following items.**
- **Within the specified range in amount**
- **Excessively dirty**
- **Coagulated by additives**
- **Use of oil of specified viscosity**

Is the check result OK?

Yes — Go to 6.

No — Adjust the oil amount, or replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 6.

## 6. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to OFF.
2. Replace the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
3. Turn the ignition switch to ON.
4. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
5. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
6. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

   **Warning:**
   - **Performing inspection mode needs a driver along with a checker who should check the data.**
   - **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

   **Note:**
   - **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
   - **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**
7. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] for the replaced oil control solenoid 1000 or more?

Yes — Go to 8.

No — Go to 7.

## 7. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 6.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

Yes — Go to 8.

No — Idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.
Go to 17.

### 8. CHECK HARNESS AND CONNECTOR.

Check for a bend, damage and poor contact of harness and connector.

**Note:**
**Check the following items.**
- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).**
- **Oil control solenoid Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.**

Is the check result OK?

Yes — Go to 9.

No — Repair or replace faulty parts.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
Go to 9.

### 9. CHECK HARNESS AND CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil control solenoid LH.
4. Measure the resistance in harness between exhaust oil control solenoid LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 11 — (E108) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 10.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid LH connector.
Go to 17.

### 10. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from exhaust camshaft position sensor LH.
2. Measure the resistance in harness between the exhaust camshaft position sensor LH connector and ECM connector.
   **Connector & terminal**
   (E51) No. 40 — (E64) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 11.

No — Repair the open circuit in the harness between ECM connector and exhaust camshaft position sensor LH connector.
Go to 17.

### 11. CHECK HARNESS AND CONNECTOR (OPEN).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance in harness between the crankshaft position sensor connector and ECM connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 12.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.
Go to 17.

### 12. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(H4DOTC)>Engine Oil Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Go to 13.

### 13. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.

Does any foreign matter exist at the oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(H4DOTC)>Oil Pan.
Go to 14.

No — Replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Caution:**
**Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**

Go to 15.

### 14. CHECK OIL PATH OF CHAIN COVER.

1. Remove the engine unit from the vehicle. Ref. to MECHANICAL(H4DOTC)>Engine Assembly.
2. Check the oil path of the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.

**Note:**
**Check the following item and repair or replace if necessary.**
- **Inlet of oil pump**
- **Outlet of oil pump**
- **Each O-ring in the path leading to left/right cylinder head**
- **Oil control solenoid**
- **Foreign matter exists**

Is the check result OK?

Yes — Go to 15.

No — Replace faulty parts. If there is any foreign matter, replace the chain cover. Ref. to MECHANICAL(H4DOTC)>Chain Cover.
Go to 15.

## 15. CHECK CAMSHAFT.

1. Remove the timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
2. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

**Note:**
**Check the following items if there is a clearly faulty condition in the camshaft (bank 2) such as restriction or rotational resistance by comparing it with the rotational resistance of the camshaft (bank 1).**
- **Foreign matter attached to camshaft**
- **Damage of camshaft (scratching, galling, wear, etc.)**
- **Check for consequence from improper rotation of cam journal bearing**

Is the check result OK?

Yes — Go to 16.

No — Replace the cam carrier and camshaft. Ref. to MECHANICAL(H4DOTC)>Cam Carrier. Ref. to MECHANICAL(H4DOTC)>Camshaft. Go to 16.

## 16. CHECK OIL PASSAGE BETWEEN OIL PUMP AND OIL CONTROL SOLENOID.

Visually check the following oil passage from the oil pump to the oil control solenoid to check obvious defectiveness such as foreign matter, clogging, etc.
- Oil passage in cam Carrier
- Oil passage on cylinder head side
- Oil passage at the joint between cam sprocket and camshaft
- Oil passage at the back of cam sprocket and the end of camshaft when the cam sprocket is removed

**Note:**
**Refer to the removal procedure of the cam carrier in the service manual. Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Is the check result OK?

Yes — Replace the cam sprocket. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

Go to 17.

No — Remove foreign matter, and replace the cam carrier oil filter (reuse not allowed). Ref. to MECHANICAL(H4DOTC)>Cam Carrier.

**Caution:**
- **Overuse of liquid gasket may cause a malfunction when installing the chain cover. Use one specified in the service manual with an appropriate amount (line diameter) of application. Ref. to MECHANICAL(H4DOTC)>Chain Cover.**
- **Make sure that the insertion amount of oil filter matches the surface of cam carrier. (Do not push in excessively.) Ref. to MECHANICAL(H4DOTC)>Cam Carrier.**

**Note:**
**After servicing, idle the engine for 5 minutes, and then replace the oil filter and engine oil (flushing). Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.**

Go to 17.

### 17. CHECK ON-BOARD MONITOR TEST RESULT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Read the values in [VVT Monitor Bank 1] and [VVT Monitor Bank 2] according to the reading out procedure of MODE $06 using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS).

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

**Note:**
- **Perform the inspection mode again without stopping the engine because the diagnosis is not completed yet when the diagnostic value indicates 0.**
- **Always keep on checking the data while reading out the diagnostic value because the diagnostic value is repeatedly updated.**

5. Record the read values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2].

Is the value of [VVT Monitor Bank 2] 1000 or more?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Go to 18. |

### 18. CHECK ON-BOARD MONITOR TEST RESULT.

Compare the values of [VVT Monitor Bank 1] and [VVT Monitor Bank 2] recorded in step 17.

Is the value of [VVT Monitor Bank 2] 1000 or less and more than (the value of [VVT Monitor Bank 1] × 1.5 + 100) compared with the value of [VVT Monitor Bank 1]?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | End. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0014. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.**

## DTC P0030 A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1

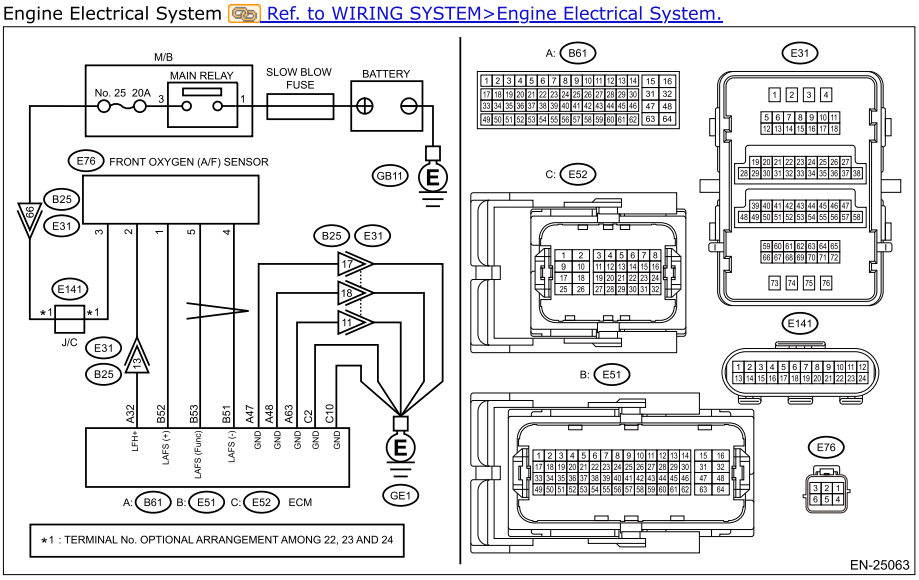
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK FRONT OXYGEN (A/F) SENSOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Start and warm up the engine.
2. Turn the ignition switch to OFF.
3. Disconnect the connector from ECM.
4. Disconnect the connector from the front oxygen (A/F) sensor.
5. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.
   **Connector & terminal**
   (E51) No. 52 — (E76) No. 1:
   (B61) No. 32 — (E76) No. 2:
   (E51) No. 51 — (E76) No. 4:
   (E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector<br>• Poor contact of coupling connector |

### 2. CHECK FRONT OXYGEN (A/F) SENSOR.

Check the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

### 3. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and front oxygen (A/F) sensor connector.

Is there poor contact of ECM or front oxygen (A/F) sensor connector?

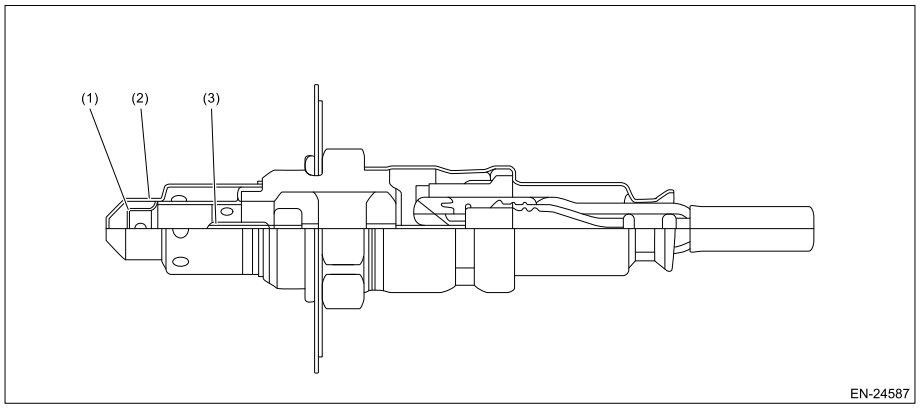
| | |
|---|---|
| Yes | Repair the poor contact of ECM or front oxygen (A/F) sensor connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect functional errors of the front oxygen (A/F) sensor heater.
Judge as NG when it is determined that the front oxygen (A/F) sensor impedance is large when looking at engine status such as deceleration fuel cut.

**COMPONENT DESCRIPTION**




(1) Element cover (inner) (2) Element cover (outer) (3) Sensor element

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| A/F sensor heater control duty | More than 10% |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously after starting the engine.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Front oxygen (A/F) sensor impedance | More than 206 Ω |

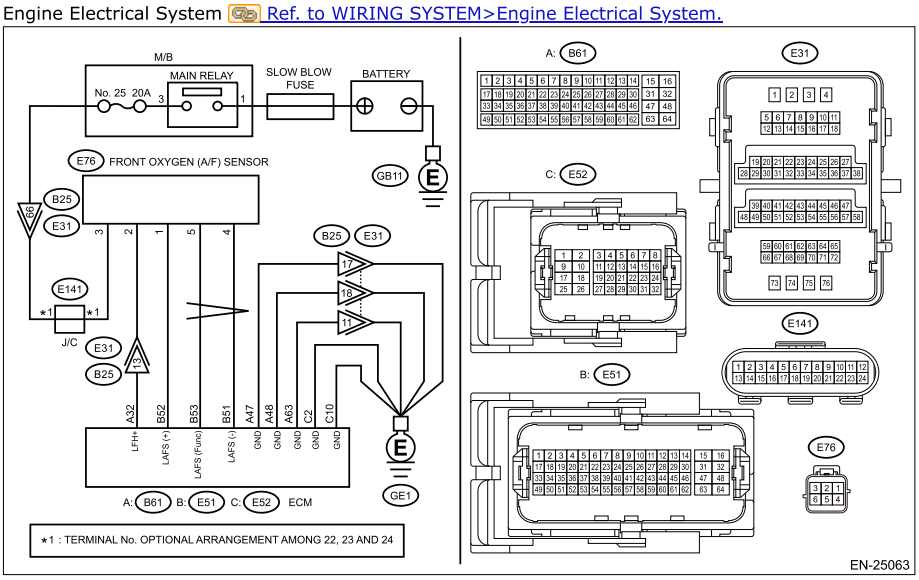
**Time needed for diagnosis:** 25 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0031 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK FRONT OXYGEN (A/F) SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.
   **Connector & terminal**
   (E76) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between M/B and front oxygen (A/F) sensor connector
- Poor contact of J/C
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and front oxygen (A/F) sensor connector.
   **Connector & terminal**
   (B61) No. 32 — (E76) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector
- Poor contact of coupling connector

### 3. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT).

Measure the resistance of harness between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of coupling connector

### 4. CHECK FRONT OXYGEN (A/F) SENSOR.

Check the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit in the front oxygen (A/F) sensor heater.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Front oxygen (A/F) sensor heater control duty | 80% or less |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

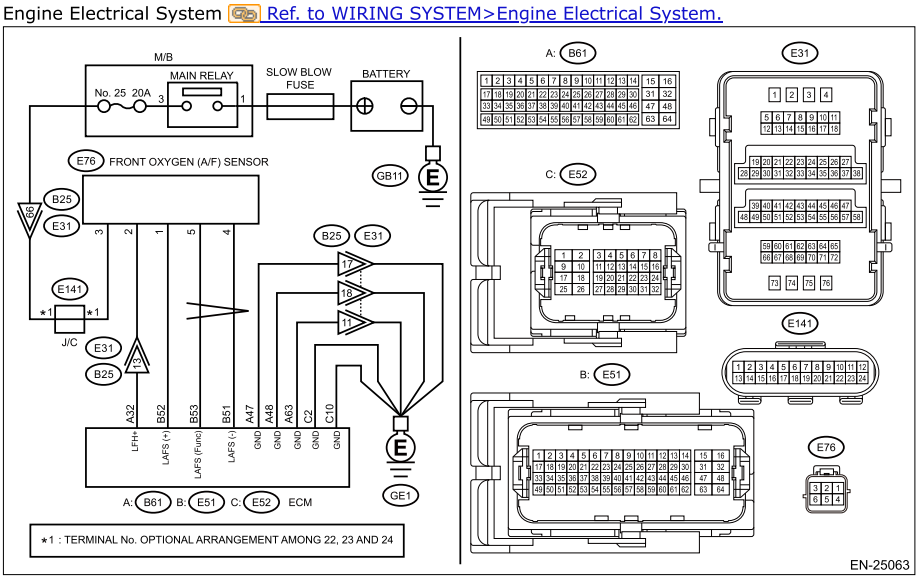
| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | 1.9 V or less |
| Or, | |
| Output voltage<br>Output current | More than 2.3 V<br>Less than 0.03 mA |

**Time needed for diagnosis:** 1000 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0032 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 32 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Go to 2. |

### 2. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT).

1. Disconnect the connector from ECM.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 47 — Engine ground:
   (B61) No. 48 — Engine ground:
   (B61) No. 63 — Engine ground:
   (E52) No. 2 — Engine ground:
   (E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and engine ground<br>• Poor contact of coupling connector |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit in the front oxygen (A/F) sensor heater.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains High.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Front oxygen (A/F) sensor heater control duty | 20% or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output current | 15.2 A or more |

**Time needed for diagnosis:** 2250 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0033 TURBOCHARGER/SUPERCHARGER BYPASS VALVE "A" CONTROL CIRCUIT

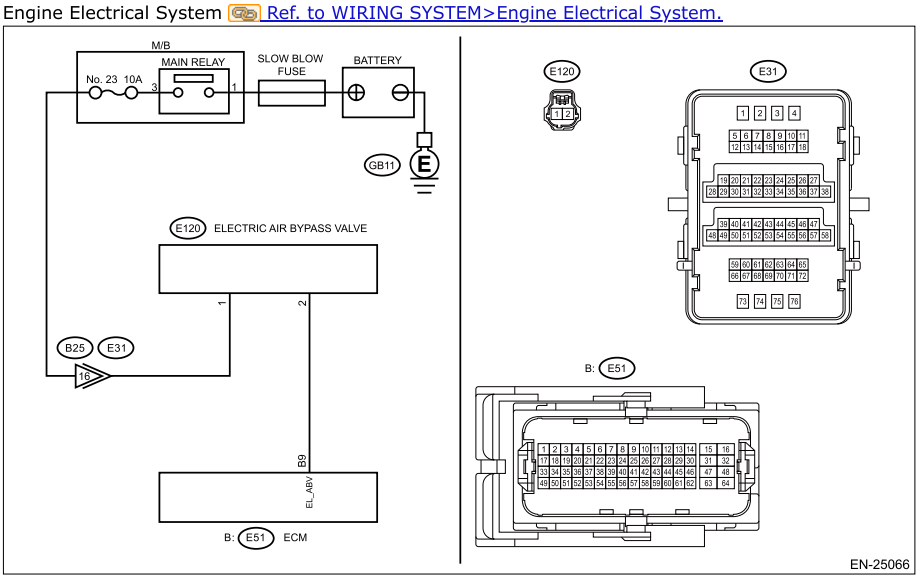
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK POWER SUPPLY OF ELECTRONIC AIR BY-PASS VALVE. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC AIR BY-PASS VALVE CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC AIR BY-PASS VALVE CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK POWER SUPPLY OF ELECTRONIC AIR BY-PASS VALVE.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from electronic air by-pass valve.
3. Turn the ignition switch to ON.
4. Measure the voltage between electronic air by-pass valve connector and engine ground.
   **Connector & terminal**
   (E120) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground of harness between M/B and electronic air by-pass valve connector<br>• Blown out of fuse<br>• Poor contact of coupling connector |

### 2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC AIR BY-PASS VALVE CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between electronic air by-pass valve connector and engine ground.
   **Connector & terminal**
   (E120) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the ground short circuit of harness between ECM connector and electronic air by-pass valve connector. |

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC AIR BY-PASS VALVE CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and electronic air by-pass valve connector.
**Connector & terminal**
(E51) No. 9 — (E120) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the open circuit of harness between ECM connector and electronic air by-pass valve connector. |

### 4. CHECK FOR POOR CONTACT.

Check for poor contact in ECM and electronic air by-pass valve connector.

Is there poor contact in ECM or electronic air by-pass valve connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM or electronic air by-pass valve connector. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of electronic air by-pass valve motor.
Judge as NG when the overcurrent signal is sent from IC after electronic air by-pass valve driving IC diagnosis.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Electronic air by-pass valve command | ON |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Malfunction signal from electronic air by-pass valve driving IC | ON |

**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0037 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2

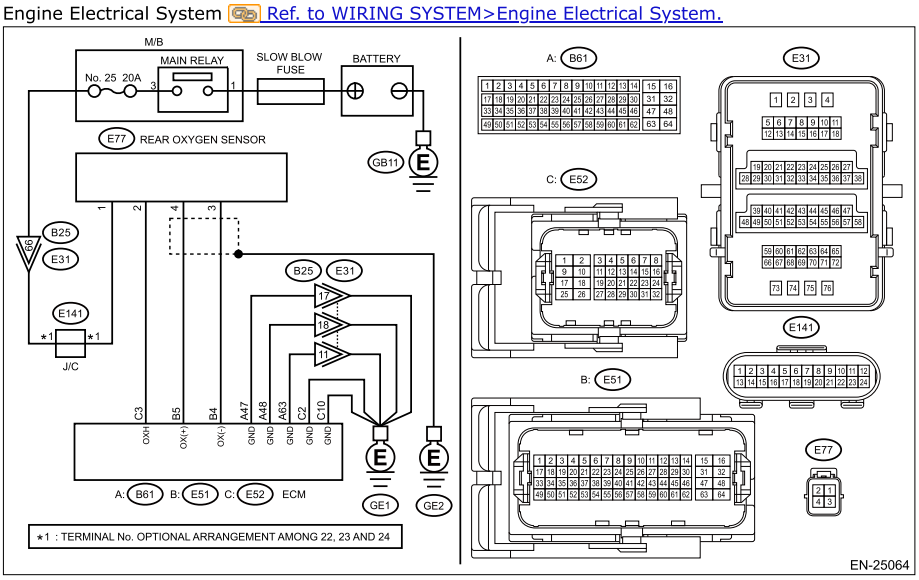
## 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK REAR OXYGEN SENSOR POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK REAR OXYGEN SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK REAR OXYGEN SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the rear oxygen sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between M/B and rear oxygen sensor connector
- Poor contact of J/C
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E52) No. 3 — (E77) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

### 3. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT).

Measure the resistance of harness between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of coupling connector

### 4. CHECK REAR OXYGEN SENSOR.

Check the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor>INSPECTION.

Is the check result OK?

Yes — Repair the poor contact of ECM connector.

No — Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open circuit or short circuit in the rear oxygen sensor heater.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Rear oxygen sensor heater control duty | 96% or less |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | 1.9 V or less |
| Or, | |
| Output voltage | More than 2.3 V |
| Output current | Less than 0.03 mA |

**Time needed for diagnosis:** 2500 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0038 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2

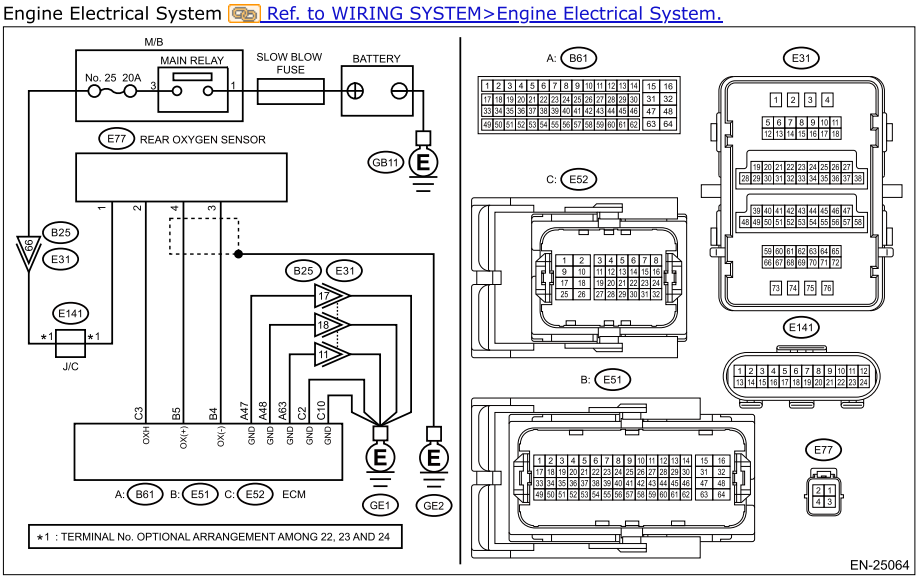
## 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and rear oxygen sensor connector. |
| No | Go to 2. |

### 2. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT).

1. Disconnect the connector from ECM.
2. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and engine ground<br>• Poor contact of coupling connector |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit in the rear oxygen sensor heater.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when overcurrent is detected.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Rear oxygen sensor heater control duty | 4% or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output current | 15.2 A or more |

**Time needed for diagnosis:** 2500 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P003A TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" POSITION EXCEEDED LEARNING LIMIT

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |

yes

3. CHECK APPEARANCE OF TURBOCHARGER (ELECTRONIC WASTEGATE VALVE).

yes → Perform the instructed procedures.

no → Perform the instructed procedures.

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P003A displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK DATA MONITOR.

Using the Subaru Select Monitor, read the value in [Electric Waste Gate Valve Position Sensor Learning Value at the Full-closed Position].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value in [Electric Waste Gate Valve Position Sensor Learning Value at the Full-closed Position] less than −3 [mm] (−0.12 in) or more than 4.3 [mm] (0.17 in)?

Yes — Go to 3.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness or temporary contamination and clogging at the valve port may be the cause.**

### 3. CHECK APPEARANCE OF TURBOCHARGER (ELECTRONIC WASTEGATE VALVE).

1. Turn the ignition switch to OFF.
2. Remove the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.
3. Check the appearance of turbocharger to make sure that there is no foreign matter pinched in the electronic wastegate valve.

**Caution:**
**Do not remove the electronic air by-pass valve and electronic wastegate valve since they are non-disassembled parts.**

Is the check result OK?

Yes — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

No — Remove the foreign matters from the turbocharger.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when full close point learning has an abnormal value.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

| Secondary parameters | Execution condition |
|---|---|
| Execution time of electronic wastegate valve fully closed command | 1500 ms or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis at full closed point learning.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fully closed position learning value | Less than −3 mm (−0.12 in)<br>Or,<br>More than 4.3 mm (0.17 in) |

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0045 TURBOCHARGER/SUPERCHARGER BOOST CONTROL "A" CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**

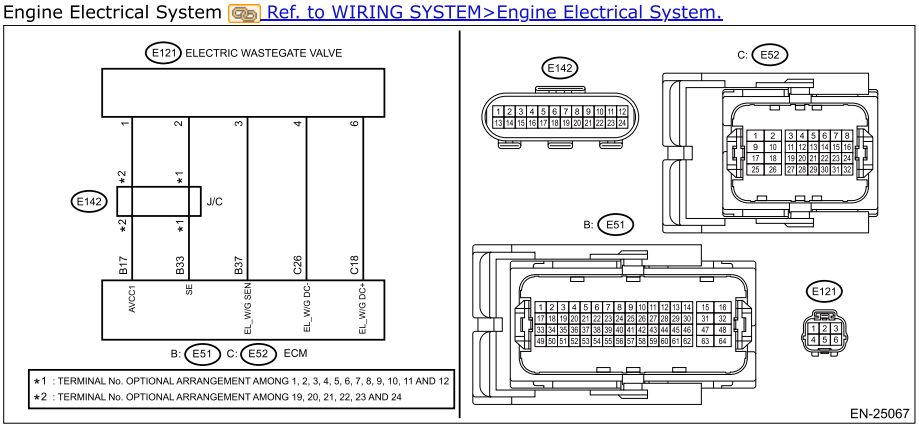
Immediately at fault recognition

**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO POWER SUPPLY).
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO GROUND). → no → Perform the instructed procedures.

yes ↓

4. CHECK FOR POOR CONTACT. → yes → Perform the instructed procedures.

4. CHECK FOR POOR CONTACT. → no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E52) No. 18 (+) — Engine ground (−):
(E52) No. 26 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the power supply short circuit of harness between ECM connector and electronic wastegate valve connector.

No — Go to 2.

### 2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (OPEN).

1. Disconnect the connector from electronic wastegate valve.
2. Measure the resistance of harness between ECM connector and electronic wastegate valve connector.

**Connector & terminal**

(E52) No. 26 — (E121) No. 4:
(E52) No. 18 — (E121) No. 6:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the open circuit in harness between ECM connector and electronic wastegate valve connector.

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 18 (+) — Engine ground (−):
(E52) No. 26 (+) — Engine ground (−):

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the ground short circuit of harness between ECM connector and electronic wastegate valve connector.

### 4. CHECK FOR POOR CONTACT.

Check for poor contact in ECM and electronic wastegate valve connector.

Is there poor contact in ECM or electronic wastegate valve connector?

Yes — Repair the poor contact of ECM or electronic wastegate valve connector.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of electronic wastegate valve motor.
Judge as NG when the overcurrent signal is sent from IC after electronic wastegate valve driving IC diagnosis.

**EXECUTION CONDITION**

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Electronic wastegate valve control duty | 80% or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Malfunction signal from electronic wastegate valve driving IC | ON |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Electronic wastegate valve voltage | Less than 0.032 V |

**Time needed for diagnosis:** 2500 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK AIR INTAKE SYSTEM. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

#### 1. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 2. |

#### 2. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mani. Absolute Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mani. Absolute Pressure] 73.3 — 106.6 [kPa] (550 — 800 mmHg, 21.6 — 31.5 inHg, 10.6 — 15.5 psi) at ignition ON, and 20 — 46.7 [kPa] (150 — 350 mmHg, 5.91 — 13.79 inHg, 2.9 — 6.8 psi) at idling?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |

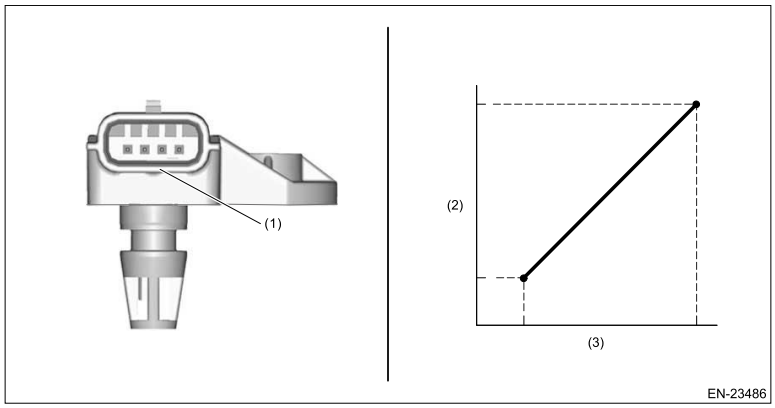
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect problems in the manifold absolute pressure sensor output properties.

Judge as NG when the intake manifold pressure AD value is Low whereas it seemed to be High from the viewpoint of engine condition, or when it is High whereas it seemed to be Low from the engine condition.

**COMPONENT DESCRIPTION**




(1) Manifold absolute pressure sensor (2) Voltage (V) (3) Absolute pressure (kPa)

**EXECUTION CONDITION**

**Low**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | Less than 3500 rpm |
| Charging efficiency (with atmospheric pressure compensation) | 60 air mass % or more |
| Throttle position | 13.6% or more |

**High**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | 475 rpm — 3000 rpm |
| Charging efficiency (with atmospheric pressure compensation) | 23 air mass % or less |
| Throttle position | Less than 13.1% |
| Elapsed time after EGR monitor status OFF | 1.5 s or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously after idling.

**DIAGNOSTIC METHOD**

Judge as NG when Low side or High side becomes NG.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (Low)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Intake manifold pressure (absolute pressure) | Less than 57.5 kPa (431.4 mmHg, 17 inHg) |

**Judgment value (High)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Intake manifold pressure (absolute pressure) | 57.5 kPa (431.4 mmHg, 17 inHg) or more |

**Time needed for diagnosis:** 3 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0071 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DATA MONITOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0071 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK DATA MONITOR.

1. Using the Subaru Select Monitor, read the value in [Ambient Air Temperature] for [Air Conditioner].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
2. Read the change of the value in [Ambient Air Temperature] while heating and cooling the ambient sensor using a hair dryer.

   **Warning:**
   **Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.**

Does the value of [Ambient Air Temperature] change between heating and cooling?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the ambient sensor. Ref. to AIR CONDITIONER>Ambient Sensor. |

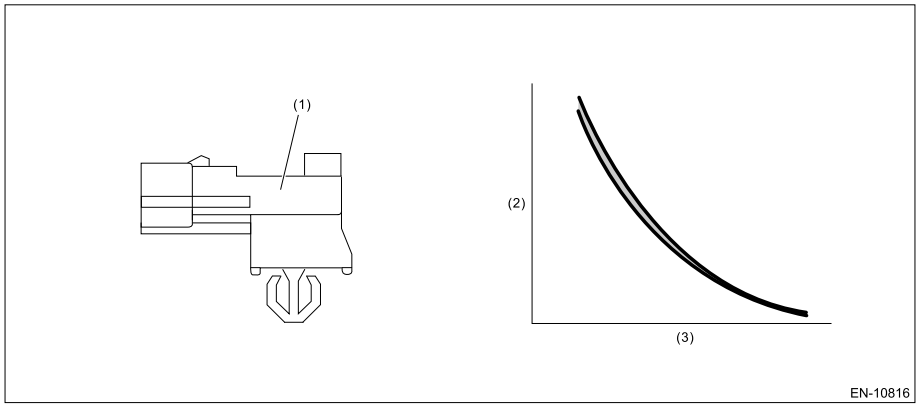
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of ambient temperature sensor characteristics.
After the engine starts after the specified period of soaking time has elapsed, judge by correlation between ambient temperature sensor value, intake air temperature sensor value and engine coolant temperature sensor value.
Judge as NG when the differences are both above the specified value by comparing between ambient air temperature and intake air temperature, ambient air temperature and engine coolant temperature.

**COMPONENT DESCRIPTION**

Ambient temperature sensor is connected to combination meter. ECM receives the data of ambient temperature sensor via CAN communication with combination meter.




(1) Ambient sensor (2) Resistance value (kΩ) (3) Ambient air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Soaking time | 21600 s or more |
| Block heater judgment | Completed |
| Use of block heater | Not detected |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the engine starts after a certain period of soaking time.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Ambient air temperature 21 sec. after first engine start − Intake air temperature 21 sec. after first engine start\| | More than value of Map |
| \|Ambient air temperature at first engine start − Engine coolant temperature at first engine start\| | More than 25°C (45°F) |

**Map**

| **Intake air temperature (°C (°F))** | **−30 (−22)** | **45 (113)** | **60 (140)** | **80 (176)** |
|---|---|---|---|---|
| \|Ambient air temperature 21 sec. after first engine start − Intake air temperature 21 sec. after first engine start\| (°C (°F)) | 20 (36) | 20 (36) | 32 (57.6) | 32 (57.6) |

**Time needed for diagnosis:** Less than 1 s

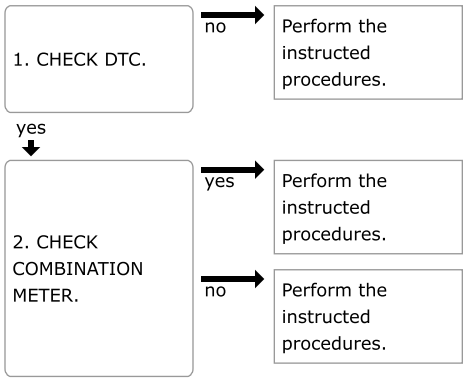
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0072 or P0073 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 2. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

#### 2. CHECK COMBINATION METER.

Check the combination meter system. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.

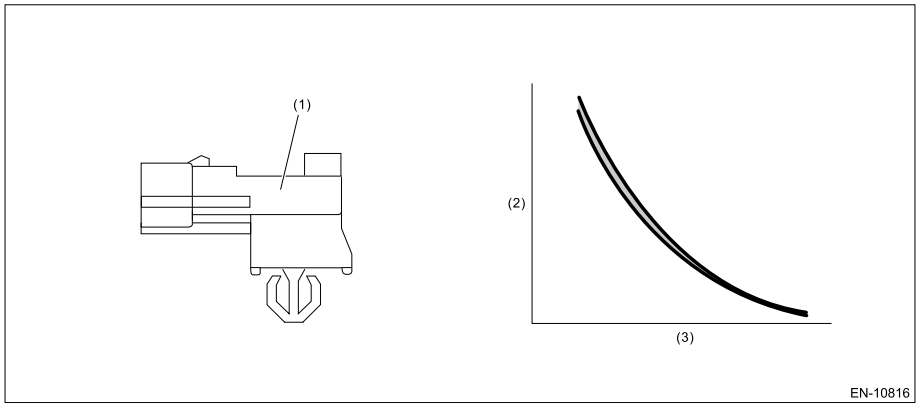
Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the combination meter system. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit of ambient temperature sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**
Ambient temperature sensor is connected to combination meter. ECM receives the data of ambient temperature sensor via CAN communication with combination meter.




(1) Ambient sensor (2) Resistance value (kΩ) (3) Ambient air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.405 V |

**Time needed for diagnosis:** 2560 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0073 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH

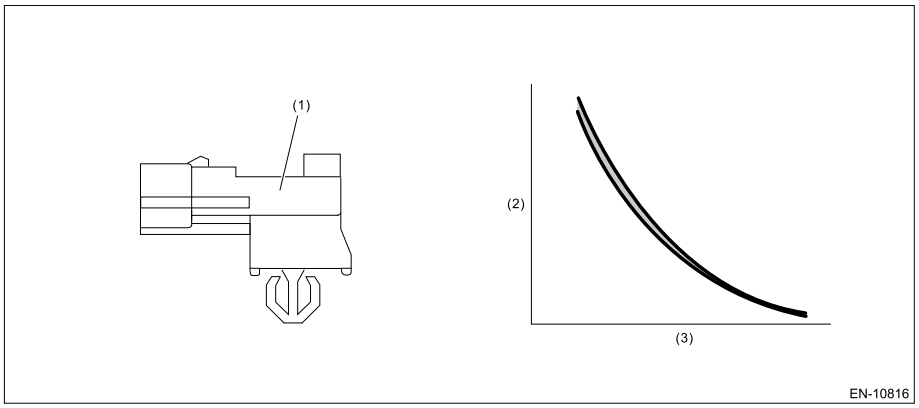
**Note:**
**For the diagnostic procedure, refer to DTC P0072. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW.**

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of ambient temperature sensor.
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION

Ambient temperature sensor is connected to combination meter. ECM receives the data of ambient temperature sensor via CAN communication with combination meter.




(1) Ambient sensor (2) Resistance value (kΩ) (3) Ambient air temperature (°C (°F))

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

## 5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.931 V |

**Time needed for diagnosis:** 2560 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0087 FUEL RAIL/SYSTEM PRESSURE - TOO LOW BANK 1

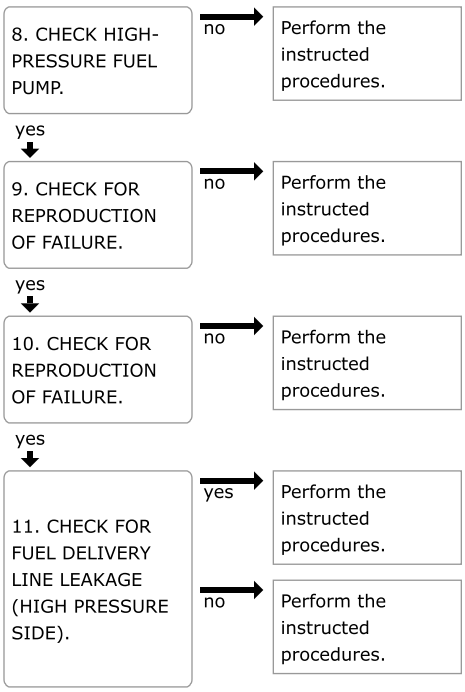
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Poor acceleration

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FOR FUEL DELIVERY LINE LEAKAGE. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK EXPERIENCE OF RUNNING OUT OF FUEL. | yes | Perform the instructed procedures. |
| | no | Go to 4. |
| 4. CHECK FUEL PRESSURE. | choice | Go to 5. |
| | choice | Go to 7. |
| | choice | Perform the instructed procedures. |
| 5. CHECK OF FUEL PUMP. | no | Perform the instructed procedures. |
| | yes | |
| 6. CHECK FUEL PRESSURE. | no | Perform the instructed procedures. |
| | yes | |
| 7. CHECK FOR FUEL DELIVERY LINE LEAKAGE (HIGH PRESSURE SIDE). | no | Go to 9. |
| | yes | |




### 1. CHECK FOR FUEL DELIVERY LINE LEAKAGE.

Visually check the fuel delivery line for leakage.

**Warning:**
- **When checking fuel delivery line during engine operation, be very careful so that one's hair, body and clothes do not touch the rotating part in the engine compartment.**
- **If there is fuel leakage, the fuel can be combusted spontaneously by the engine heat, resulting in serious accident. Therefore, take extra care.**
- **Prepare the necessary fire-extinguishing appliance for immediate fire fighting in case of fire.**

**Note:**
**Concerning the section where visible inspection is difficult, the fuel odor provides a good indication of determining the fuel leakage.**

Are there leaks from the fuel delivery line?

Yes — Replace the faulty fuel delivery line.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

No — Go to 2.

### 2. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0087 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 3.

### 3. CHECK EXPERIENCE OF RUNNING OUT OF FUEL.

Check if there was an experience of running out of fuel using Check List for Interview. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Check List for Interview.

Has the vehicle experienced running out of fuel?

Yes — Finish the diagnosis.

**Note:**
**DTC may be stored by running out of fuel.**

No — Go to 4.

### 4. CHECK FUEL PRESSURE.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value of [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A] when racing the engine.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

If the value of [Fuel Rail Pressure A] is synchronized with that of [Commanded Fuel Rail Pressure A], go to A.
If the value in [Fuel Rail Pressure A] does not increase, go to B.
If the value in [Fuel Rail Pressure A] does not change, go to C.

A — Go to 5.

B — Go to 7.

C — Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor.

### 5. CHECK OF FUEL PUMP.

1. Turn the ignition switch to ON. (Engine OFF)
2. Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test].

**Note:**
**For detailed operation procedures, refer to "Help" of application.**

3. Check for operating sound in the fuel pump according to ON/OFF switching operation.

Does the fuel pump emit operating sound?

Yes — Go to 6.

No — Check fuel pump circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

### 6. CHECK FUEL PRESSURE.

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 7.

No — Check the fuel pump and fuel delivery line.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

### 7. CHECK FOR FUEL DELIVERY LINE LEAKAGE (HIGH PRESSURE SIDE).

1. Start the engine.
2. Using the Subaru Select Monitor, read the change in values of [Fuel Rail Pressure A] when stopping the engine.

**Note:**
- **In order to maintain the communication with Subaru Select Monitor, turn the ignition switch to OFF, and immediately turn it to ON.**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Fuel Rail Pressure A] decrease rapidly?

Yes — Go to 8.

No — Go to 9.

### 8. CHECK HIGH-PRESSURE FUEL PUMP.

Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION.

Is the check result OK?

Yes — Go to 9.

No — Replace the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump.

### 9. CHECK FOR REPRODUCTION OF FAILURE.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0087 displayed? (Current code)

Yes — Replace the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump.
After replacement, go to the next step. Go to 10.

**Note:**
**When the high-pressure fuel pump has been replaced in step 8, go to "CHECK FOR FUEL DELIVERY LINE LEAKAGE (HIGH PRESSURE SIDE)" without replacing the high-pressure fuel pump. Go to 11.**

No — End.

### 10. CHECK FOR REPRODUCTION OF FAILURE.

1. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
3. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0087 displayed? (Current code)

Yes — Go to 11.

No — End.

### 11. CHECK FOR FUEL DELIVERY LINE LEAKAGE (HIGH PRESSURE SIDE).

1. Start the engine.
2. Using the Subaru Select Monitor, read the change in values of [Fuel Rail Pressure A] when stopping the engine.

**Note:**
- **In order to maintain the communication with Subaru Select Monitor, turn the ignition switch to OFF, and immediately turn it to ON.**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Fuel Rail Pressure A] decrease rapidly?

| | |
|---|---|
| Yes | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0088. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0088 FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1.**

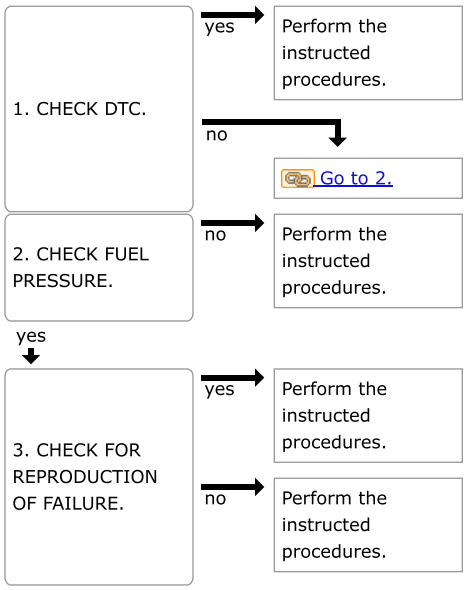
# DTC P0088 FUEL RAIL/SYSTEM PRESSURE - TOO HIGH BANK 1

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0088 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK FUEL PRESSURE.

1. Start the engine.
2. Using Subaru Select Monitor, read the values of [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A] while the vehicle is accelerated from the parked state to 60 km/h (37.3 MPH) and stops again.

**Warning:**
- **Follow traffic rules and give the highest priority to safe driving.**
- **During driving, do not operate or gaze at the Subaru Select Monitor.**
- **Always check the measurement value after bringing the vehicle to a stop in a safe place.**

**Note:**
- **In order to apply the running load to the vehicle, actually drive the vehicle, and read the measurement value.**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Fuel Rail Pressure A] synchronized with that of [Commanded Fuel Rail Pressure A]?

| | |
|---|---|
| Yes | Replace the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump. After replacement, go to the next step. Go to 3. |
| No | Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor. |

### 3. CHECK FOR REPRODUCTION OF FAILURE.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0088 displayed? (Current code)

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | End. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of high pressure fuel system function.
Judge as NG when actual pressure is not close to target pressure.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Elapsed time after starting the engine | 10 s or more |
| Continuous time after fuel cut | 5 s or more |
| (Target pressure change in every 10 ms | 1000 kPa (7501.9 mmHg, 295.3 inHg) or less |
| duration) | 1500 ms or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Actual fuel pressure − Target fuel pressure | Less than −15100 kPa (−113278.3 mmHg, −4459.8 inHg) | P0087 |
| Actual fuel pressure − Target fuel pressure | More than 14800 kPa (111027.8 mmHg, 4371.2 inHg) | P0088 |

**Time needed for diagnosis:** 10 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0096 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE BANK 1

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DATA MONITOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0096 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK DATA MONITOR.

1. Using the Subaru Select Monitor, read the value in [IAT Sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

2. Read the change of the value in [IAT Sensor #12] while heating and cooling the manifold absolute pressure and intake air temperature sensor using a hair dryer.

**Warning:**
**Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.**

Does the value of [IAT Sensor #12] change between heating and cooling?

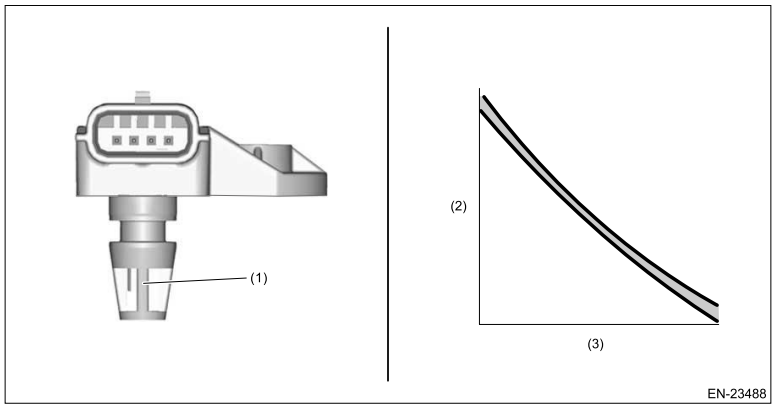
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of the intake air temperature sensor (integrated with manifold absolute pressure sensor) output properties.
After the engine starts for the first time after the specified period of soaking time has elapsed, diagnose by correlation between intake air temperature sensor value, engine coolant temperature sensor value and ambient temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between intake air temperature and engine coolant temperature, intake air temperature and ambient air temperature.

**COMPONENT DESCRIPTION**




(1) Intake air temperature sensor (2) Resistance value (Ω) (3) Intake air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Soaking time | 21600 s or more |
| Block heater judgment | Completed |
| Use of block heater | Not detected |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the first engine start after a certain period of soaking time.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Intake air temperature (manifold absolute pressure sensor) 21 sec. after the first engine start − Engine coolant temperature at the first engine start\| | More than value of Map1 |
| \|Intake air temperature (manifold absolute pressure sensor) 21 sec. after the first engine start − Ambient air temperature 21 sec. after the first engine start\| | More than value of Map2 |

**Map1**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Intake air temperature (manifold absolute pressure sensor) 21 sec. after the first engine start − Engine coolant temperature at the first engine start\| (°C (°F)) | 11 (19.8) | 11 (19.8) | 11 (19.8) | 11 (19.8) |

**Map2**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Intake air temperature (manifold absolute pressure sensor) 21 sec. after the first engine start − Ambient air temperature 21 sec. after the first engine start\| (°C (°F)) | 20 (36) | 20 (36) | 32 (57.6) | 32 (57.6) |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

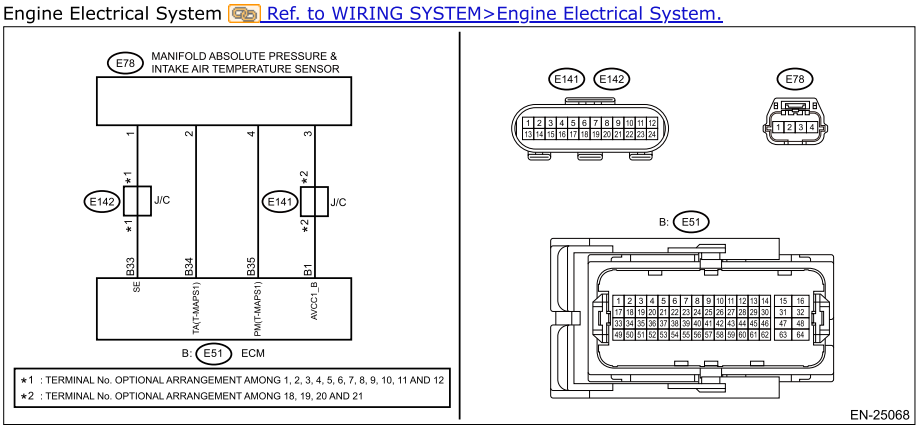
## DTC P0097 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [IAT Sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [IAT Sensor #12] 120[°C] (248°F) or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

### 4. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 34 — Engine ground:

Is the resistance 1 MΩ or more?

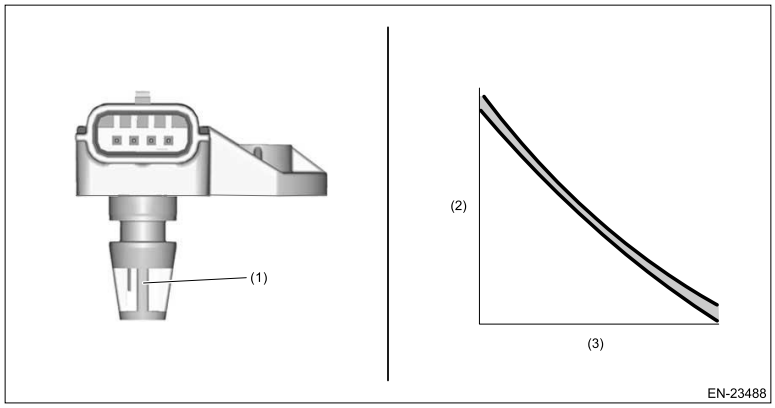
| | |
|---|---|
| Yes | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |
| No | Repair the ground short circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect short circuit of the intake air temperature sensor (integrated with manifold absolute pressure sensor).
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Intake air temperature sensor (2) Resistance value (kΩ) (3) Intake air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.24 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

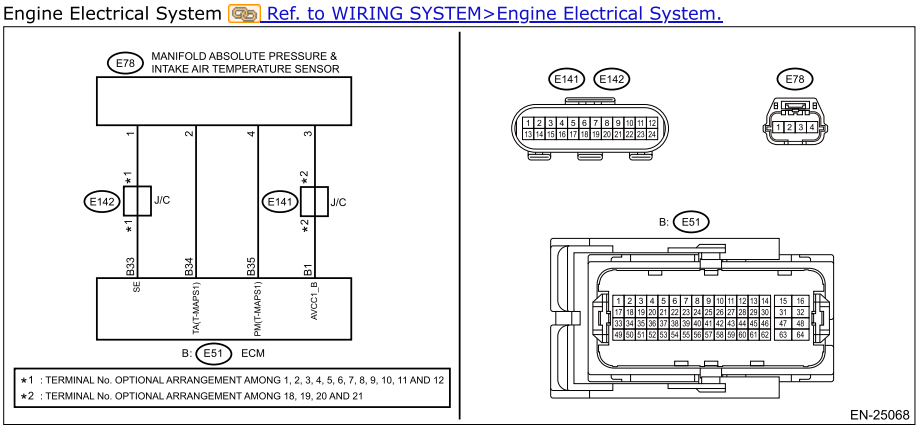
## DTC P0098 INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Go to 5. |

5. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).
→ no: Perform the instructed procedures.
↓ yes

6. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
→ yes: Perform the instructed procedures.
→ no: Perform the instructed procedures.

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

Yes: Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW.

No: Go to 2.

**2. CHECK DTC.**

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

Yes: Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH.

No: Go to 3.

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [IAT Sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [IAT Sensor #12] less than −40[°C] (−40°F)?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and manifold absolute pressure and intake air temperature sensor connector.

Is there poor contact of ECM or manifold absolute pressure and intake air temperature sensor connector?

Yes — Repair the poor contact of ECM or manifold absolute pressure and intake air temperature sensor connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector.
   **Connector & terminal**
   (E51) No. 33 — (E78) No. 1:
   (E51) No. 34 — (E78) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of J/C

**6. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 34 (+) — Engine ground (−):

Is the voltage 5 V or more?

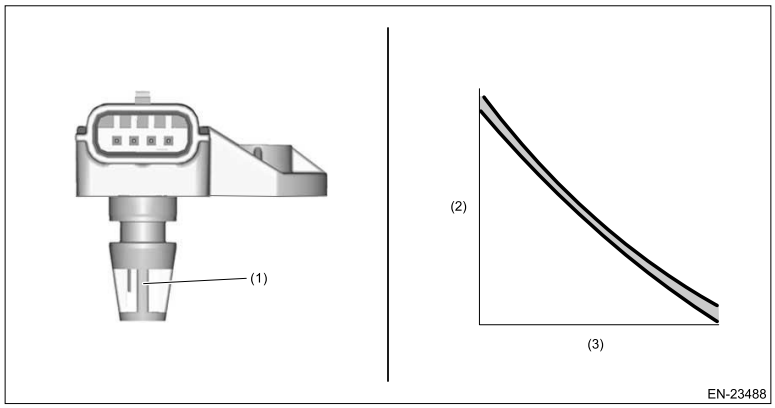
| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector. |
| No | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect open or short circuit of the intake air temperature sensor (integrated with manifold absolute pressure sensor).
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Intake air temperature sensor (2) Resistance value (kΩ) (3) Intake air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.725 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0101 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

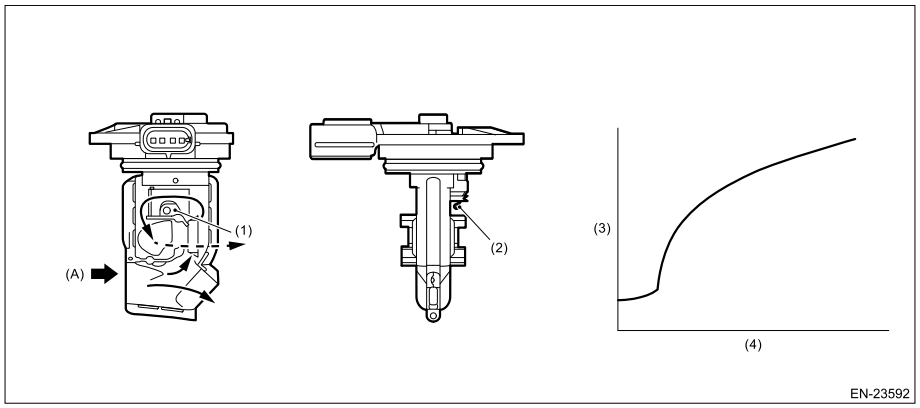
Is DTC other than P0101 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of air flow sensor output properties.
Judge as a low side NG when the air flow voltage indicates a small value regardless of running in a state where the air flow voltage increases.
Judge as a high side NG when the air flow voltage indicates a large value regardless of running in a state where the air flow voltage decreases.
Judge air flow sensor property as NG when the low side or high side becomes NG.

**COMPONENT DESCRIPTION**




(A) Air
(1) Air flow sensor
(2) Intake air temperature sensor
(3) Frequency (kHz)
(4) Amount of intake air (kg (lb)/s)

**EXECUTION CONDITION**

**Low**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | 1600 rpm or more |
| Throttle position | 13.1% or more |
| Intake manifold pressure (with atmospheric pressure compensation) | 96 kPa (720.2 mmHg, 28.4 inHg) or more |

**High**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | 475 rpm — 1800 rpm |
| Throttle position | Less than 13.6% |
| Intake manifold pressure (with atmospheric pressure compensation) | Less than 40 kPa (300.1 mmHg, 11.8 inHg) |
| Elapsed time after EGR monitor status OFF | 1.5 s or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously after idling.

**DIAGNOSTIC METHOD**

Judge as NG when low side or high side is established.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (Low)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Airflow amount | Less than 18.9 g/s (0.7 oz/s) |

**Judgment value (High)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Airflow amount | 18.9 g/s (0.7 oz/s) or more |

**Time needed for diagnosis:** 3 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

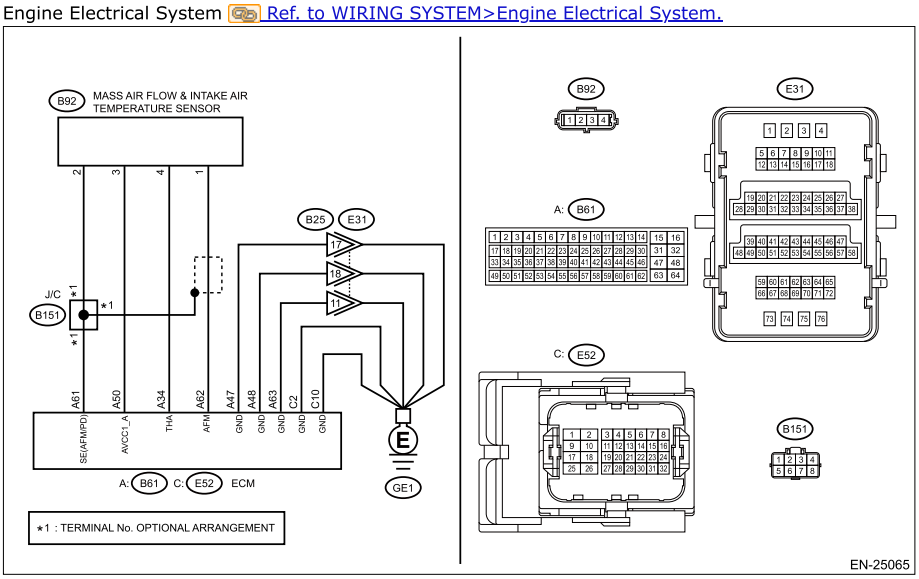
## DTC P0102 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK POWER SUPPLY OF MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR. | no → | Perform the instructed procedures. |

yes

5. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

no → Perform the instructed procedures.

yes

6. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

7. CHECK HARNESS BETWEEN ECM AND THE MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (SHORT TO POWER SUPPLY).

yes → Perform the instructed procedures.

no → Go to 8.

8. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (OPEN).

no → Perform the instructed procedures.

yes

9. CHECK FOR POOR CONTACT.

yes → Perform the instructed procedures.

no → Perform the instructed procedures.

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

Yes — Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW.

No — Go to 2.

## 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

## 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 0 [g/s] (0 lb/min)?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## 4. CHECK POWER SUPPLY OF MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from the mass air flow and intake air temperature sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground.
   **Connector & terminal**
   (B92) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 5.

No — Repair the open circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

## 5. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   **Connector & terminal**
   (B61) No. 62 — (B92) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

### 6. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 62 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector. |

### 7. CHECK HARNESS BETWEEN ECM AND THE MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 62 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and the mass air flow and intake air temperature sensor connector. |
| No | Go to 8. |

### 8. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (OPEN).

1. Turn the ignition switch to OFF.
2. Connect the connector to ECM.
3. Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground.
   **Connector & terminal**
   (B92) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Go to 9. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector<br>• Poor contact of J/C |

### 9. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.

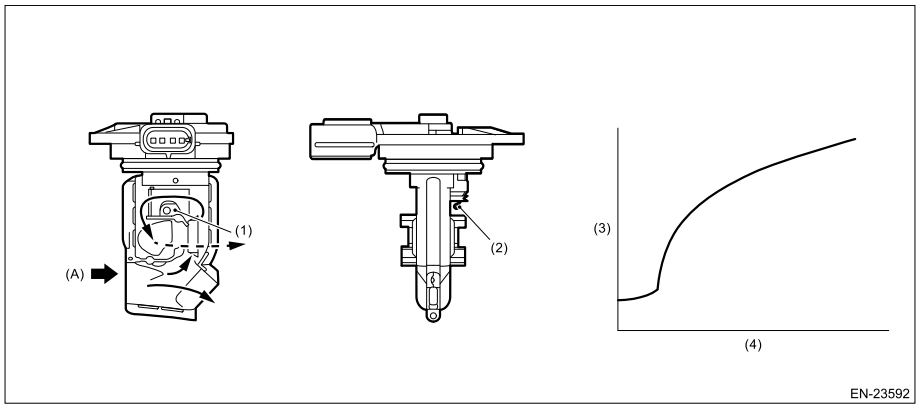
Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect open or short circuits of the air flow sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Frequency (kHz)

(4) Amount of intake air (kg (lb)/s)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Elapsed time after engine cranking or starting | 520 ms or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output frequency | Less than 0.997 kHz |

**Time needed for diagnosis:** 520 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

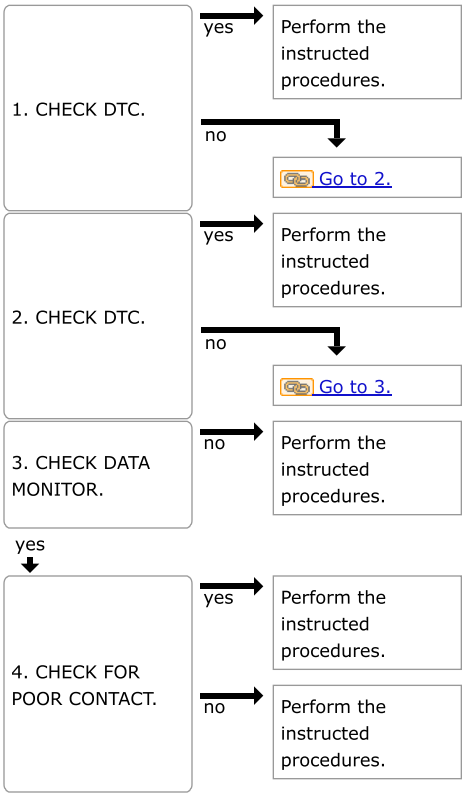
# DTC P0103 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 232.32 g/s (30.74 lb/min) or more?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK FOR POOR CONTACT.

Check for poor contact of mass air flow and intake air temperature sensor connector.

Is there poor contact of mass air flow and intake air temperature sensor connector?

Yes — Repair the poor contact of mass air flow and intake air temperature sensor connector.

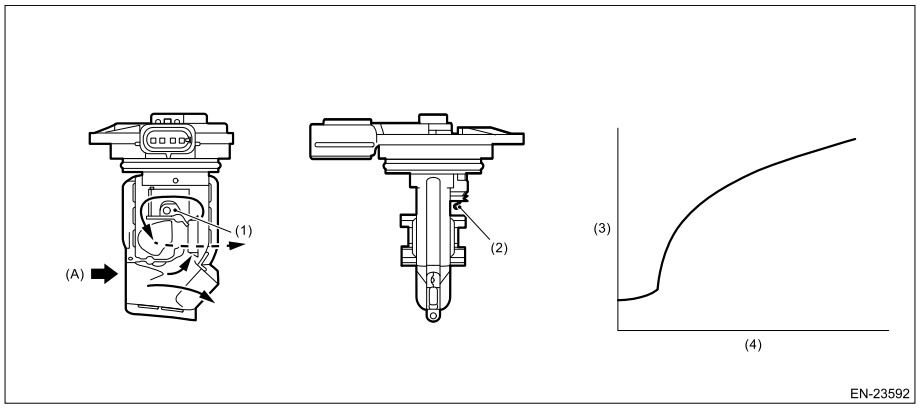
No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the out-of-range malfunction of air flow sensor.

**COMPONENT DESCRIPTION**




(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Frequency (kHz)

(4) Amount of intake air (kg (lb)/s)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Elapsed time after engine cranking or starting | 520 ms or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output frequency | More than 10.021 kHz |

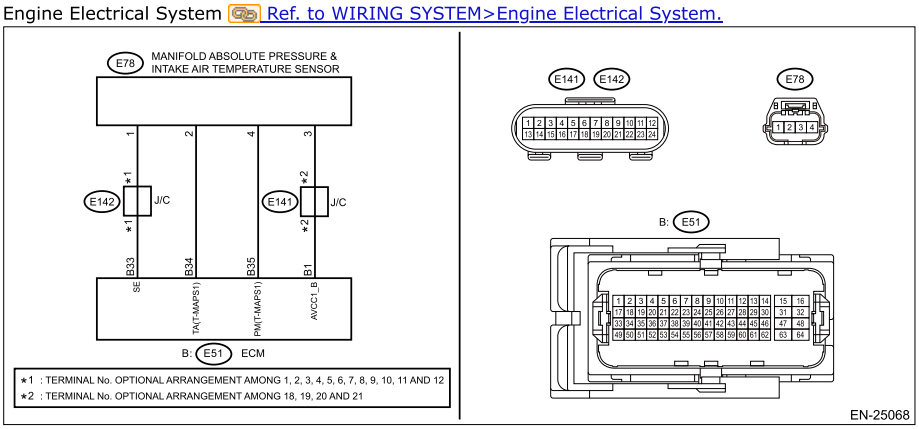
**Time needed for diagnosis:** 520 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW

## 1. —

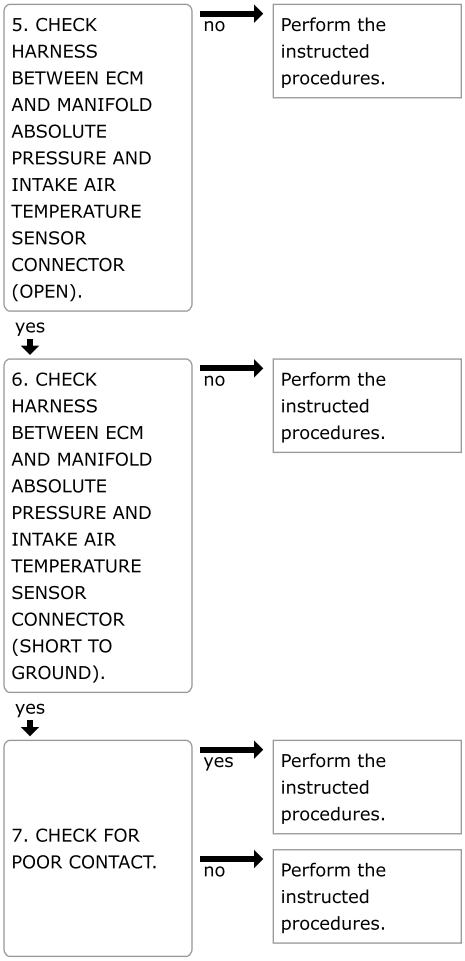
**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK DATA MONITOR. | no | Perform the instructed procedures. |
| | yes ↓ | |
| 4. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY. | no | Perform the instructed procedures. |
| | yes ↓ | |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Mani. Absolute Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mani. Absolute Pressure] less than 13.3 [kPa] (100 mmHg, 3.94 inHg)?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between the manifold absolute pressure and intake air temperature sensor connector and engine ground.
   **Connector & terminal**
   (E78) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of ECM connector
- Poor contact of J/C

### 5. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector.
   **Connector & terminal**
   (E51) No. 35 — (E78) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit of the harness between the ECM connector and the manifold absolute pressure & intake air temperature sensor connector.

### 6. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 35 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the ground short circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector. |

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and manifold absolute pressure and intake air temperature sensor connector.

Is there poor contact of ECM or manifold absolute pressure and intake air temperature sensor connector?

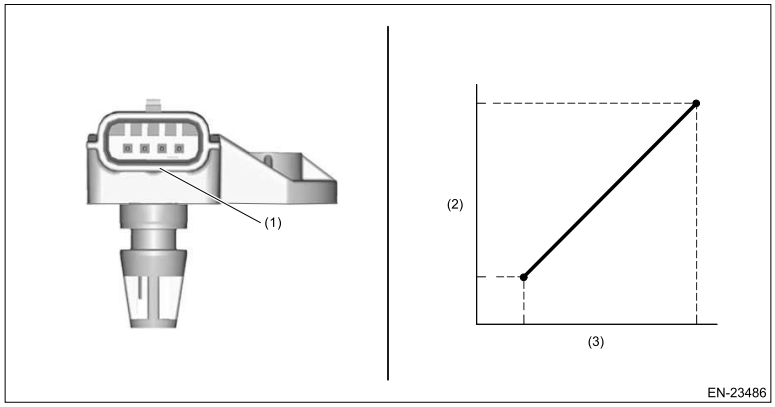
| | |
|---|---|
| Yes | Repair the poor contact of ECM or manifold absolute pressure and intake air temperature sensor connector. |
| No | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of manifold pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Manifold absolute pressure sensor (2) Voltage (V) (3) Absolute pressure (kPa)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

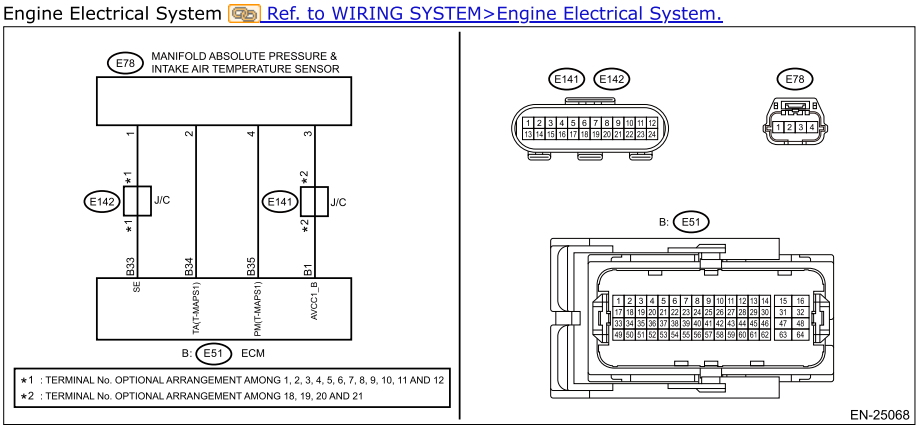
| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.232 V |

**Time needed for diagnosis:** 2 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
   - yes → Perform the instructed procedures.
   - no → Go to 3.
3. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓

| | | |
|---|---|---|
| 4. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Mani. Absolute Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mani. Absolute Pressure] 256 [kPa] (1920.5 mmHg, 75.6 inHg, 37.1 psi) or more?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
3. Start the engine.
4. Using the Subaru Select Monitor, read the value in [Mani. Absolute Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mani. Absolute Pressure] 256 [kPa] (1920.5 mmHg, 75.6 inHg, 37.1 psi) or more?

Yes — Repair the short circuit to power in harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between manifold absolute pressure and intake air temperature sensor connector and engine ground.
   **Connector & terminal**
   (E78) No. 1 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of ECM connector
- Poor contact of J/C

### 4. CHECK FOR POOR CONTACT.

Check for poor contact of the manifold absolute pressure and intake air temperature sensor connector.

Is there poor contact of the manifold absolute pressure and intake air temperature sensor connector?

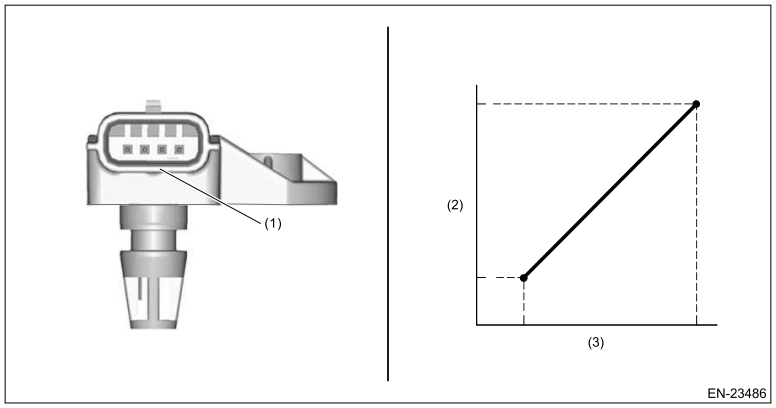
| | |
|---|---|
| Yes | Repair the poor contact of the manifold absolute pressure and intake air temperature sensor connector. |
| No | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of manifold absolute pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Manifold absolute pressure sensor (2) Voltage (V) (3) Absolute pressure (kPa)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.086 V |

**Time needed for diagnosis:** 2 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DATA MONITOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0111 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK DATA MONITOR.

1. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
2. Read the change of the value in [IAT Sensor #11] while heating and cooling the mass air flow and intake air temperature sensor using a hair dryer.

   **Warning:**
   **Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.**

Does the value of [IAT Sensor #11] change between heating and cooling?

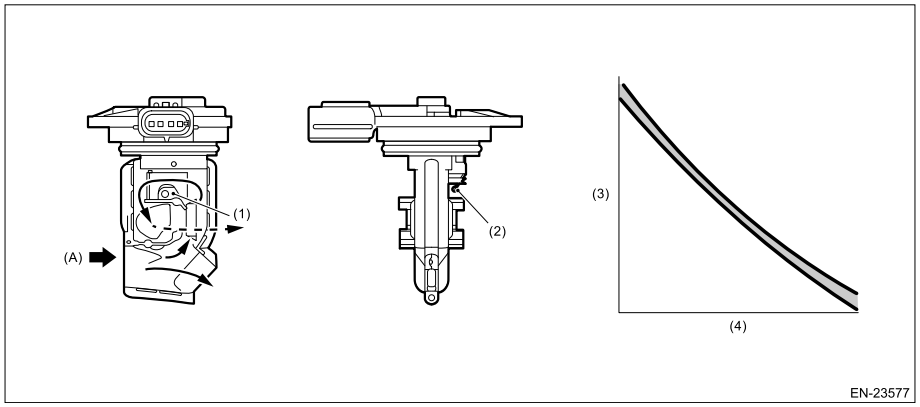
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of the intake air temperature sensor (integrated with air flow sensor) output properties.

After the engine starts for the first time after the specified period of soaking time has elapsed, diagnose by correlation between intake air temperature sensor value, engine coolant temperature sensor value and ambient temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between intake air temperature and engine coolant temperature, intake air temperature and ambient air temperature.

**COMPONENT DESCRIPTION**




(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Resistance value (Ω)

(4) Intake air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Soaking time | 21600 s or more |
| Block heater judgment | Completed |
| Use of block heater | Not detected |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the first engine start after a certain period of soaking time.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Intake air temperature (air flow sensor) 21 sec. after the first engine start − Engine coolant temperature at the first engine start\| | More than value of Map1 |
| \|Intake air temperature (air flow sensor) 21 sec. after the first engine start − Ambient air temperature 21 sec. after the first engine start\| | More than value of Map2 |

**Map1**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Intake air temperature (air flow sensor) 21 sec. after the first engine start − Engine coolant temperature at the first engine start\| (°C (°F)) | 12 (21.6) | 12 (21.6) | 22 (39.6) | 22 (39.6) |

**Map2**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Intake air temperature (air flow sensor) 21 sec. after the first engine start − Ambient air temperature 21 sec. after the first engine start\| (°C (°F)) | 20 (36) | 20 (36) | 32 (57.6) | 32 (57.6) |

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

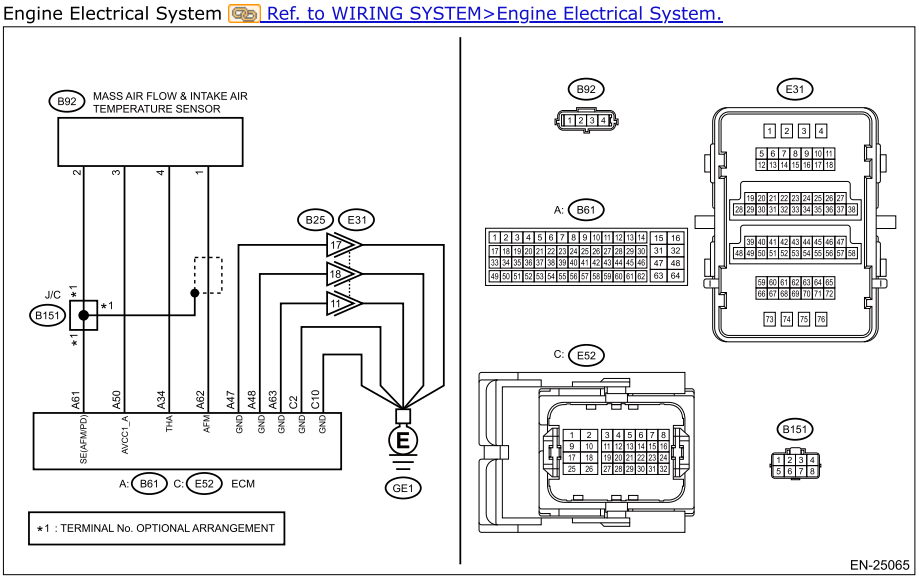
## DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [IAT Sensor #11] 120[°C] (248°F) or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

### 2. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 34 — Engine ground:

Is the resistance 1 MΩ or more?

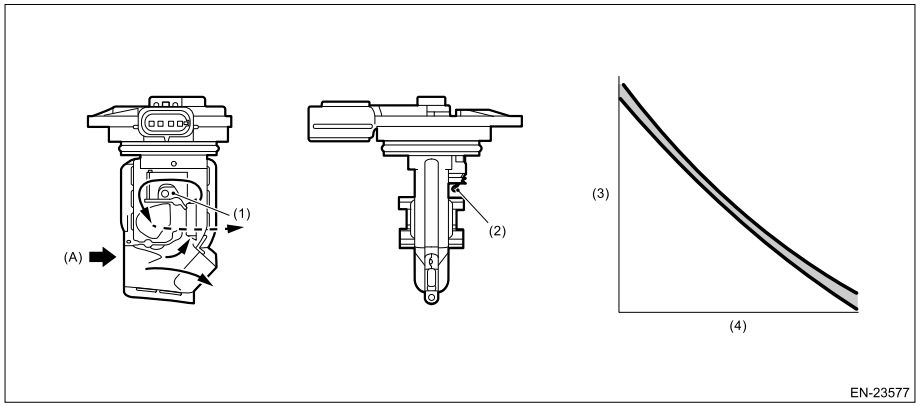
| | |
|---|---|
| Yes | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |
| No | Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit in the intake air temperature sensor (integrated with air flow sensor).
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Air
(1) Air flow sensor
(2) Intake air temperature sensor
(3) Resistance value (Ω)
(4) Intake air temperature (°C (°F))

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.365 V |

**Time needed for diagnosis:** 520 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

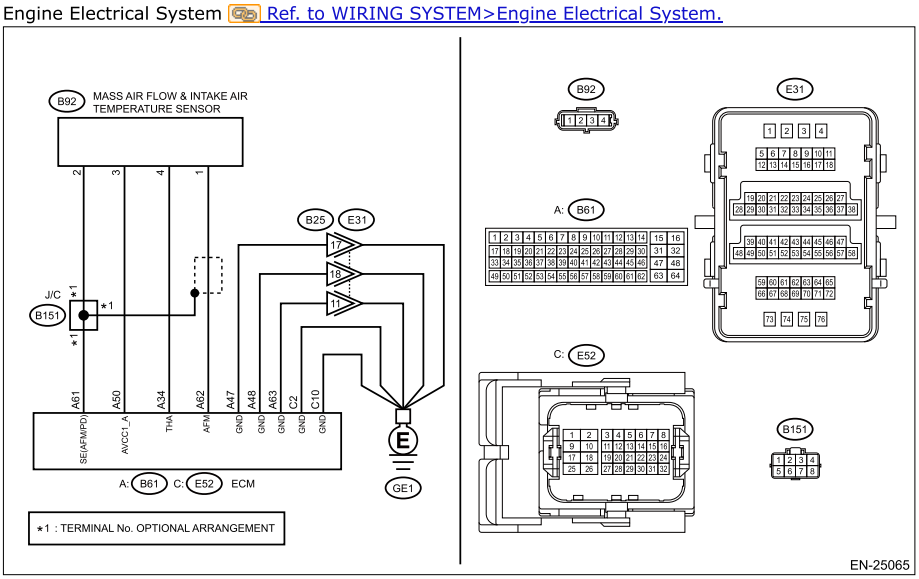
## DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no ↓ | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |

| | | |
|---|---|---|
| 4. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [IAT Sensor #11] less than −40[°C] (−40°F)?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.

Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?

Yes — Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   **Connector & terminal**
   (B61) No. 61 — (B92) No. 2:
   (B61) No. 34 — (B92) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Poor contact of J/C

**4. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER).**

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 34 (+) — Engine ground (−):

Is the voltage 5 V or more?

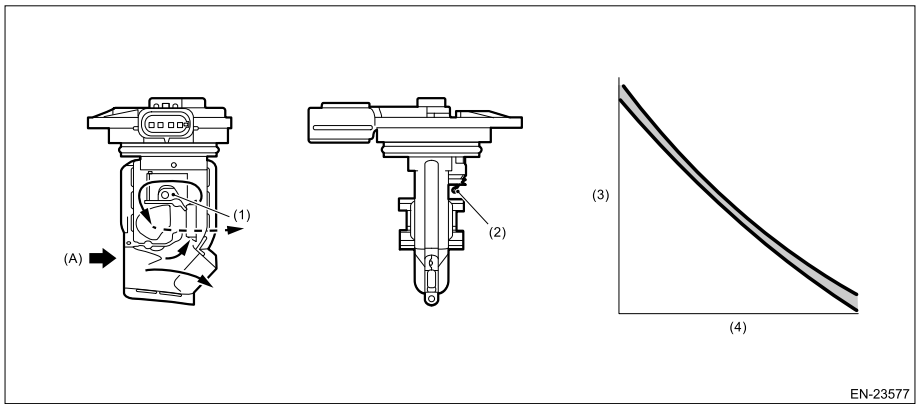
| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and the mass air flow and intake air temperature sensor connector. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor (integrated with air flow sensor).
Judge as NG if out of specification.

### COMPONENT DESCRIPTION




(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Resistance value (Ω)

(4) Intake air temperature (°C (°F))

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.695 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**

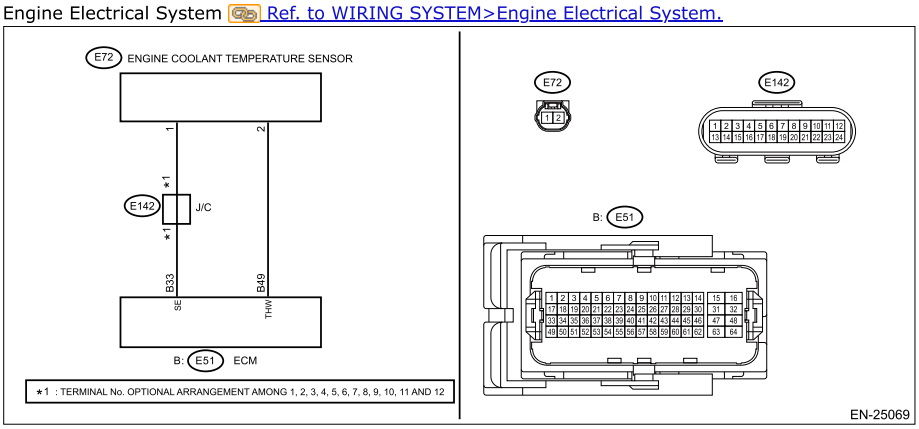
Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0116 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from the engine coolant temperature sensor.
3. Measure the resistance between engine coolant temperature sensor terminals when the engine coolant is cold and after warmed up.

**Terminals**

No. 1 — No. 2:

Is the resistance of engine coolant temperature sensor different between when engine coolant is cold and after warmed up?

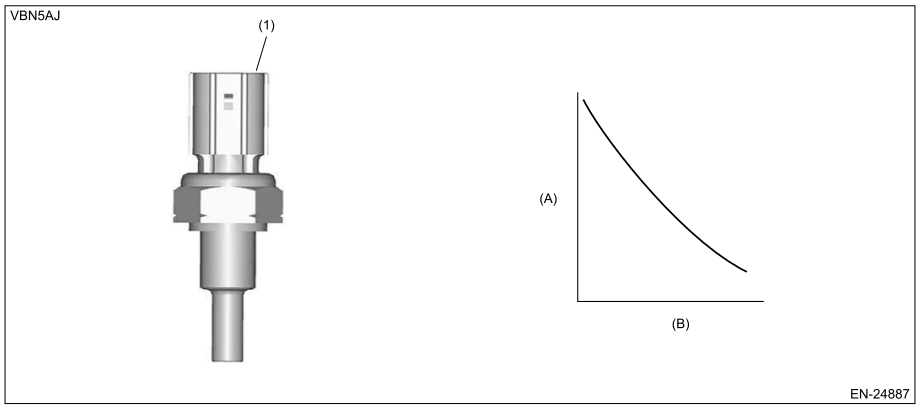
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of the engine coolant temperature sensor characteristics.
After the engine starts after the specified period of soaking time has elapsed, diagnose by correlation between engine coolant temperature sensor value, intake air temperature sensor value and ambient temperature sensor value.
Judge as NG when the differences are both above the specified value by comparing between engine coolant temperature and ambient air temperature, engine coolant temperature and intake air temperature.

**COMPONENT DESCRIPTION**




(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Engine coolant temperature sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Soaking time | 21600 s or more |
| Block heater judgment | Completed |
| Use of block heater | Not detected |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the engine starts after a certain period of soaking time.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Engine coolant temperature at first engine start − Intake air temperature 21 sec. after first engine start\| | More than value of Map |
| \|Engine coolant temperature at first engine start − Ambient air temperature at first engine start\| | More than 25°C (45°F) |

**Map**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Engine coolant temperature at first engine start − Intake air temperature 21 sec. after first engine start\| (°C (°F)) | 12 (21.6) | 12 (21.6) | 22 (39.6) | 22 (39.6) |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

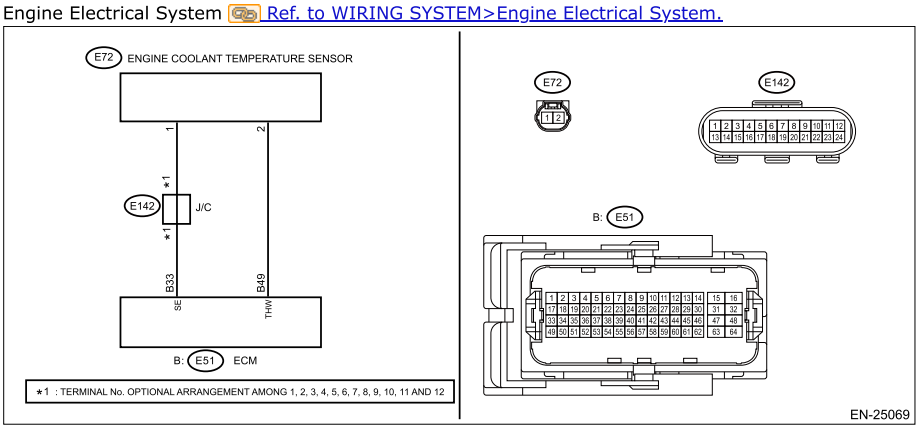
## DTC P0117 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 150[°C] (302°F) or more?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**
(E51) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

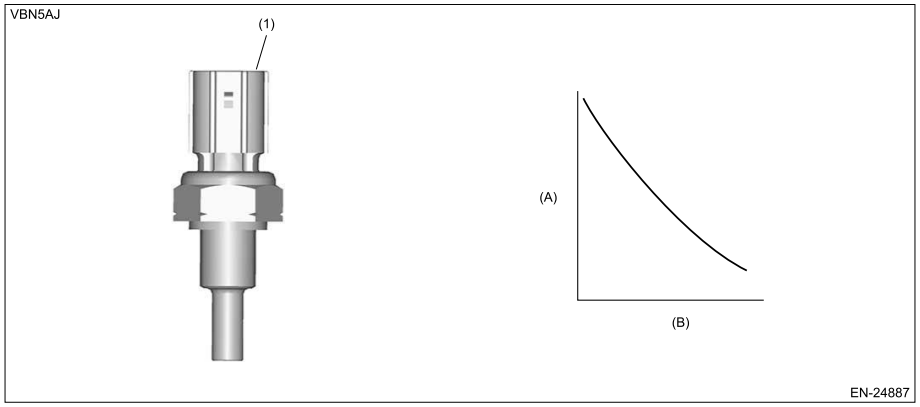
Yes — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

No — Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit of the engine coolant temperature sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Engine coolant temperature sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.33 V |

**Time needed for diagnosis:** 500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

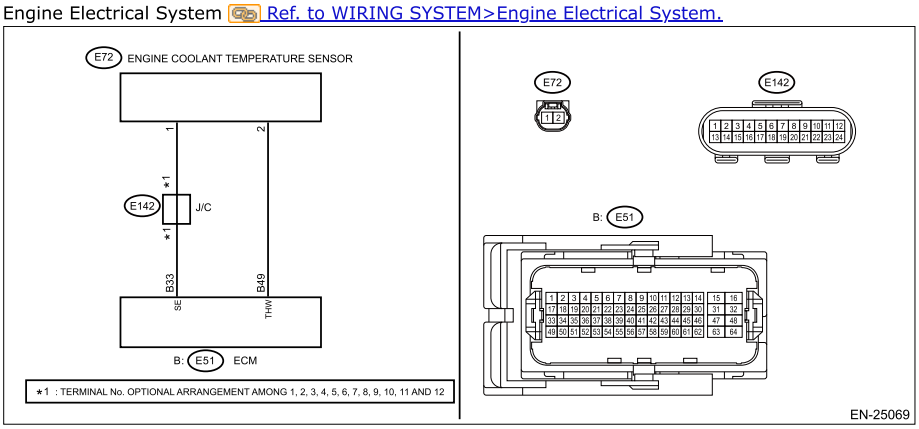
## DTC P0118 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK FOR POOR CONTACT.
   - yes → Perform the instructed procedures.
   - no → Go to 3.
3. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓

| | | |
|---|---|---|
| 4. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] less than −40[°C] (−40°F)?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and engine coolant temperature sensor connector.

Is there poor contact of ECM or engine coolant temperature sensor connector?

Yes — Repair the poor contact of ECM or engine coolant temperature sensor connector.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.
   **Connector & terminal**
   (E51) No. 33 — (E72) No. 1:
   (E51) No. 49 — (E72) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between ECM connector and engine coolant temperature sensor connector
- Poor contact of J/C

**4. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 49 (+) — Engine ground (−):

Is the voltage 5 V or more?

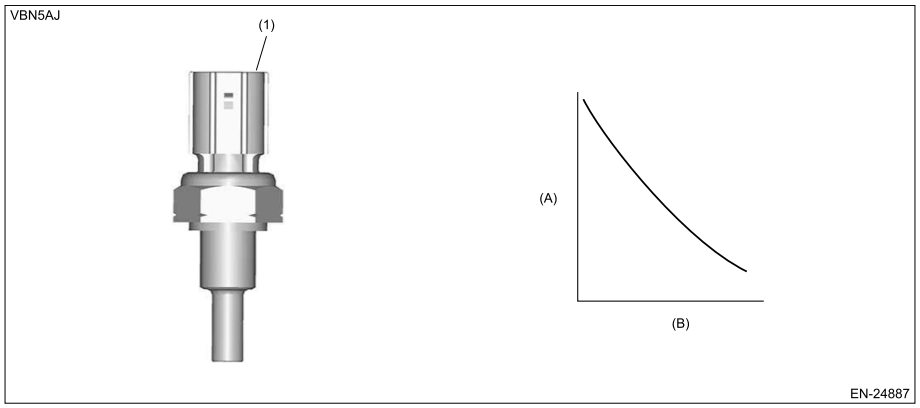
| | |
|---|---|
| Yes | Repair the short circuit of harness to power supply between ECM connector and engine coolant temperature sensor connector. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if out of specification.

### COMPONENT DESCRIPTION




(A) Resistance value (kΩ)
(B) Temperature (°C (°F))

(1) Engine coolant temperature sensor

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.71 V |

**Time needed for diagnosis:** 500 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

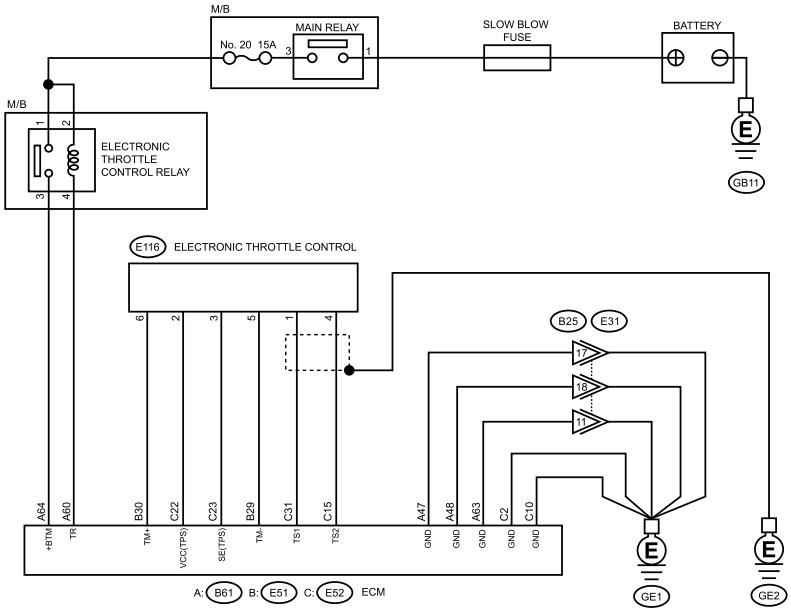
## DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

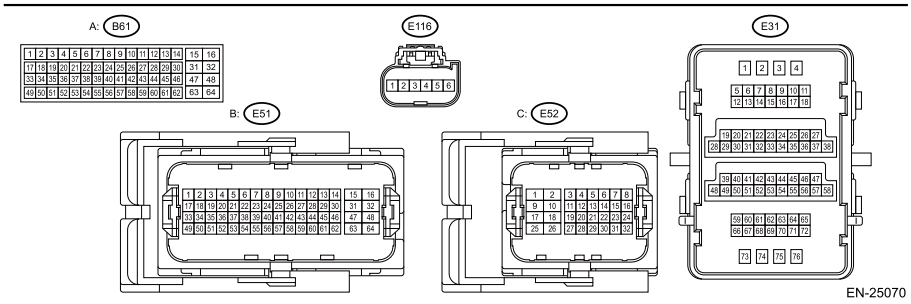
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

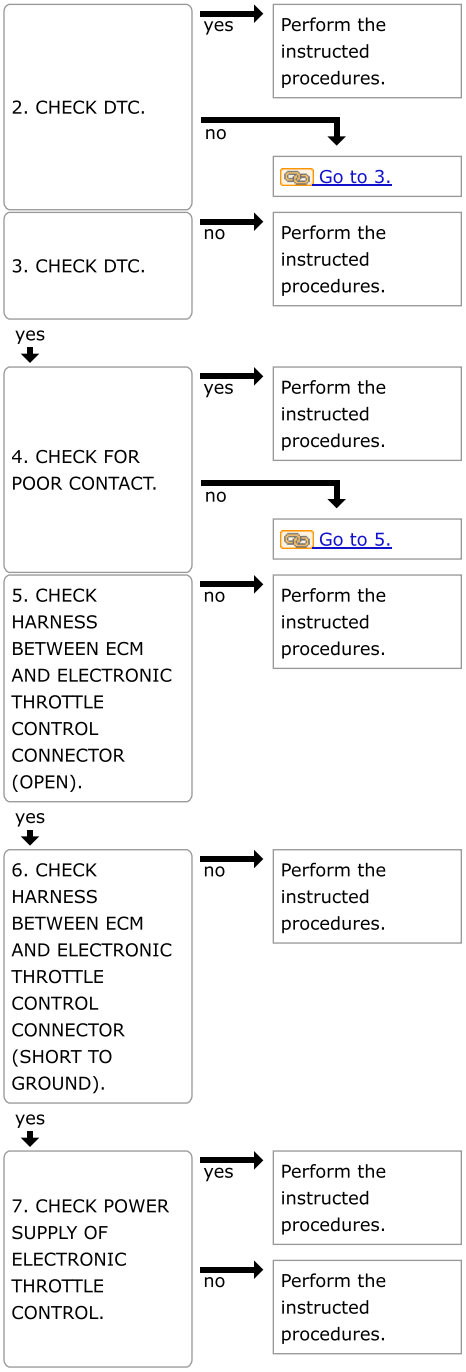



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0122 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

### 4. CHECK FOR POOR CONTACT.

1. Turn the ignition switch to OFF.
2. Check for poor contact of ECM and electronic throttle control connector.

Is there poor contact in ECM or electronic throttle control connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM or electronic throttle control connector. |
| No | Go to 5. |

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connectors from electronic throttle control.
3. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 31 — (E116) No. 1:
   (E52) No. 22 — (E116) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit of harness between ECM connector and electronic throttle control connector. |

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 31 — Engine ground:

(E52) No. 22 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. |

### 7. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 2 — Engine ground:

Is the voltage 4.5 — 5.5 V?

| | |
|---|---|
| Yes | Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

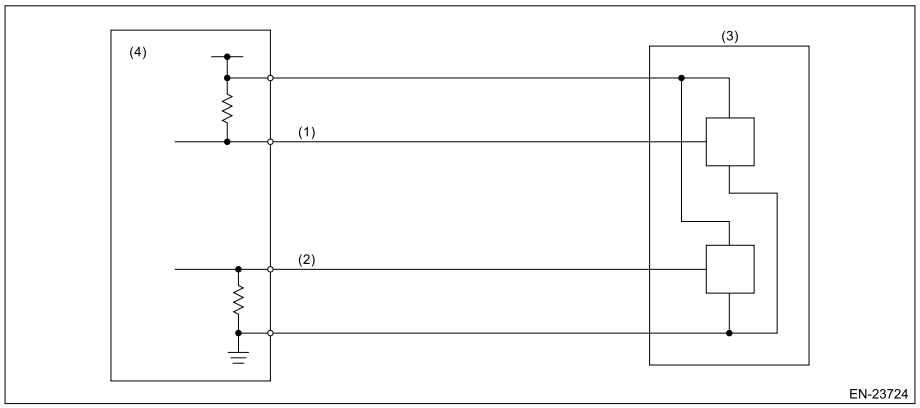
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of throttle position sensor 1.

Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Throttle position sensor 1 signal
(3) Throttle position sensor
(4) Engine control module (ECM)
(2) Throttle position sensor 2 signal

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 1 input voltage | Less than 0.294 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

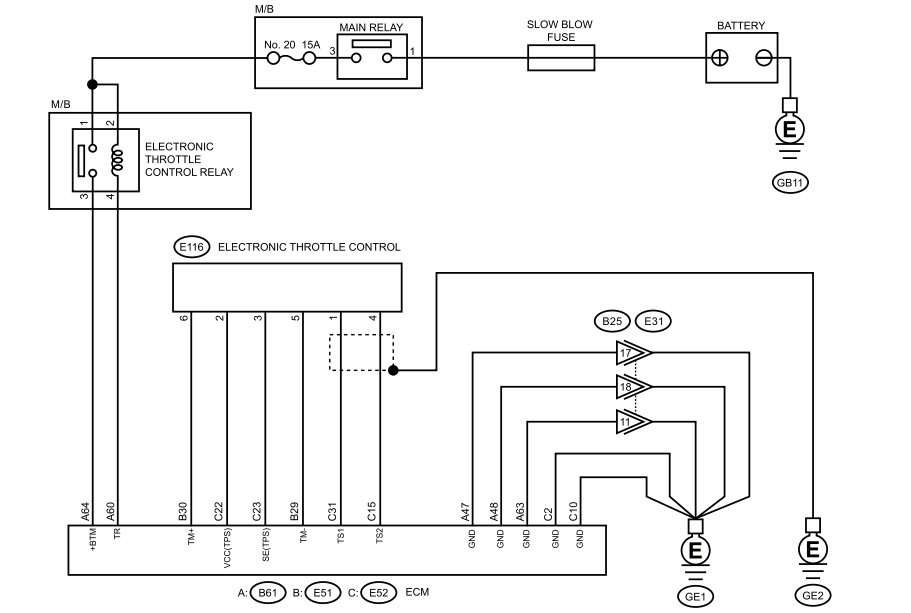
## DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

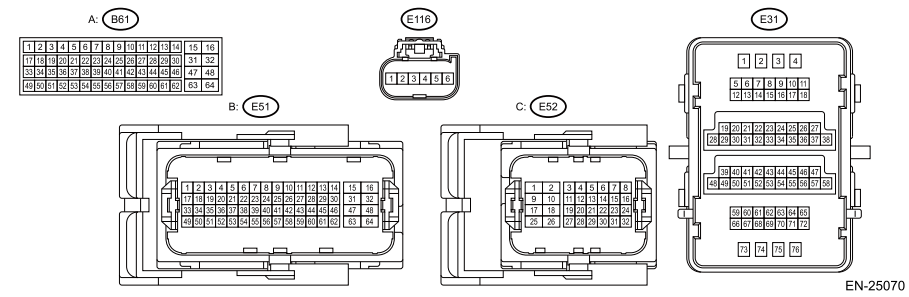
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

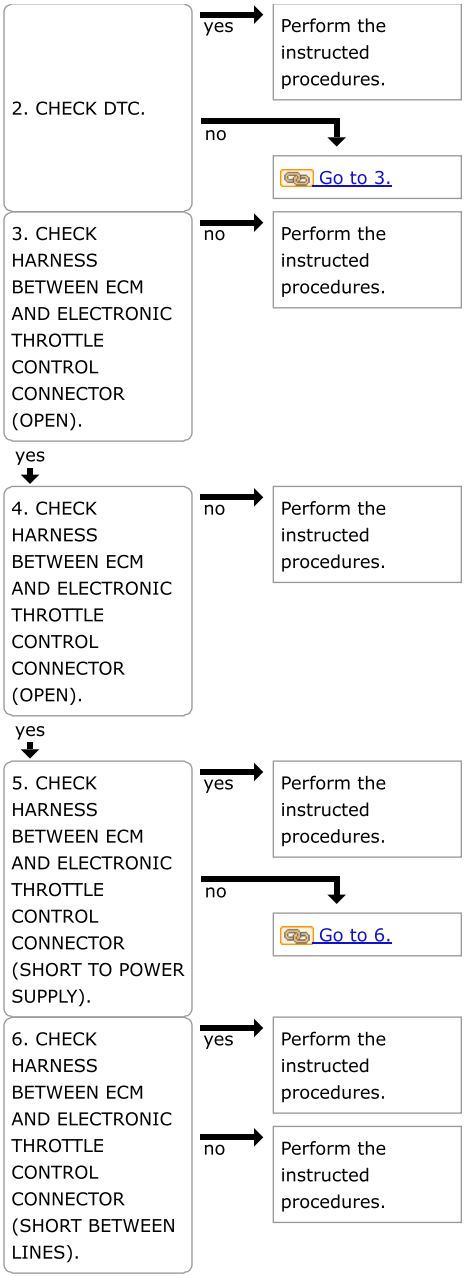



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

## 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

## 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.

**Connector & terminal**

(E52) No. 31 — (E116) No. 1:
(E52) No. 23 — (E116) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

## 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 5.

No — Repair the following item.

- Open circuit of harness between ECM connector and engine ground
- Poor contact of ECM connector

## 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 1 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 6.

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E52) No. 22 — (E52) No. 31:

Is the resistance 1 MΩ or more?

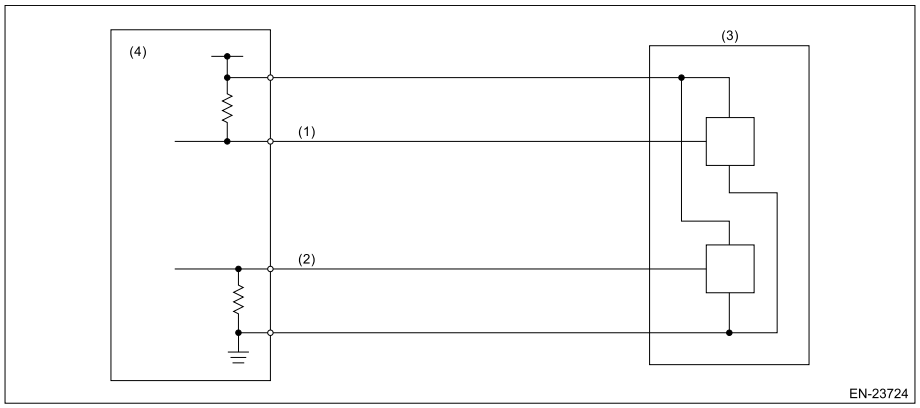
| | |
|---|---|
| Yes | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |
| No | Repair the line-to-line short circuit between ECM connector and electronic throttle control connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 1 input voltage | 4.753 V or more |

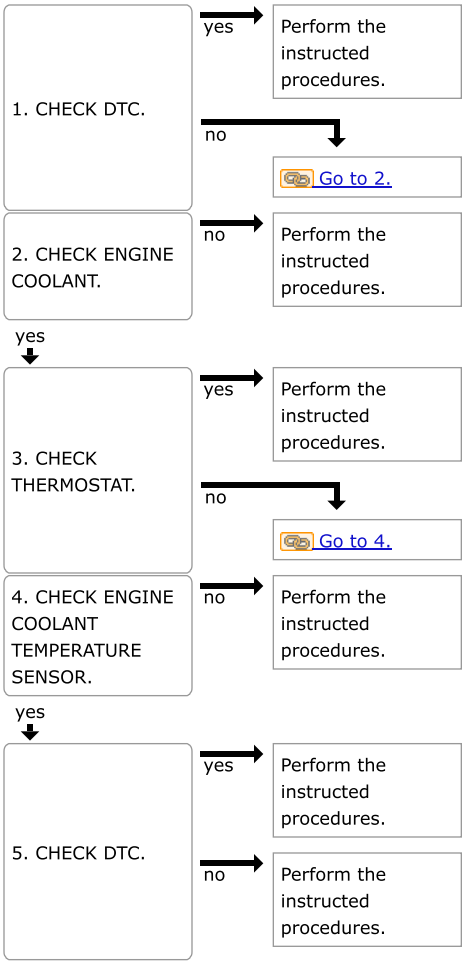
**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Engine does not return to idle.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0125 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK ENGINE COOLANT.

Check the following items:
- Amount of engine coolant
- Engine coolant freeze
- Contamination of engine coolant

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Fill or replace the engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant. |

### 3. CHECK THERMOSTAT.

Check the thermostat. Ref. to COOLING(H4DOTC)>Thermostat>INSPECTION.

Does the thermostat remain opened?

| | |
|---|---|
| Yes | Replace the thermostat. Ref. to COOLING(H4DOTC)>Thermostat. |
| No | Go to 4. |

### 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

### 5. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Engine] displayed? (Current code)

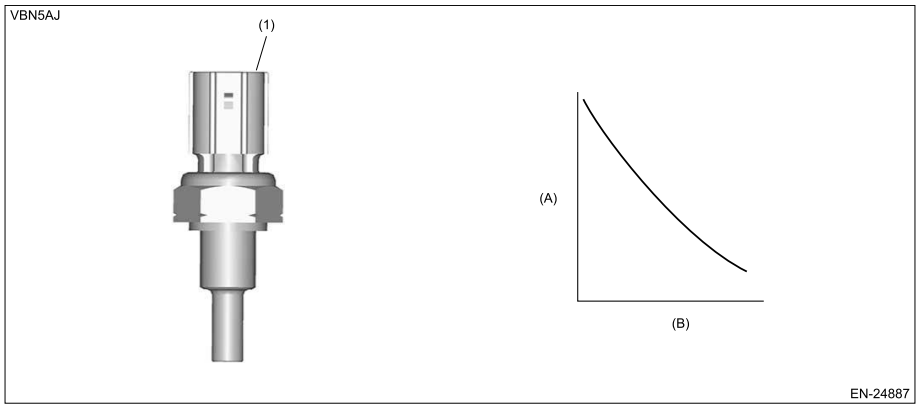
| | |
|---|---|
| Yes | Check the connection of connector. If there is no faulty connector, perform the diagnosis for the displayed DTCs. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.<br>**Note:**<br>**After the concerned inspection step is performed, the final check in Basic Diagnostic Procedure is not necessary.** |
| No | Finish the diagnosis.<br>**Note:**<br>**After the concerned inspection step is performed, the final check in Basic Diagnostic Procedure is not necessary.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of engine coolant temperature sensor output property.
Judge as NG when the actual engine coolant temperature does not reach the predetermined value and Σ(Estimated engine coolant temperature − Actual engine coolant temperature) exceeded the predetermined value.

**COMPONENT DESCRIPTION**




(A) Resistance value (kΩ)
(B) Temperature (°C (°F))

(1) Engine coolant temperature sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Engine speed | 475 rpm or more |
| Estimated coolant temperature | 0°C (32°F) or more |
| Engine coolant temperature after first engine start | Less than 0°C (32°F) |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the first engine start from cold condition.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Actual engine coolant temperature | Less than 0°C (32°F) |
| Σ(Estimated engine coolant temperature − Actual engine coolant temperature) | More than 1387.5 °C (2529.5°F) |

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

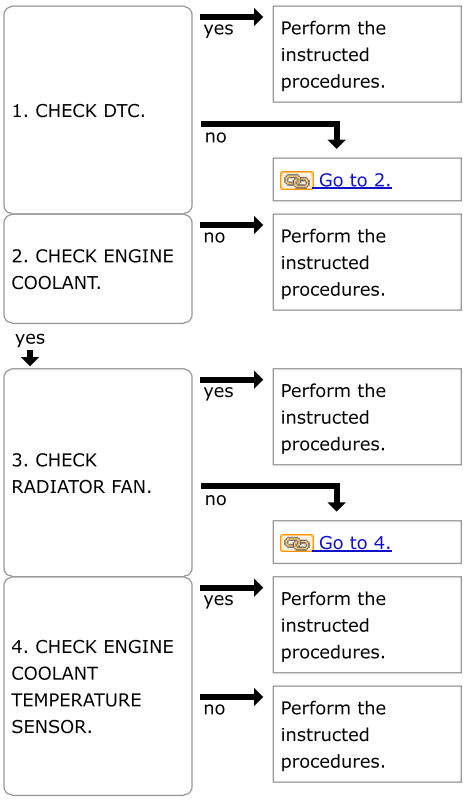
## DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Thermostat remains open.
- Coolant temperature rises slowly.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0128 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK ENGINE COOLANT.

Check the engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Refill the engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant. |

### 3. CHECK RADIATOR FAN.

1. Start the engine.
2. While keeping idling for approx. 3 minutes (with accelerator OFF), check the operation of the radiator fan.

Does the radiator fan continuously rotate for 3 minutes or more during idling?

| | |
|---|---|
| Yes | Repair the radiator fan system. Ref. to COOLING(H4DOTC)>Radiator Fan System. |
| No | Go to 4. |

### 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Replace the thermostat. Ref. to COOLING(H4DOTC)>Thermostat. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

## GENERAL DESCRIPTION

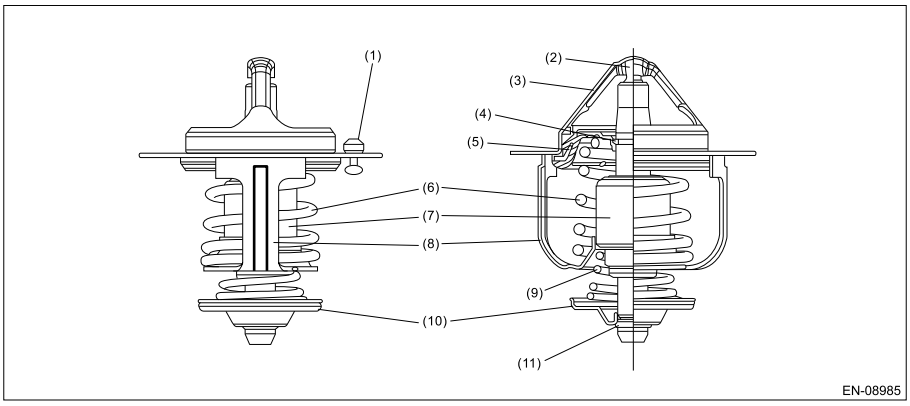
**OUTLINE OF DIAGNOSIS**

Detect malfunctions of the thermostat function.

Judge as NG when any one of the following conditions is established.

- When the actual engine coolant temperature does not reach the maximum temperature necessary to perform other OBDII diagnosis and Σ(Estimated engine coolant temperature − Actual engine coolant temperature) exceeded the predetermined value. (Diagnosis 1)
- When the actual engine coolant temperature does not reach the range within −11.1°C (−19.98°F) from the regulated temperature and Σ(Estimated engine coolant temperature − Actual engine coolant temperature) exceeded the predetermined value. (Diagnosis 2)
- When the actual engine coolant temperature reaches −11.1°C (−19.98°F) from the regulated temperature and then becomes less than the predetermined value. (Diagnosis 3)

**COMPONENT DESCRIPTION**




(1) Jiggle valve
(2) Piston
(3) Flange
(4) Stop ring
(5) Dust seal
(6) Main spring
(7) Wax element
(8) Frame
(9) Bypass spring
(10) Bypass valve
(11) Stop ring

**EXECUTION CONDITION**

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Ambient air temperature | −7°C (19.4°F) or more |
| Engine coolant temperature at engine start | Less than 60°C (140°F) |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Ambient air temperature | −7°C (19.4°F) or more |
| Engine coolant temperature at engine start | Less than 60°C (140°F) |

**Diagnosis 3**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Ambient air temperature | −7°C (19.4°F) or more |
| Actual engine coolant temperature | Value of Map1 or more (experienced) |
| Diagnosis mask condition | Not established |

**Map1**

| Ambient temperature (°C (°F)) | −7 (19.4) | 8 (46.4) | 60 (140) |
|---|---|---|---|
| Actual engine coolant temperature (°C (°F)) | 70.8 (159.4) | 79.4 (174.9) | 79.4 (174.9) |

**GENERAL DRIVING CYCLE**

Diagnosis 1 and Diagnosis 2: Perform the diagnosis only once after starting the engine.
Diagnosis 3: Always perform the diagnosis after starting the engine.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Actual engine coolant temperature | Less than 50°C (122°F) |
| Σ(Estimated engine coolant temperature − Actual engine coolant temperature) | More than 1387.5°C (2497.5°F) |
| Estimated coolant temperature | More than 50°C (122°F) |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Actual engine coolant temperature | Less than value of Map1 |

| Malfunction Criteria | Threshold Value |
|---|---|
| Σ(Estimated engine coolant temperature − Actual engine coolant temperature) | More than 1387.5°C (2497.5°F) |
| Estimated coolant temperature | More than Map2 |

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Actual engine coolant temperature | Less than 50°C (122°F) |

**Map1**

| **Ambient temperature (°C (°F))** | **−7 (19.4)** | **8 (46.4)** | **60 (140)** |
|---|---|---|---|
| Actual engine coolant temperature (°C (°F)) | 70.8 (159.4) | 79.4 (174.9) | 79.4 (174.9) |

**Map2**

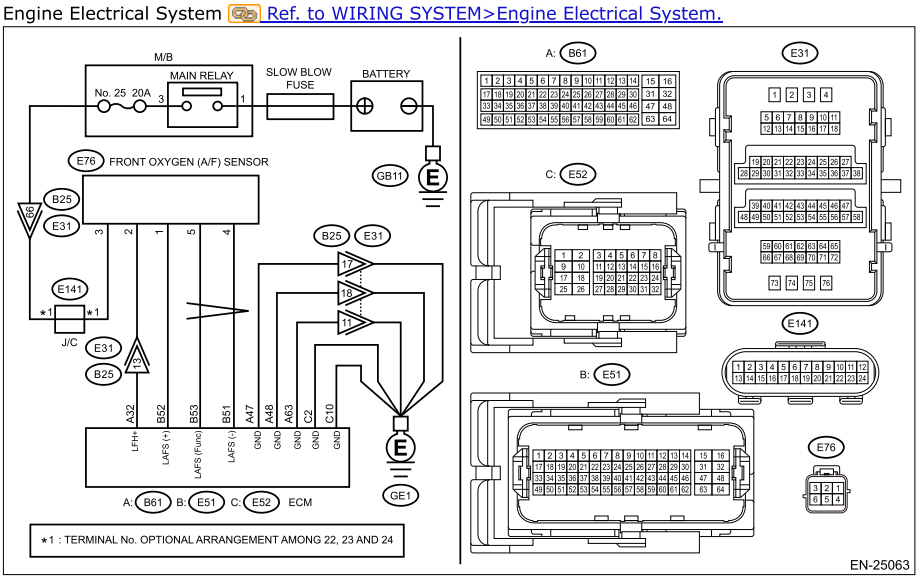
| **Ambient temperature (°C (°F))** | **−7 (19.4)** | **8 (46.4)** | **60 (140)** |
|---|---|---|---|
| Estimated engine coolant temperature (°C (°F)) | 70.8 (159.4) | 79.4 (174.9) | 79.4 (174.9) |

**Time needed for diagnosis**
Diagnosis 1: Less than 1 s
Diagnosis 2: Less than 1 s
Diagnosis 3: 10 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0130 A/F / O2 SENSOR CIRCUIT BANK 1 SENSOR 1

### 1. —

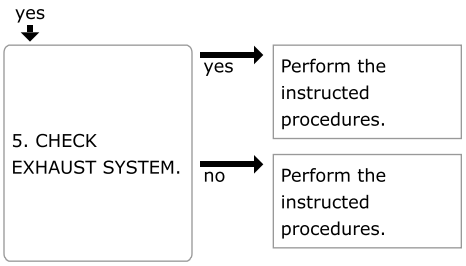
**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK FRONT OXYGEN (A/F) SENSOR DATA.
   - no → Go to 3.
   - yes ↓
2. CHECK FRONT OXYGEN (A/F) SENSOR DATA.
   - yes → Go to 5.
   - no → Go to 3.
3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
   - no → Perform the instructed procedures.




## 1. CHECK FRONT OXYGEN (A/F) SENSOR DATA.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. Idle the engine for one minute or more.
3. Using the Subaru Select Monitor, read the value in [A/F Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [A/F Sensor #11] 1.2 — 3 [V]?

Yes — Go to 2.

No — Go to 3.

## 2. CHECK FRONT OXYGEN (A/F) SENSOR DATA.

1. Race the engine so that the engine speed stays at 3000 rpm. (Five times in total)
2. Using the Subaru Select Monitor, read the value of [A/F Sensor #11] during racing.

**Note:**
- **Slowly depress the accelerator pedal to increase engine speed up to 3000 rpm, keep it for approximately 5 seconds, and quickly release the accelerator pedal to decrease engine speed.**
- **Normally, the air fuel ratio is rich during racing.**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [A/F Sensor #11] 2.5 [V] or more?

Yes — Go to 5.

No — Go to 3.

## 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.
   **Connector & terminal**
   (E51) No. 52 — (E76) No. 1:
   (E51) No. 51 — (E76) No. 4:
   (E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 52 — Engine ground:
(E51) No. 51 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector. |

### 5. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

**Note:**
**Check the following items.**
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Loose or improperly attached front oxygen (A/F) sensor and rear oxygen sensor**

Is there any fault in exhaust system?

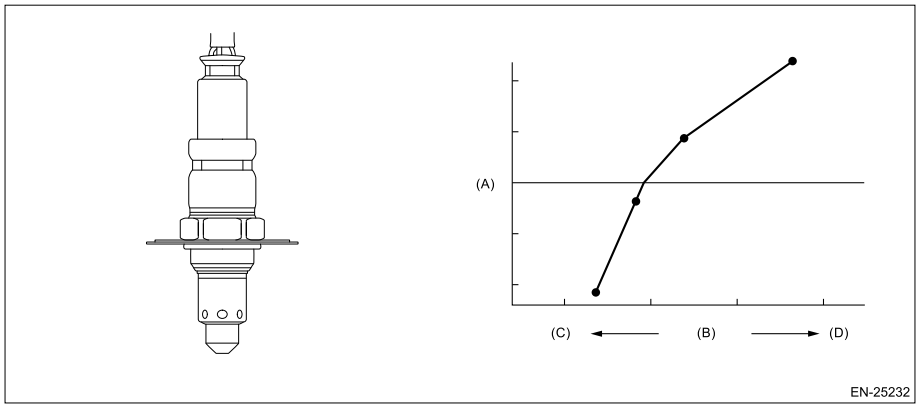
| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG, while the element impedance is low with the element current out of the range.

**COMPONENT DESCRIPTION**




(A) Electromotive force (C) Rich (D) Lean
(B) Air fuel ratio

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Front oxygen (A/F) sensor impedance | 403 Ω or less |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Input current | Less than −45 μA |

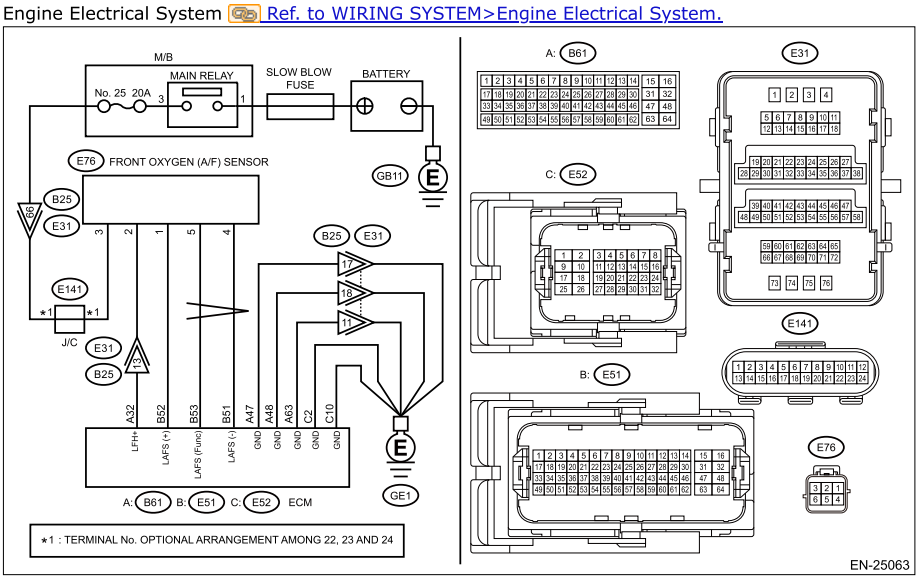
| Malfunction Criteria | Threshold Value |
| --- | --- |
| | Or,<br>More than 45 μA |

**Time needed for diagnosis:** 3040 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0131 A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the front oxygen (A/F) sensor.
4. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector. |

### 3. CHECK FOR POOR CONTACT.

Check for poor contact of the front oxygen (A/F) sensor connector.

Is there poor contact of front oxygen (A/F) sensor connector?

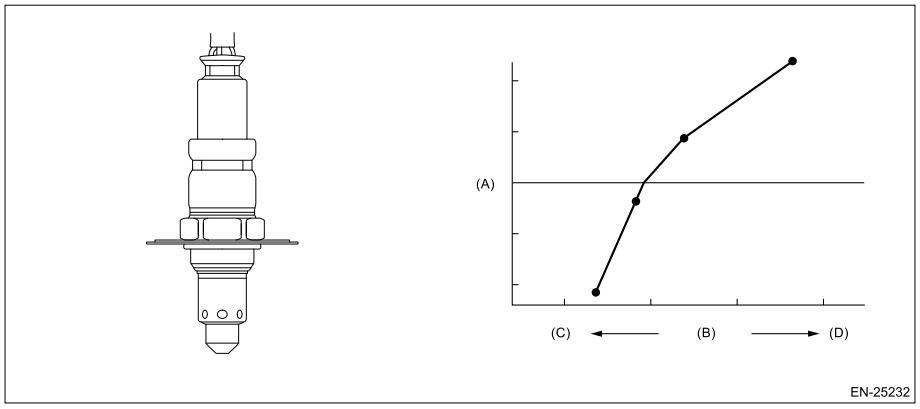
| | |
|---|---|
| Yes | Repair the poor contact of front oxygen (A/F) sensor connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit in the front oxygen (A/F) sensor.
Judge as NG, when the element voltage is out of the specified range.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Input voltage (+) | 1 V or less |
| Or, | |
| Input voltage (−) | 1 V or less |
| Or, | |
| Sensor reference voltage | 1 V or less |

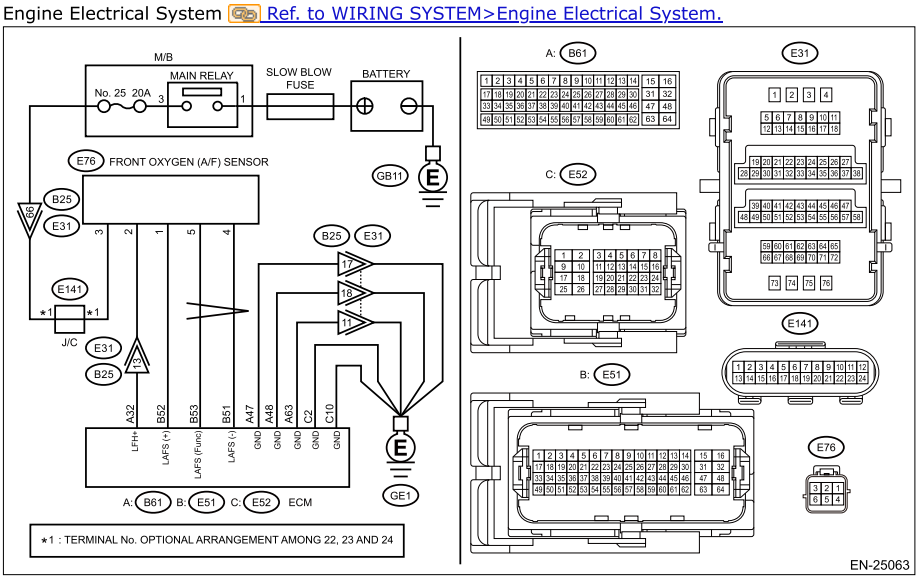
**Time needed for diagnosis:** 560 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0132 A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

**2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 (+) — Engine ground (−):
(E51) No. 52 (+) — Engine ground (−):
(E51) No. 53 (+) — Engine ground (−):

Is the voltage 8 V or more?

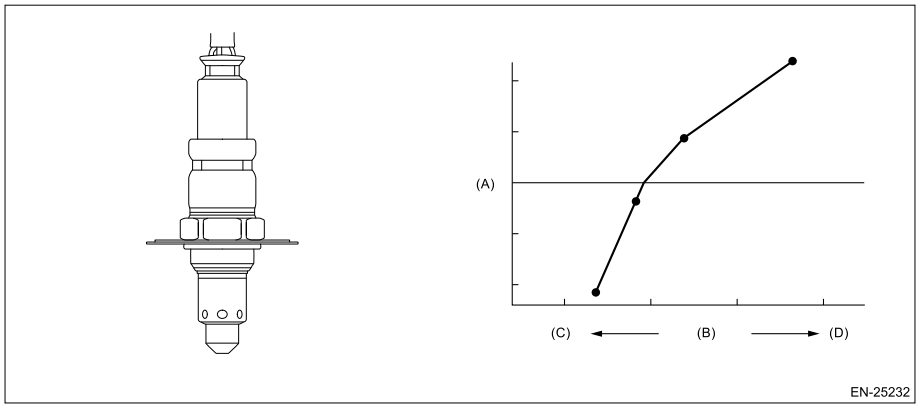
| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the short circuit in the front oxygen (A/F) sensor.
Judge as NG, when the element voltage is out of the specified range.

### COMPONENT DESCRIPTION




(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

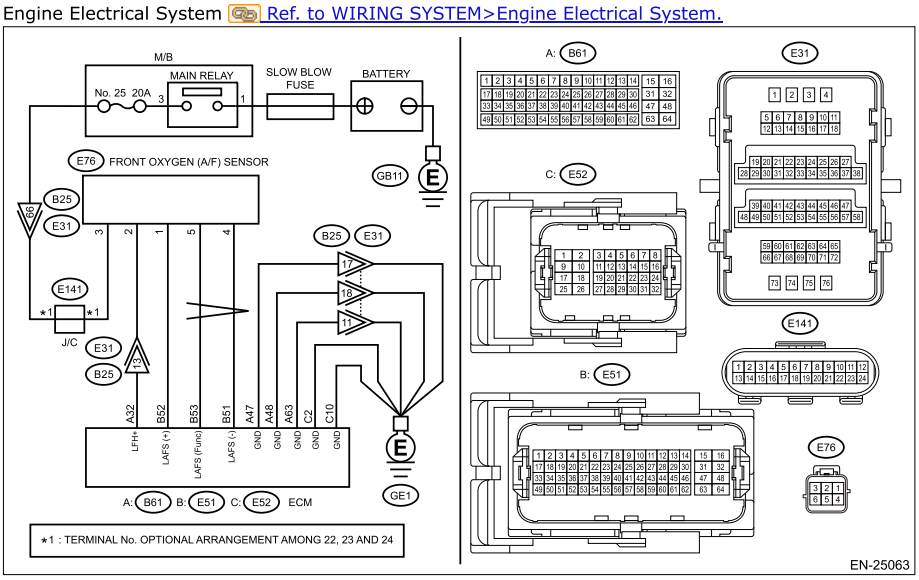
| Malfunction Criteria | Threshold Value |
|---|---|
| Input voltage (+) | Battery voltage − 1 V or more |
| Or, | |
| Input voltage (−) | Battery voltage − 1 V or more |
| Or, | |
| Sensor reference voltage | 6.5 V or more |

**Time needed for diagnosis:** 560 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0134 A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector. |

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and front oxygen (A/F) sensor connector.

Is there poor contact of ECM or front oxygen (A/F) sensor connector?

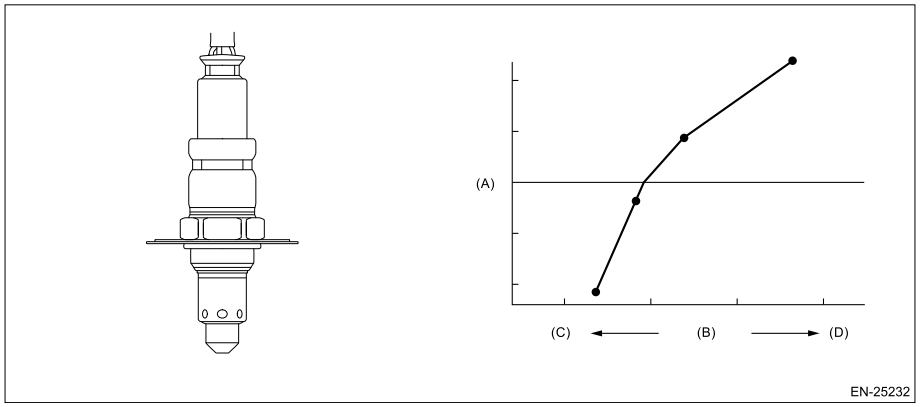
| | |
|---|---|
| Yes | Repair the poor contact of ECM or front oxygen (A/F) sensor connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open circuit in the front oxygen (A/F) sensor.
Judge as NG when the element voltage is out of range, or when the malfunction signal is received from the front oxygen (A/F) sensor IC, or when the element current gets stuck.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Front oxygen (A/F) sensor impedance | More than 403 Ω |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Input voltage (+) | More than 2.65 V |

| Malfunction Criteria | Threshold Value |
| --- | --- |
| Or,<br>Sensor reference voltage<br>Or,<br>Input current | <br>3.6 V or less<br><br>−45 μA or more<br>and<br>45 μA or less |

**Time needed for diagnosis**
Input voltage (+): 30 seconds
Sensor reference voltage: 2 seconds
Input current: 2 seconds
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2

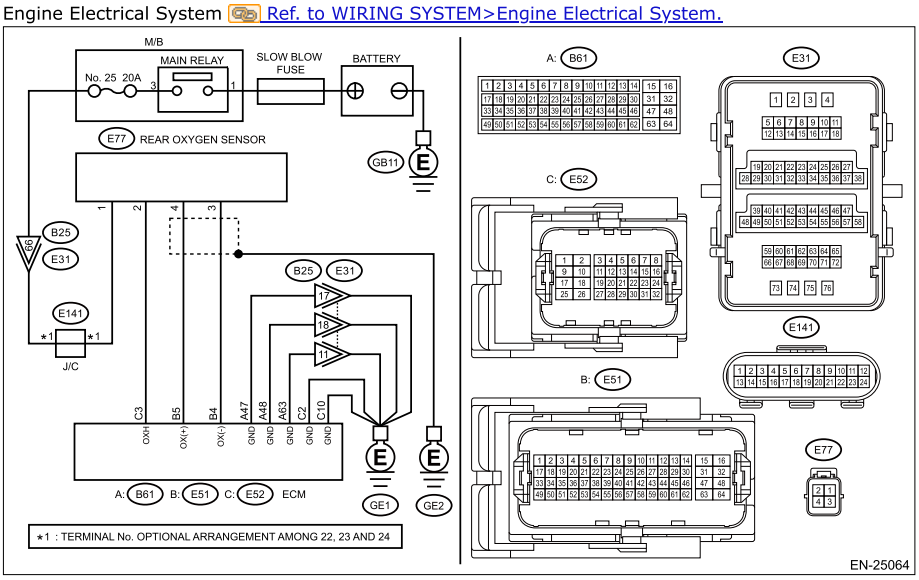
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK REAR OXYGEN SENSOR DATA. | yes | Go to 6. |
| | no | Go to 2. |
| 2. CHECK REAR OXYGEN SENSOR CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | yes | |
| 4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND). | no | Perform the instructed procedures. |

yes

| | | |
|---|---|---|
| 5. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 6. CHECK EXHAUST SYSTEM. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.49 [V] or more?

Yes — Go to 6.

No — Go to 2.

### 2. CHECK REAR OXYGEN SENSOR CONNECTOR.

Check the rear oxygen sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 4 — (E77) No. 3:
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance of harness between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 4 — Engine ground

(E51) No. 5 — Engine ground

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector. |

### 5. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.

**Connector & terminal**

(E77) No. 3 (+) — Engine ground (−):

Is the voltage 1.8 V or more?

| | |
|---|---|
| Yes | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 6. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

**Note:**
**Check the following items.**
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Loose or improperly attached front oxygen (A/F) sensor and rear oxygen sensor**

Is there any fault in exhaust system?

| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |

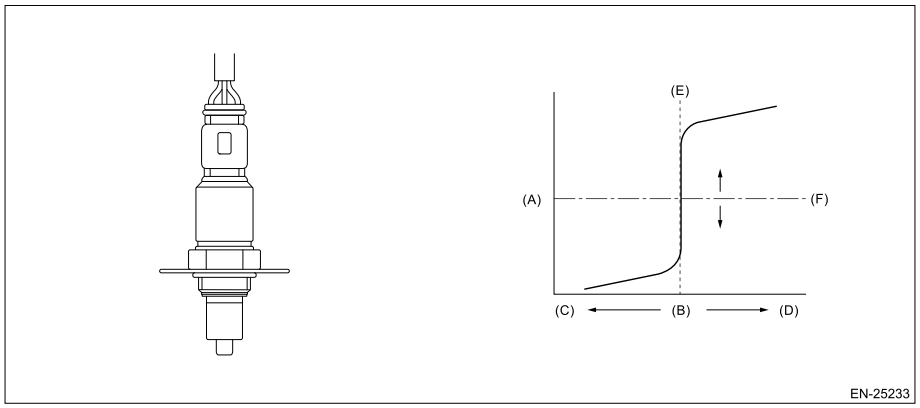
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of rear oxygen sensor.

Judge as NG when the rear oxygen sensor output voltage is out of possible range.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

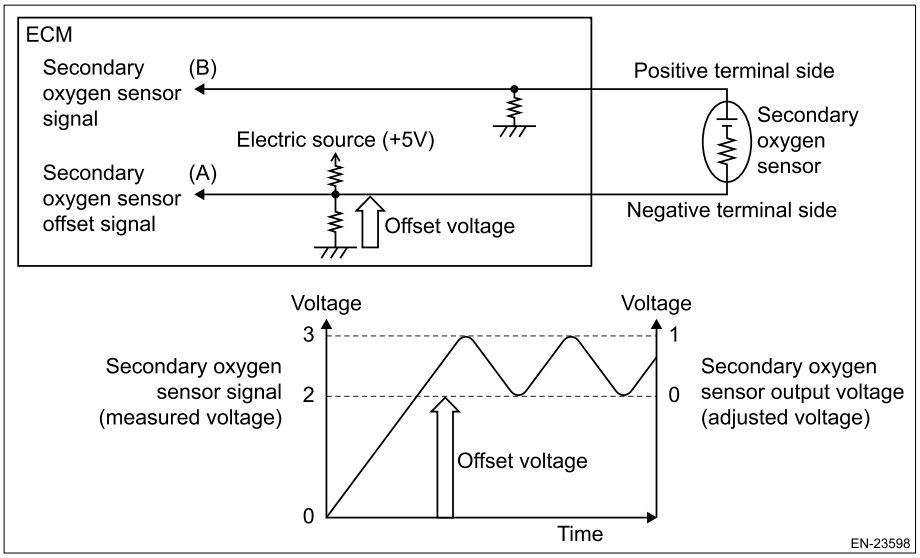
**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |
| Cumulative duty ratio of the rear oxygen sensor heater after engine starting | 54400% or more |
| Rear oxygen sensor offset signal | More than 1.8 V<br>and<br>Less than 2.2 V |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**




If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor signal (A) | Less than 1.8 V |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage of rear oxygen sensor {(B) − (A)} | Less than −0.22 V |

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor signal (B) | 0.375 V or more |
| Or, | |
| Rear oxygen sensor signal (B) | 0.375 V or more<br>and<br>Less than 1.7 V |

**Time needed for diagnosis:** 1000 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2

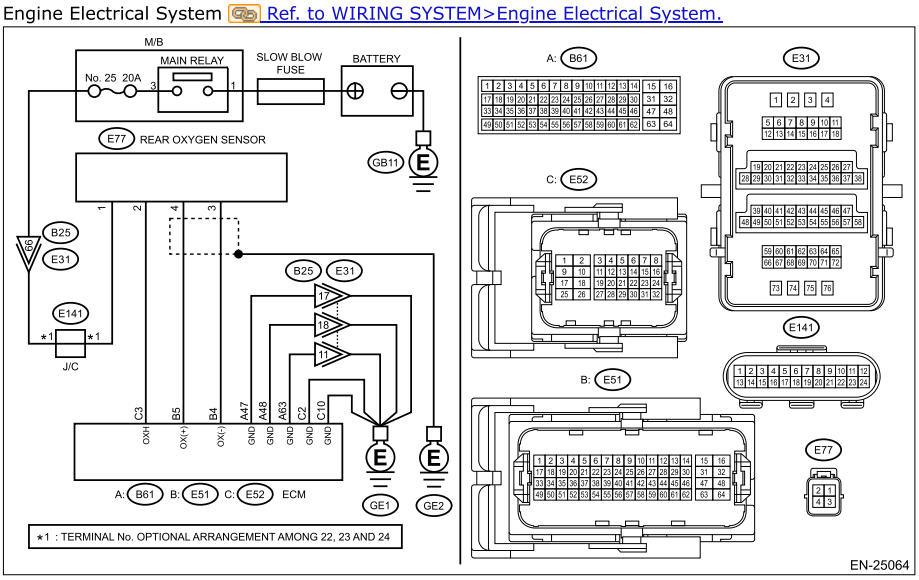
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK REAR OXYGEN SENSOR DATA. | yes | Go to 5. |
| | no | Go to 2. |
| 2. CHECK REAR OXYGEN SENSOR CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no | Perform the instructed procedures. |
| 4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

| | | |
|---|---|---|
| 5. CHECK EXHAUST SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

## 1. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3000 rpm.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.25 [V] or less?

Yes — Go to 5.

No — Go to 2.

## 2. CHECK REAR OXYGEN SENSOR CONNECTOR.

Check the rear oxygen sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 3.

## 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.

**Connector & terminal**
(E51) No. 4 — (E77) No. 3:
(E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.

**Connector & terminal**

(E77) No. 3 (+) — Engine ground (−):

Is the voltage 2.2 V or less?

| | |
|---|---|
| Yes | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 5. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

**Note:**
**Check the following items.**
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Loose or improperly attached front oxygen (A/F) sensor and rear oxygen sensor**

Is there any fault in exhaust system?

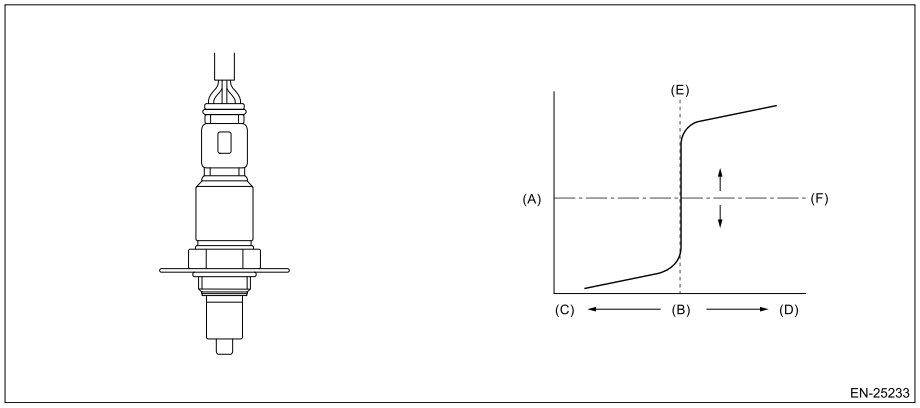
| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the rear oxygen sensor short circuit.
Judge as NG when the rear oxygen sensor output voltage is out of possible range.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

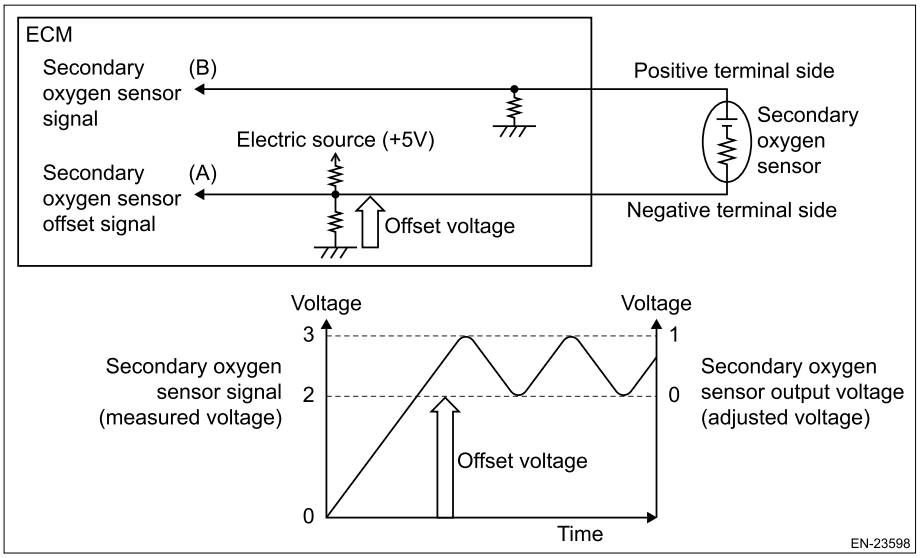
**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**




If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor offset signal (A) | More than 2.2 V |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor signal (B) | More than 3.25 V |

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage of rear oxygen sensor {(B) − (A)} | More than 1.2 V |

**Time needed for diagnosis:** 1000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2

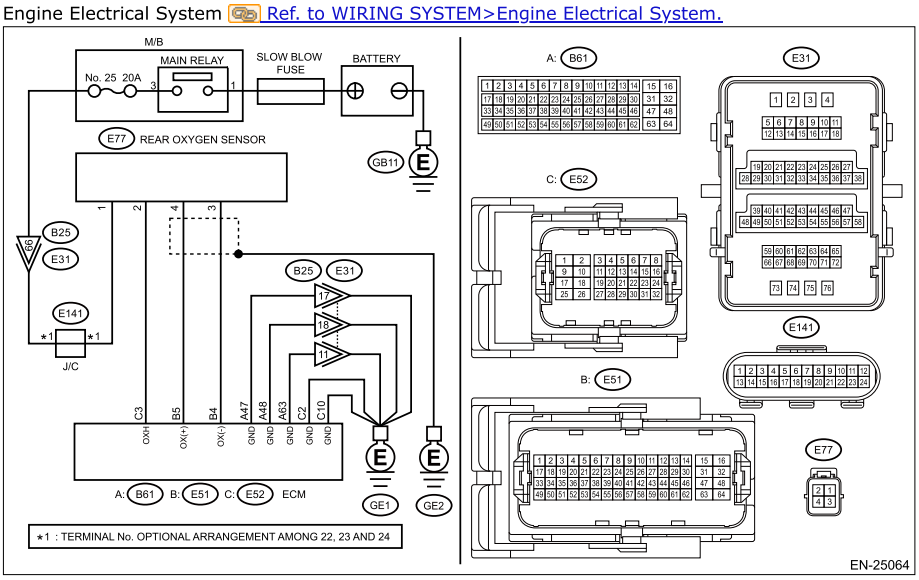
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |

| | | |
|---|---|---|
| 4. CHECK REAR OXYGEN SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P013A, P013B, P013E or P013F displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and rear oxygen sensor connector. |

### 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between rear oxygen sensor connector and engine ground.
**Connector & terminal**
(E77) No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector. |

### 4. CHECK REAR OXYGEN SENSOR.

Measure the resistance between rear oxygen sensor terminals.

**Terminals**

No. 3 — No. 4

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

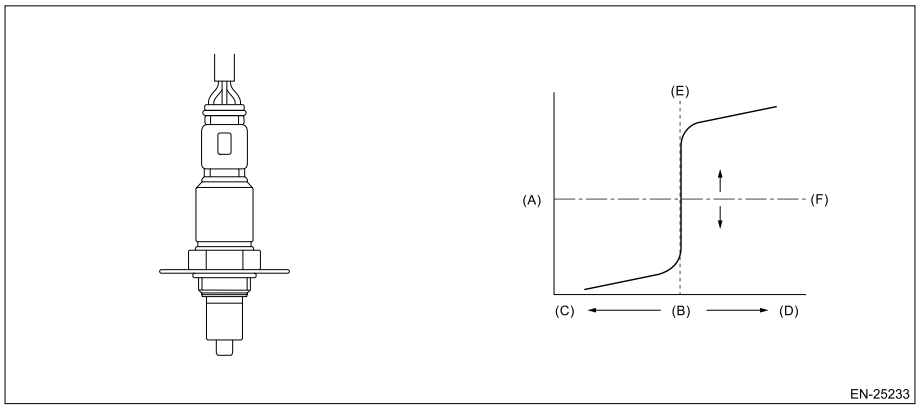
**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the slow response of rich → lean for rear oxygen sensor output.
When the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the response time is larger than the threshold value.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

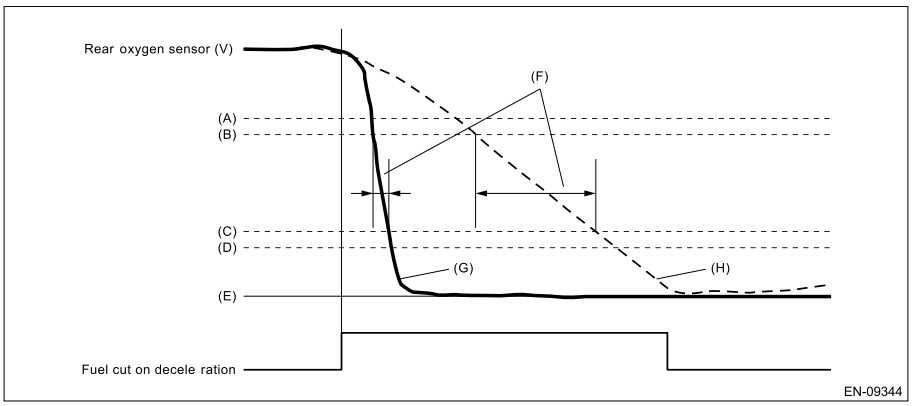
| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Rear oxygen sensor voltage when fuel cut starts | 0.55 V or more |
| Time while the fuel shut-off function is in operation | 5000 ms or more |
| Estimated temperature of rear oxygen sensor element when fuel cut starts | 450°C (842°F) or more |

**GENERAL DRIVING CYCLE**

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

**DIAGNOSTIC METHOD**

Detect a malfunction by measuring the rear oxygen sensor response time during fuel cut.




(A) 0.55 V
(B) 0.5 V
(C) 0.2 V
(D) 0.15 V
(E) 0 V
(F) Diagnostic parameter
(G) Normal
(H) Malfunction

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Time needed for rear oxygen sensor voltage to change from 0.5 V to 0.2 V | More than 2 s |

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

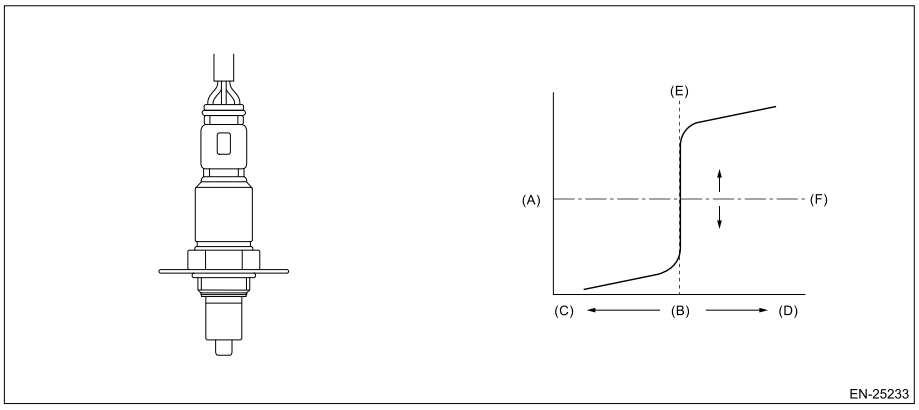
## DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2

**Note:**
**For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.**

### 1. OUTLINE OF DIAGNOSIS

Detect the slow response of lean → rich for rear oxygen sensor output.
After the deceleration fuel cut has recovered, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the rear oxygen sensor output voltage is less than the threshold value when the response time is more than the threshold value.

### 2. COMPONENT DESCRIPTION




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Main feedback | In operation |
| (Time while the fuel shut-off function is in operation | 3000 ms or more |

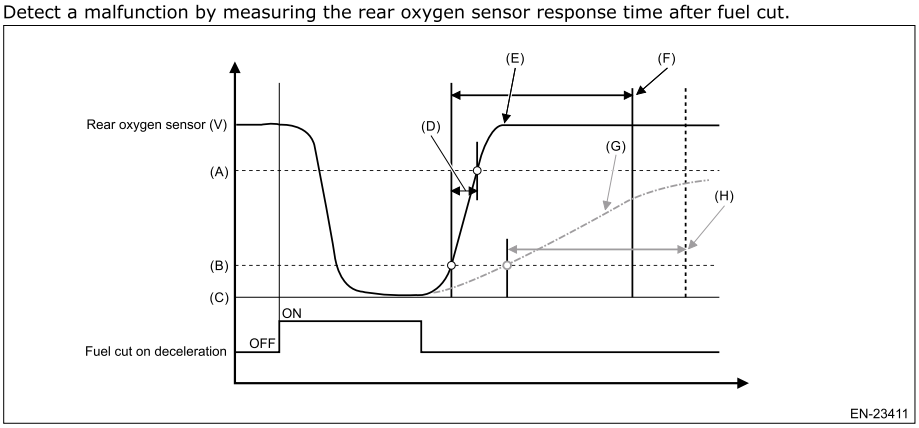
| Secondary parameters | Execution condition |
|---|---|
| Fuel shut-off function after experienced above) | Not in operation |
| Output voltage of rear oxygen sensor | 0.2 V or more |
| Compensation to rich | Rich |
| Amount of intake air | 20 g/s (0.7 oz/s) or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |

### 4. GENERAL DRIVING CYCLE

Perform diagnosis only once after recovering from a deceleration fuel cut continued for more than predetermined time.

### 5. DIAGNOSTIC METHOD

Detect a malfunction by measuring the rear oxygen sensor response time after fuel cut.




(A) 0.5 V
(B) 0.2 V
(C) 0 V
(D) Diagnostic parameter
(E) Voltage at normal condition
(F) Response time at normal condition
(G) Voltage at abnormal condition
(H) Response time at abnormal condition

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage value of rear oxygen sensor | Less than 0.5 V |
| Elapsed time | More than 3 s |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

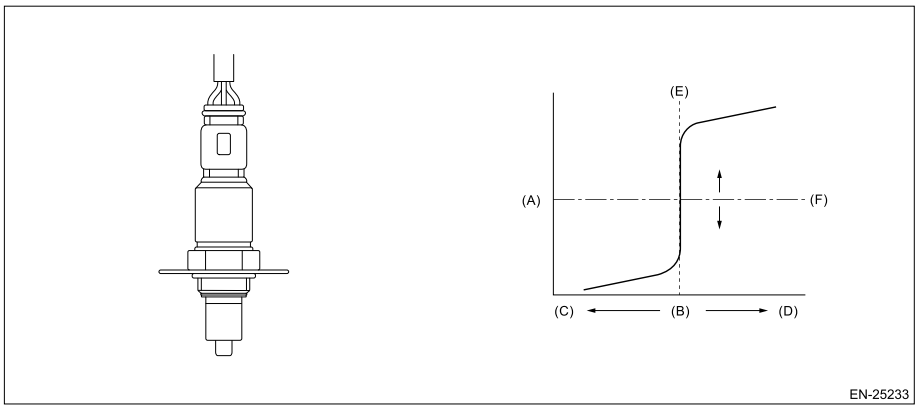
## DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2

**Note:**
**For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.**

### 1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for rich → lean.
After the deceleration fuel cut has started, detect the trouble by calculating the time when the rear oxygen sensor output decreases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

## 2. COMPONENT DESCRIPTION




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

## 3. EXECUTION CONDITION

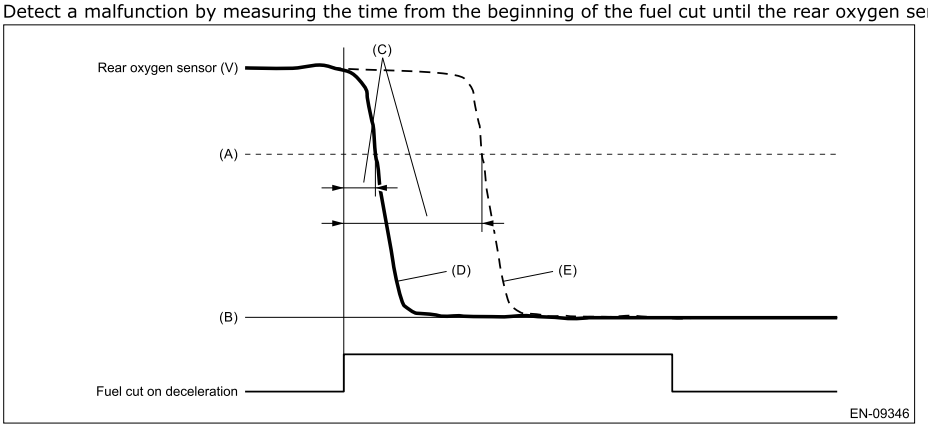
| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Rear oxygen sensor voltage when fuel cut starts | More than 0.55 V |
| (Time while the fuel shut-off function is in operation | More than 5 s |
| Fuel shut-off function after experienced above) | Not in operation |
| Estimated temperature of the rear oxygen sensor element | More than 450°C (842°F) |

## 4. GENERAL DRIVING CYCLE

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

## 5. DIAGNOSTIC METHOD

Detect a malfunction by measuring the time from the beginning of the fuel cut until the rear oxygen sensor voltage starts to drop.




(A) 0.5 V
(B) 0 V
(C) Diagnostic parameter
(D) Normal
(E) Malfunction

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Time needed for the rear oxygen sensor voltage to change up to 0.5 V after the fuel cut started | More than 4000 ms |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



# DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2

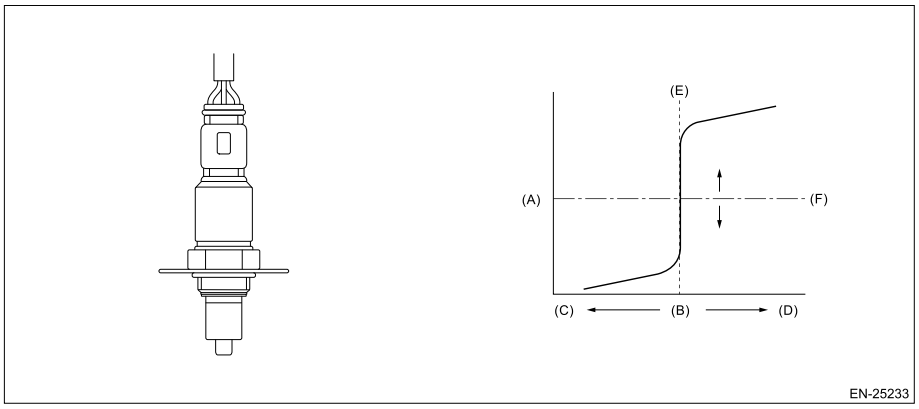
**Note:**

**For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.**

## 1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for lean → rich.
After the deceleration fuel cut has completed, detect the trouble by calculating the time when the rear oxygen sensor output increases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

## 2. COMPONENT DESCRIPTION




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

## 3. EXECUTION CONDITION

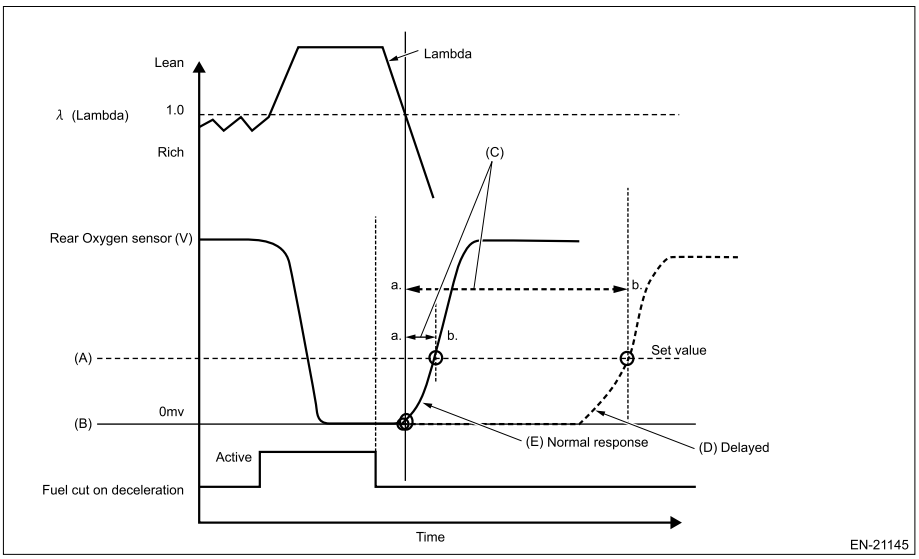
| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Main feedback | In operation |
| Rear oxygen sensor voltage when fuel cut has completed | Less than 0.15 V |
| (Time while the fuel shut-off function is in operation<br>Fuel shut-off function after experienced above) | More than 3 s<br>Not in operation |
| Estimated temperature of the rear oxygen sensor element | More than 450°C (842°F) |
| Compensation to rich | Rich |
| Amount of intake air | 25 g/s (0.88 oz/s) or more |

## 4. GENERAL DRIVING CYCLE

Perform diagnosis only once when recovering from the deceleration fuel cut continued for more than predetermined time with the rear oxygen sensor warmed up sufficiently.

## 5. DIAGNOSTIC METHOD

Detect a malfunction by measuring the time from fuel cut completed until the rear oxygen sensor voltage begins to rise.




(A) 0.3 V
(B) 0 V
(C) Diagnostic parameter
(D) Malfunction
(E) Normal

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage value of rear oxygen sensor | Less than 0.2 V |
| Elapsed time* | More than value of Map |

*: The time since the λ became less than 1 after the end of fuel cut

**Map**

| **Average value of intake air amount (g/s (oz/s))** | **24 (0.85)** | **25 (0.88)** | **45 (1.6)** |
|---|---|---|---|
| Elapsed time (s) | 4.32 | 4.30 | 4.30 |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

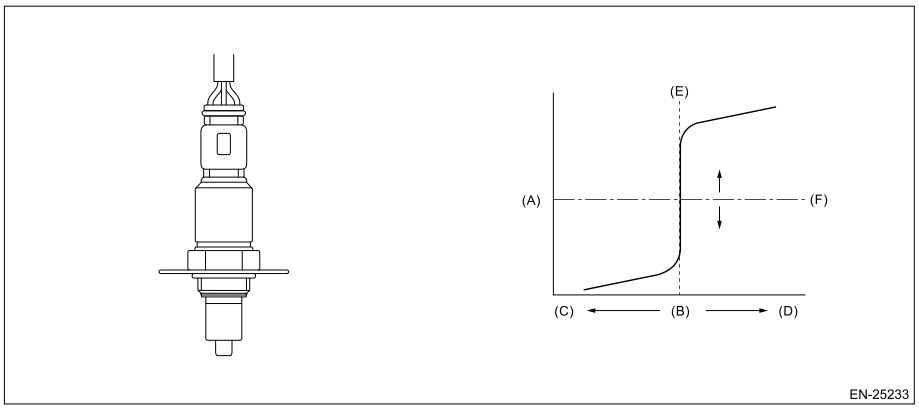
## DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 2

**Note:**
**For the diagnostic procedure, refer to DTC P0137. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2.**

### 1. OUTLINE OF DIAGNOSIS

Detect the open circuit in the rear oxygen sensor.

## 2. COMPONENT DESCRIPTION




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

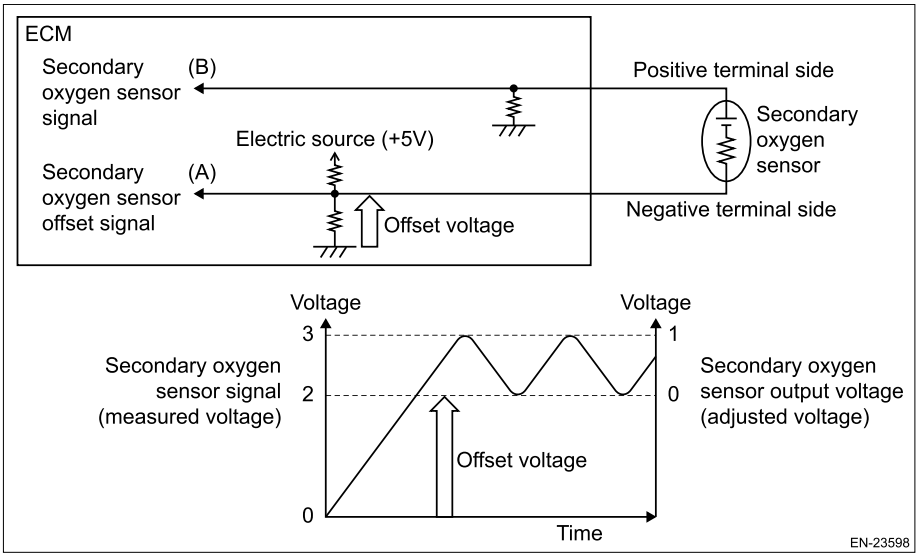
## 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |
| Cumulative duty ratio of the rear oxygen sensor heater after engine starting | 54400% or more |
| Rear oxygen sensor offset signal | More than 1.8 V<br>and<br>Less than 2.2 V |

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

## 5. DIAGNOSTIC METHOD




If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor signal (B) | Less than 0.375 V |

**Time needed for diagnosis:** 1000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0141 O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2

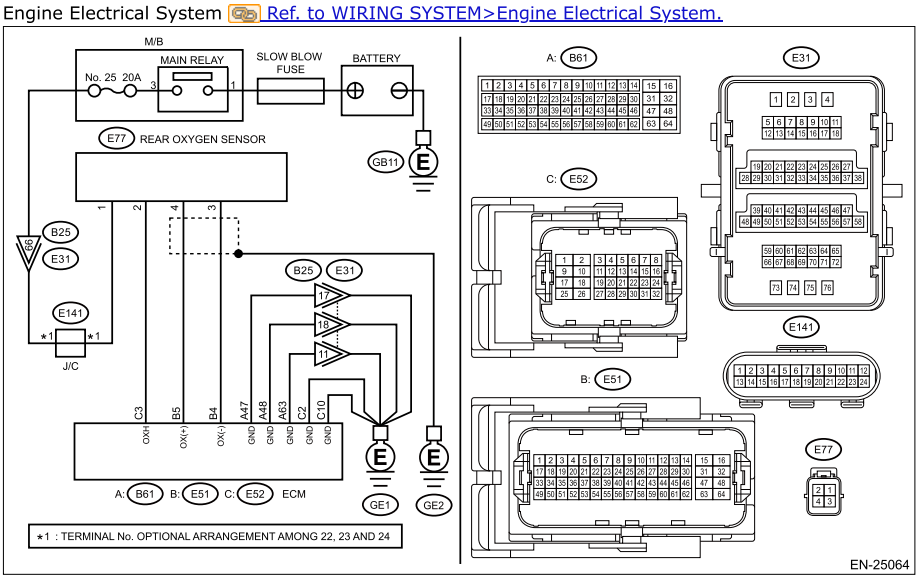
**1. —**

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK REAR OXYGEN SENSOR POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK GROUND CIRCUIT FOR ECM. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK REAR OXYGEN SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK REAR OXYGEN SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the rear oxygen sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between M/B and rear oxygen sensor connector
- Poor contact of J/C
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E77) No. 2 — (E52) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

### 3. CHECK GROUND CIRCUIT FOR ECM.

Measure the resistance of harness between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of coupling connector

### 4. CHECK REAR OXYGEN SENSOR.

Check the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor>INSPECTION.

Is the check result OK?

Yes — Repair the poor contact of ECM connector.

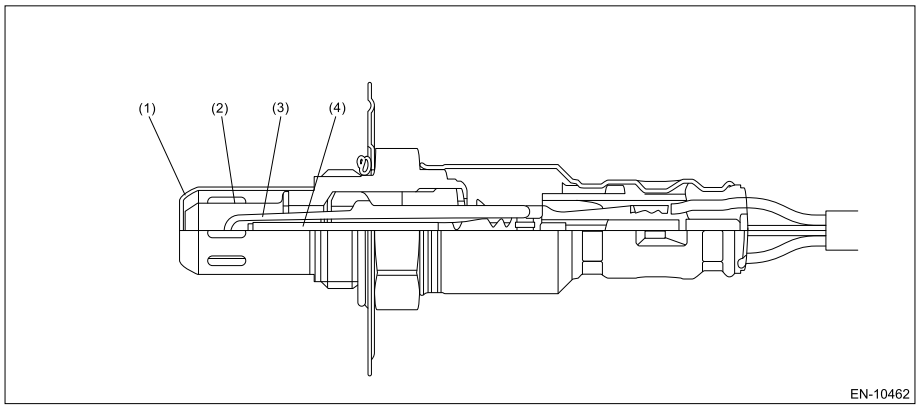
No — Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor.

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect malfunction of the rear oxygen sensor heater.
Judge as NG if it is determined that the rear oxygen sensor impedance is large by observing the engine conditions.

### COMPONENT DESCRIPTION




(1) Element cover (outer)
(2) Element cover (inner)
(3) Sensor element
(4) Ceramic heater

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Rear oxygen sensor heater control duty | 4% or more |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Rear oxygen sensor heater current | Less than value of Map |

**Map**

| Battery voltage (V) | 10.9 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|
| Threshold value (mA) | 330 | 358 | 385 | 413 | 440 | 468 |

**Time needed for diagnosis:** 10 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK EXHAUST SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0031, P0032, P0131, P0132, or P0134 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK EXHAUST SYSTEM.

Check the exhaust system.

**Note:**
**Check the following items.**
- **Loose installation of front portion of exhaust pipe onto cylinder heads**
- **Loose connection between front exhaust pipe and front catalytic converter**
- **Damage of exhaust pipe resulting in a hole**

Is there any fault in exhaust system?

| | |
|---|---|
| Yes | Repair the exhaust system. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

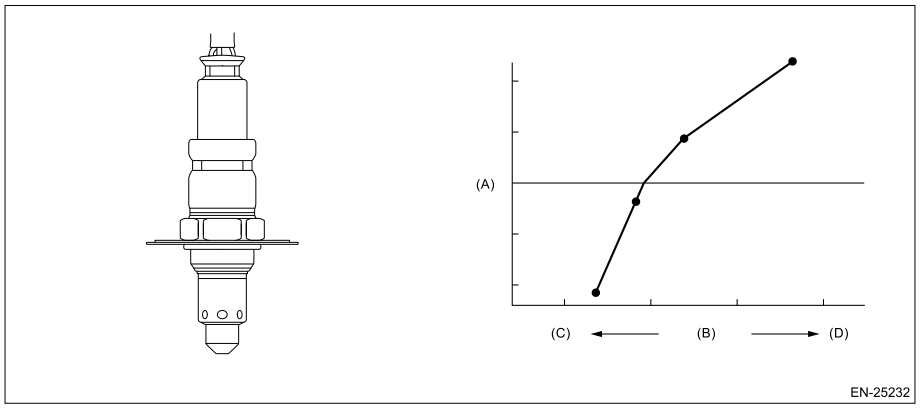
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the delayed response of the front oxygen (A/F) sensor.

For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

**COMPONENT DESCRIPTION**




(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

**EXECUTION CONDITION**

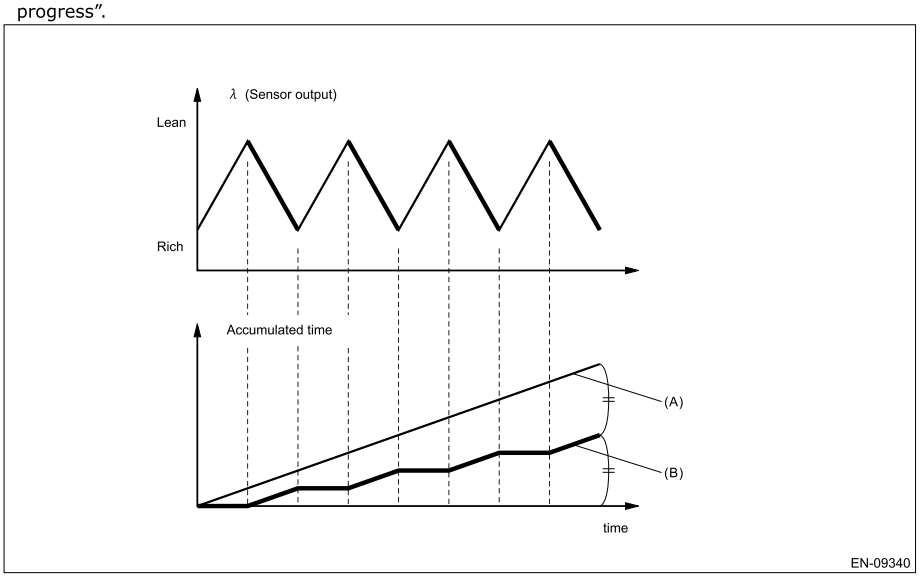
| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Operation time of main feedback | 5000 ms or more |
| Engine speed | 1000 rpm or more |
| Amount of intake air | 10 g/s (0.35 oz/s) or more |

**GENERAL DRIVING CYCLE**

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

**DIAGNOSIS 1**

Detect the malfunction by checking "Cumulative value of time when λ changes from lean → rich" in comparison to "Time during which diagnosis is in progress".




(A) Time during which diagnosis is in progress (B) Cumulative value of time when λ changes from lean → rich

Judge as NG when the following conditions are established.

**Judgment value (P014C)**

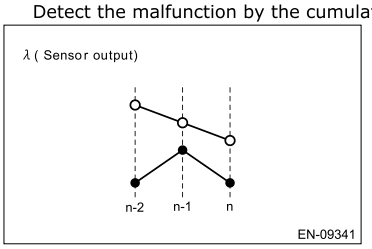
| Malfunction Criteria | Threshold Value |
|---|---|
| (Cumulative value of time when λ changes from lean → rich) / (Time during which diagnosis is in progress) | Less than 0.4 |
| and | |
| Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean | More than 10 ms |

**Judgment value (P014D)**

| Malfunction Criteria | Threshold Value |
|---|---|
| (Cumulative value of time when λ changes from lean → rich) / (Time during which diagnosis is in progress) and | More than 0.6 |
| Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean | More than 10 ms |

**Time needed for diagnosis:** 120 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

**DIAGNOSIS 2**
Detect the malfunction by the cumulative value obtained from the amount of variation in λ change.




Judge as NG when the following conditions are established.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Cumulative value obtained from the amount of variation in λ change | Less than value of Map |

**Map**

| **Cumulative value obtained from the amount of variation in λ** | **0** | **3** | **9** |
|---|---|---|---|
| Cumulative value obtained from the amount of variation in λ change | 0 | 2.5 | 2.5 |

**Time needed for diagnosis:** 120 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P014D A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

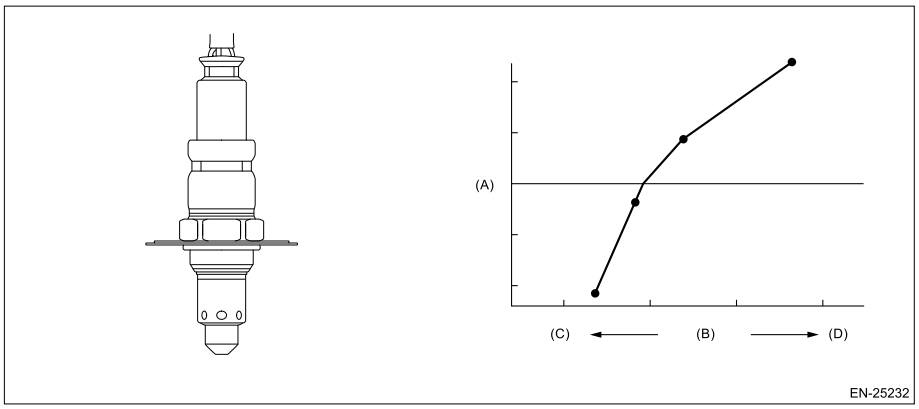
## DTC P015A A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1

**Note:**
**For the diagnostic procedure, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.**

### 1. OUTLINE OF DIAGNOSIS

Detect the delayed response of the front oxygen (A/F) sensor.
For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

## 2. COMPONENT DESCRIPTION




(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean

## 3. EXECUTION CONDITION

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Operation time of main feedback | 5000 ms or more |
| Engine speed | 1000 rpm or more |
| Amount of intake air | 10 g/s (0.35 oz/s) or more |

**Diagnosis 2**

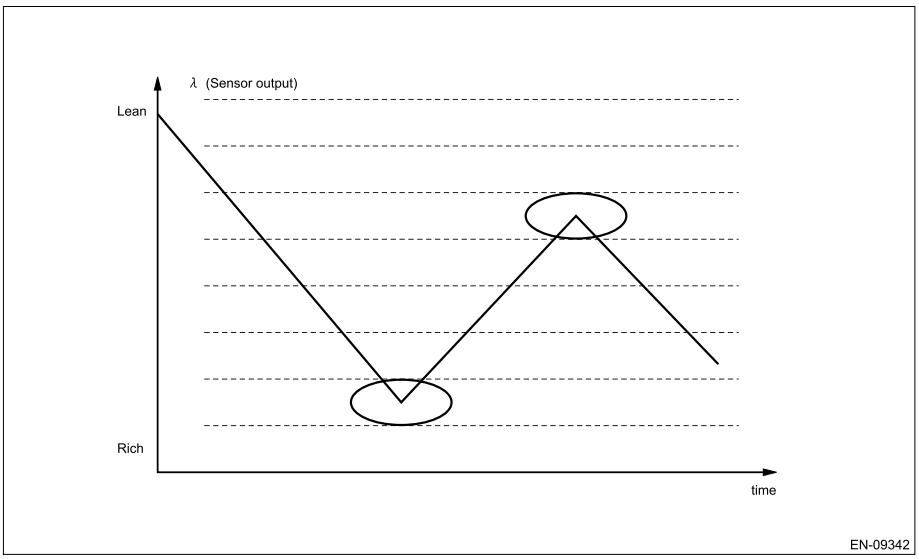
| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Main feedback | In operation |
| Engine speed | 1000 rpm or more |
| Amount of intake air | 20 g/s (0.7 oz/s) or more and Less than 100 g/s (3.5 oz/s) |
| Change amount of intake air (CVT model) | 0.5 g/s (0.02 oz/s) or more |
| \| Change amount of intake air \| (MT model) | 1 g/s (0.04 oz/s) or less |

## 4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

## 5. DIAGNOSIS 1

Detect the malfunction depending on the average value of time necessary for λ to inverse the air fuel ratio from “Lean → Rich → Lean” to “Rich → Lean → Rich”.




Judge as NG when the following conditions are established.

**Judgment value (P015A)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean<br>and<br>Average value when λ is lean | More than 550 ms<br><br>More than 600 ms |

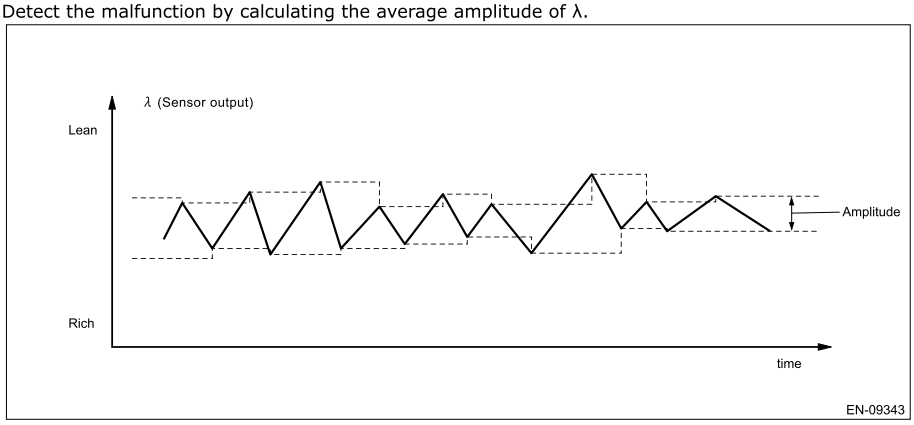
**Judgment value (P015B)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Average value of time necessary for λ to inverse the air fuel ratio to Rich → Lean → Rich<br>and<br>Average value when λ is rich | More than 550 ms<br><br>More than 750 ms |

**Time needed for diagnosis:** 120 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## 6. DIAGNOSIS 2

Detect the malfunction by calculating the average amplitude of λ.




Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Average value for λ amplitude | More than 0.085 |

**Time needed for diagnosis:** 120 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P015B A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1

**Note:**

- **For the diagnostic procedure, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.**
- **For the detection standard, refer to DTC P015A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015A A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0171 SYSTEM TOO LEAN BANK 1

**Note:**

**For the diagnostic procedure, refer to DTC P0172. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0172 SYSTEM TOO RICH BANK 1.**

### 1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.
Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Main feedback | In operation |

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously during main feedback.

### 4. DIAGNOSTIC METHOD

Compare the diagnostic value with the threshold value, and if a condition meeting the criteria continues for 10 s × 3 times or more, judge that there is a fault in the fuel system.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Diagnostic value {[Short term fuel trim B1] + [Long term fuel trim B1] + ([A/F Sensor #1] − [Target Equivalence Ratio]) × 100} | More than 1.35 |

**Time needed for diagnosis:** 10 s × 3 times
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0172 SYSTEM TOO RICH BANK 1

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**

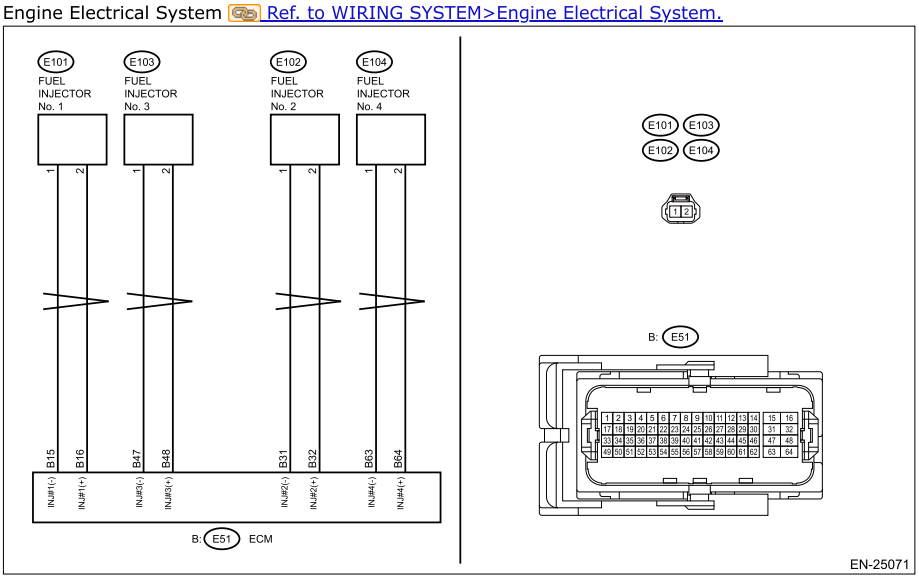
**When a short period (distance) driving from the engine start to stop is repeated, engine warm-up followed may cause detection of P0172 due to gasoline evaporation within the engine oil and blow-by gas increase.**

**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

- **After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**
- **When a short period (distance) driving from the engine start to stop is repeated, engine warm-up followed may cause detection of P0172 due to gasoline evaporation within the engine oil and blow-by gas increase.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. | yes | Go to 5. |
| | no | Go to 4. |

4. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

yes → Perform the instructed procedures.

no → Perform the instructed procedures.

5. CHECK EXHAUST SYSTEM.

yes → Perform the instructed procedures.

no → Go to 6.

6. CHECK AIR INTAKE SYSTEM.

yes → Perform the instructed procedures.

no → Go to 7.

7. CHECK FUEL PRESSURE.

no → Perform the instructed procedures.

yes ↓

8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

no → Perform the instructed procedures.

yes ↓

9. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

no → Perform the instructed procedures.

yes ↓

10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

no → Perform the instructed procedures.

yes ↓

11. CHECK FUEL INJECTOR.

no → Perform the instructed procedures.

yes ↓

12. CHECK PCV HOSE.

no → Perform the instructed procedures.

yes ↓

13. CHECK CONDITION OF PCV PIPE AND INTAKE DUCT NO. 1 CONNECTION.

no → Perform the instructed procedures.

yes ↓

| | | |
|---|---|---|
| 14. CHECK ECM CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.

**Connector & terminal**

#1 (E51) No. 15 — (E51) No. 16:
#2 (E51) No. 31 — (E51) No. 32:
#3 (E51) No. 47 — (E51) No. 48:
#4 (E51) No. 63 — (E51) No. 64:

Is the resistance 1.5 Ω (at 23°C (73°F))?

Yes — Go to 3.

No — Go to 2.

### 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Disconnect the connector from fuel injector.
2. Measure the resistance of harness between ECM connector and defective fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Repair or replace the following items.
- Poor contact of fuel injector connector
- Defective fuel injector Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 5.

No — Go to 4.

### 4. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from fuel injector.
2. Measure the resistance between ECM connector and engine ground on defective fuel injectors.

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 5. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

Yes — Repair the exhaust system.

No — Go to 6.

### 6. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes — Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description.

No — Go to 7.

## 7. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 8.

No — Check the fuel pump and fuel delivery line.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

## 8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 75[°C] (167°F) or more?

Yes — Go to 9.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

## 9. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 2 — 5 [g/s] (0.26 — 0.66 lb/min)?

Yes — Go to 10.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Subtract ambient temperature from [IAT Sensor #11]. Is the obtained value −10 — 50 [°C] (−18 — 90 °F)?

Yes — Go to 11.

No — Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

### 11. CHECK FUEL INJECTOR.

Check fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

### 12. CHECK PCV HOSE.

Check the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose>INSPECTION.

Is the check result OK?

Yes — Go to 13.

No — Repair or replace the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose.

### 13. CHECK CONDITION OF PCV PIPE AND INTAKE DUCT NO. 1 CONNECTION.

Check for disconnection between the PCV pipe and the intake duct No. 1. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Pipe.

Is the check result OK?

Yes — Go to 14.

No — Connect the PCV pipe and the intake duct No. 1. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Pipe.

### 14. CHECK ECM CONNECTOR.

Check the ECM connector.

Is there poor contact of ECM connector?

Yes — Repair the poor contact of ECM connector.

No — Check the following two items, and when either one matches, replace the engine oil and engine oil filter. Ref. to LUBRICATION(H4DOTC)>Engine Oil. Ref. to LUBRICATION(H4DOTC)>Oil Filter.

- It is assumed that the user tends to repeat short period (distance) driving from the engine start to stop, and also tends to drive before full engine warmed-up.
- Compared to other engines of the same type, there is a lot stronger gasoline odor from the engine oil filler neck.

After the replacement, perform the clear memory of [Engine] using the Subaru Select Monitor or a general scan tool (Ref. to COMMON (DIAGNOSTICS)>Clear memory.), and warm up the engine completely.
After the engine is fully warmed up, perform a no-load idling operation for at least 10 minutes. And then check that the value of the data monitor item, [Short term fuel trim B1] + [Long term fuel trim B1], is −20 — 20 %.

**Note:**
**When a short period (distance) driving from the engine start to stop is repeated, engine warm-up followed may cause detection of P0172 due to gasoline evaporation within the engine oil and blow-by gas increase.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect fuel system malfunction by the amount of main feedback control.
Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Main feedback | In operation |

**GENERAL DRIVING CYCLE**
Perform the diagnosis continuously after idling.

**DIAGNOSTIC METHOD**
Compare the diagnostic value with the threshold value, and if a condition meeting the criteria continues for 10 s × 3 times or more, judge that there is a fault in the fuel system.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Diagnostic value {[Short term fuel trim B1] + [Long term fuel trim B1] + ([A/F Sensor #1] − [Target Equivalence Ratio]) × 100} | Less than value of Map |

**Map**

| Warm-up increase compensation coefficient | 0 | 0.05 | 0.1 | 0.14 | 0.2 | 0.25 |
|---|---|---|---|---|---|---|
| Threshold Value | 0.65 | 0.6 | 0.56 | 0.51 | 0.47 | 0.44 |

| Warm-up increase compensation coefficient | 0.3 | 0.35 | 0.39 | 0.45 | 0.5 | 0.55 | 0.6 |
|---|---|---|---|---|---|---|---|
| Threshold Value | 0.41 | 0.36 | 0.34 | 0.31 | 0.29 | 0.27 | 0.24 |

**Time needed for diagnosis:** 10 s × 3 times
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

**Note:**
**When a short period (distance) driving from the engine start to stop is repeated, engine warm-up followed may cause detection of P0172 due to gasoline evaporation within the engine oil and blow-by gas increase.**

## DTC P0191 FUEL RAIL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1

### 1. —

**DTC detecting condition:**

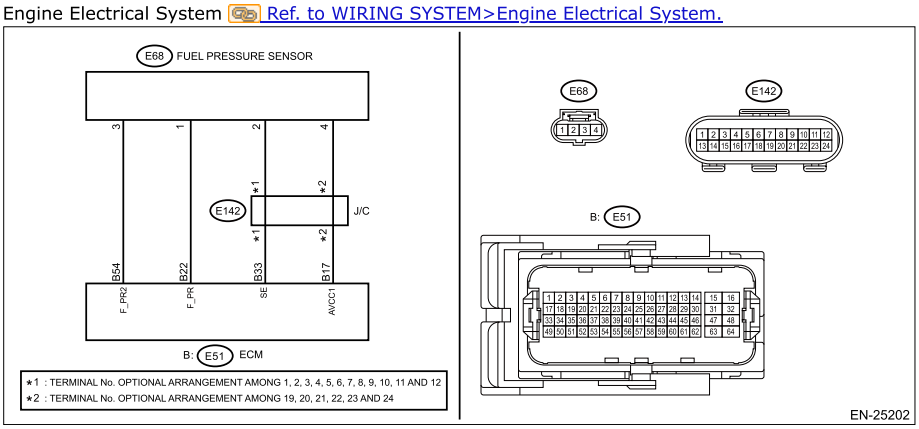
Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



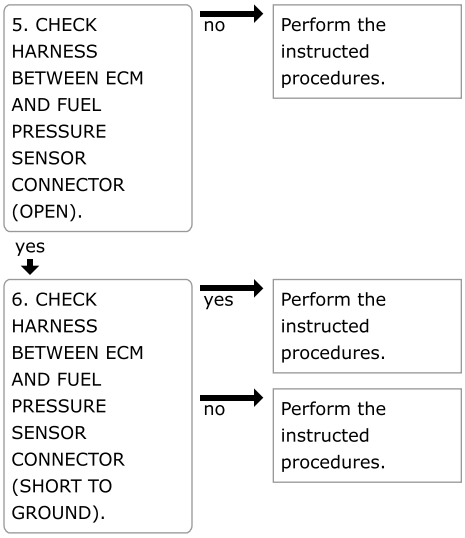

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK FUEL PRESSURE SENSOR POWER SUPPLY.
   - no → Go to 5.
   - yes ↓
3. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.




### 1. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Start the engine.
5. Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Fuel Rail Pressure B].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the difference of the values between [Fuel Rail Pressure A] and [Fuel Rail Pressure B] 2.24 MPa (16804 mmHg, 662 inHg) or more?

Yes — Go to 2.

No — Refer to "Check non-permanent occurrence malfunctions". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>INSPECTION > CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS.

### 2. CHECK FUEL PRESSURE SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the fuel pressure sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel pressure sensor connector and engine ground.
   **Connector & terminal**
   (E68) No. 4 (+) — Engine ground (−):

Is the voltage 4.5 — 5.5 V?

Yes — Go to 3.

No — Go to 5.

### 3. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 22 — (E68) No. 1:
   (E51) No. 33 — (E68) No. 2:
   (E51) No. 54 — (E68) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pressure sensor connector
- Poor contact of J/C

### 4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between ECM connector and fuel pressure sensor connector and engine ground.
**Connector & terminal**
(E51) No. 22 — Engine ground:
(E51) No. 54 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor.

No — Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector.

### 5. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 17 — (E68) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pressure sensor connector
- Poor contact of J/C

### 6. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between ECM connector and fuel pressure sensor connector and engine ground.
**Connector & terminal**
(E51) No. 17 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor.

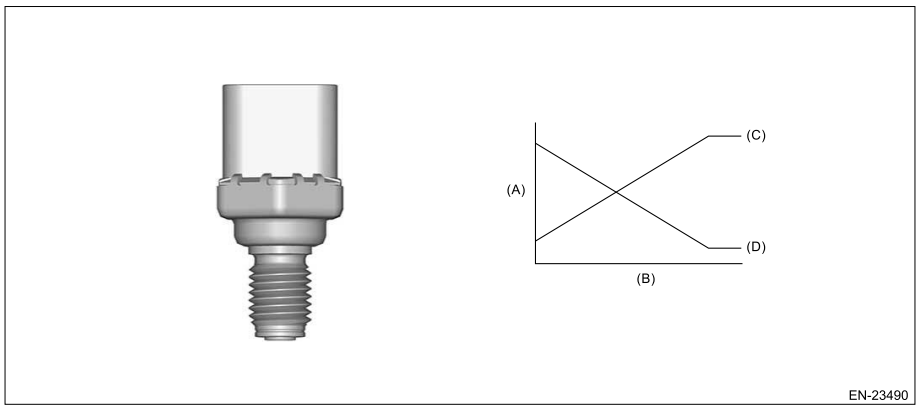
No — Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the difference of values between fuel pressure sensor main signal and sub signal is equal to or more than the predetermined value.

**COMPONENT DESCRIPTION**




(A) Output voltage
(B) Absolute pressure
(C) Main signal
(D) Sub signal

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Main fuel pressure − Sub fuel pressure\| | 2.24 MPa (16804 mmHg, 662 inHg) or more |

**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

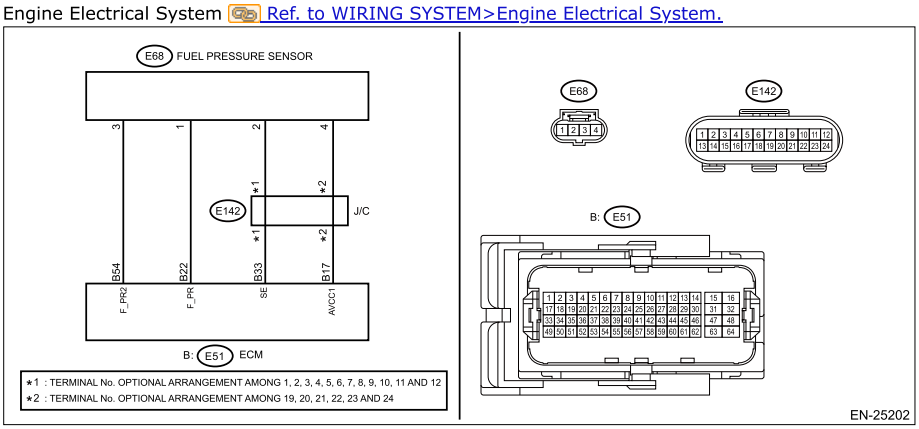
## DTC P0192 FUEL RAIL PRESSURE SENSOR CIRCUIT LOW BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Start the engine.
5. Using the Subaru Select Monitor, read the value in [Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Fuel Rail Pressure A] approx. 0 [kPa] (0 psi)?

| | |
|---|---|
| Yes | Go to 4. |
| No | Refer to "Check non-permanent occurrence malfunctions". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>INSPECTION > CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS. |

### 4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the fuel pressure sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 22 — Engine ground:

Is the resistance 1 MΩ or more?

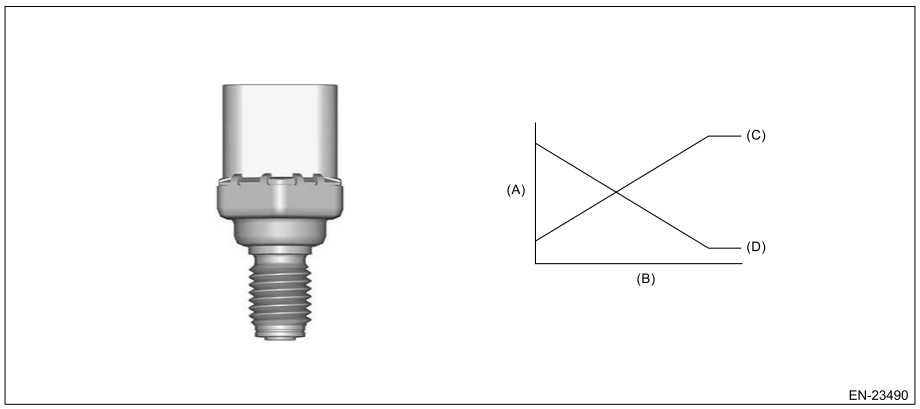
| | |
|---|---|
| Yes | Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor. |
| No | Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit in the fuel pressure sensor main signal.

Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Output voltage
(B) Absolute pressure
(C) Main signal
(D) Sub signal

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.263 V |

**Time needed for diagnosis:** 2400 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

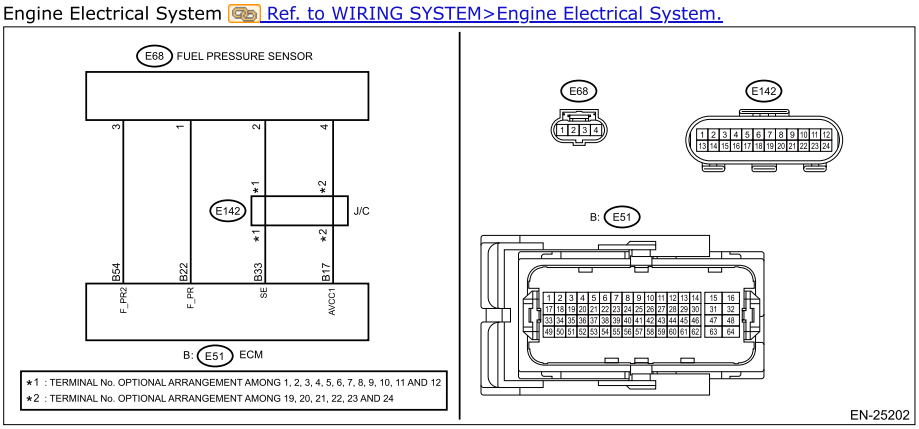
## DTC P0193 FUEL RAIL PRESSURE SENSOR CIRCUIT HIGH BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 3.
3. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓
4. CHECK FUEL PRESSURE SENSOR POWER SUPPLY.
   - no → Go to 7.
   - yes ↓

5. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).
→ no → Perform the instructed procedures.
yes ↓

6. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

7. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).
→ no → Perform the instructed procedures.
yes ↓

8. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

Yes — Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW.

No — Go to 2.

**2. CHECK DTC.**

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Fuel Rail Pressure A] 30000 [kPa] (4350 psi) or more?

Yes — Go to 4.

No — Refer to "Check non-permanent occurrence malfunctions". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>INSPECTION > CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS.

### 4. CHECK FUEL PRESSURE SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the fuel pressure sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel pressure sensor connector and engine ground.
   **Connector & terminal**
   (E68) No. 4 (+) — Engine ground (−):

Is the voltage 4.5 — 5.5 V?

Yes — Go to 5.

No — Go to 7.

### 5. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 22 — (E68) No. 1:
   (E51) No. 33 — (E68) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pressure sensor connector
- Poor contact of J/C

### 6. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 22 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power in the harness between ECM connector and fuel pressure sensor connector.

No — Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor.

### 7. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 17 — (E68) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 8. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and fuel pressure sensor connector<br>• Poor contact of J/C |

### 8. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between fuel pressure sensor connector and engine ground.
**Connector & terminal**
(E68) No. 4 — Engine ground:

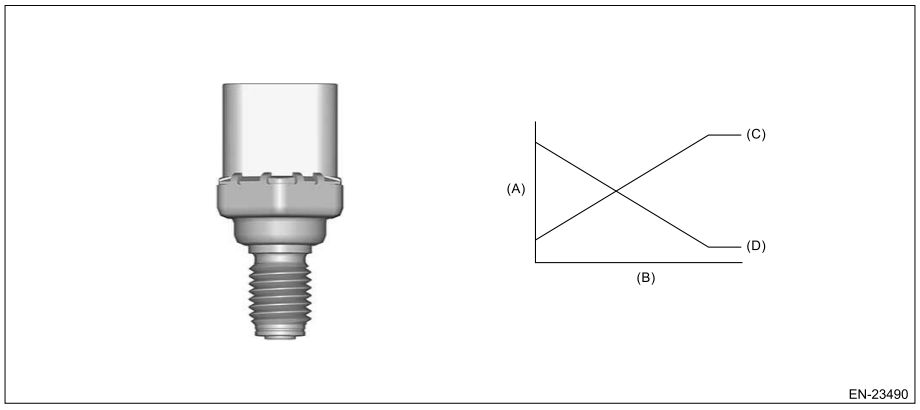
Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit in main signal of the fuel pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Output voltage (C) Main signal (D) Sub signal
(B) Absolute pressure

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.362 V |

**Time needed for diagnosis:** 2400 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

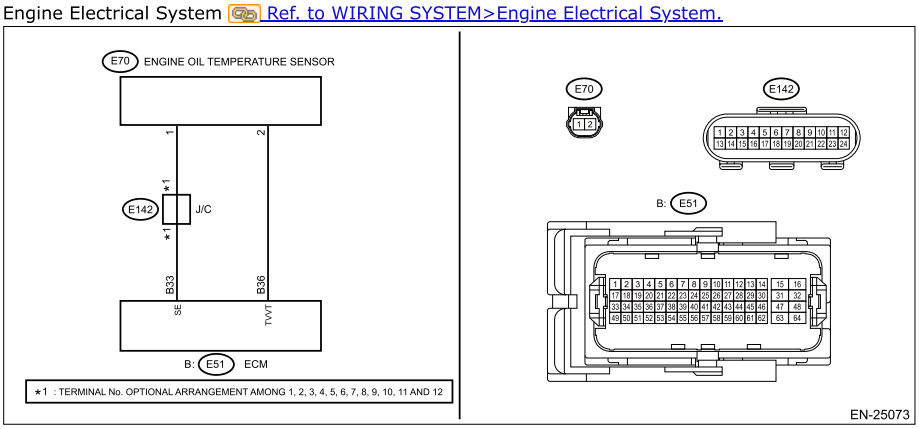
## DTC P0196 ENGINE OIL TEMPERATURE SENSOR "A" RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK ENGINE OIL TEMPERATURE SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0196 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK ENGINE OIL TEMPERATURE SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from the engine oil temperature sensor.
3. Measure the resistance between engine oil temperature sensor terminals when the engine is cold and after warmed up.

**Terminals**

No. 1 — No. 2:

Is the resistance of engine oil temperature sensor different between when engine is cold and after warmed up?

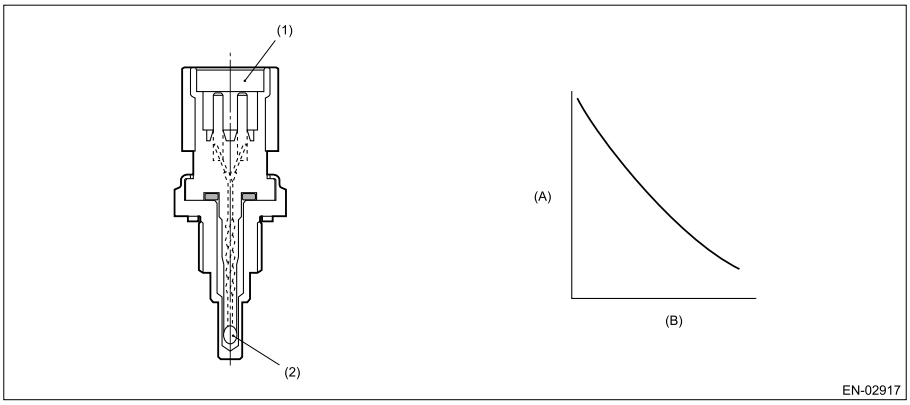
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the engine oil temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Oil Temperature Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of the engine oil temperature sensor output properties.
After the engine starts for the first time after the specified period of soaking time has elapsed, diagnose by correlation between engine oil temperature sensor value, engine coolant temperature sensor value and intake air temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between engine oil temperature and engine coolant temperature, engine oil temperature and intake air temperature.
(Correlation diagnosis)

**COMPONENT DESCRIPTION**




(A) Resistance value (kΩ) (B) Temperature (°C (°F))

(1) Connector (2) Thermistor element

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Soaking time | 21600 s or more |
| Block heater judgment | Completed |
| Use of block heater | Not detected |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the first engine start after a certain period of soaking time.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Oil temperature 21 sec. after the first engine start − Engine coolant temperature at the first engine start\| | More than 10°C (18°F) |
| \|Oil temperature 21 sec. after the first engine start − Intake air temperature 21 sec. after the first engine start\| | More than value of Map |

**Map**

| **Ambient temperature (°C (°F))** | **−30 (−22)** | **30 (86)** | **45 (113)** | **60 (140)** |
|---|---|---|---|---|
| \|Engine oil temperature at first engine start − Intake air temperature 21 sec. after first engine start\| (°C (°F)) | 10 (18) | 10 (18) | 22 (39.6) | 22 (39.6) |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

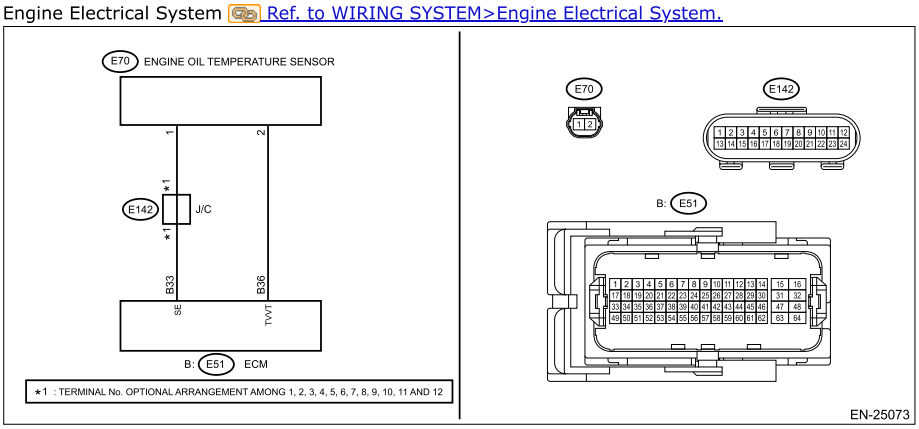
# DTC P0197 ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT LOW

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Oil Temperature].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oil Temperature] 150[°C] (302°F) or more?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

**2. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).**

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine oil temperature sensor.
4. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 36 — Engine ground:

Is the resistance 1 MΩ or more?

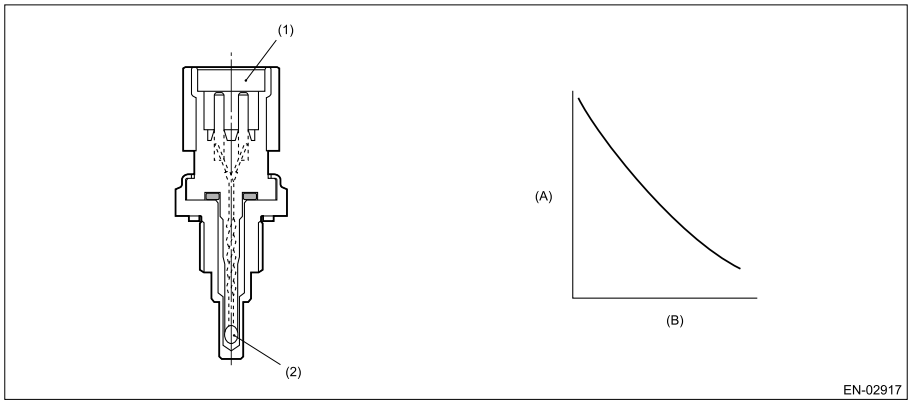
| | |
|---|---|
| Yes | Replace the engine oil temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Oil Temperature Sensor. |
| No | Repair the short circuit to ground in the harness between the ECM connector and engine oil temperature sensor connector. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the short circuit of the engine oil temperature sensor.
Judge as NG when outside of the judgment value.

### COMPONENT DESCRIPTION




(A) Resistance value (kΩ) (B) Temperature (°C (°F))

(1) Connector (2) Thermistor element

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.18 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

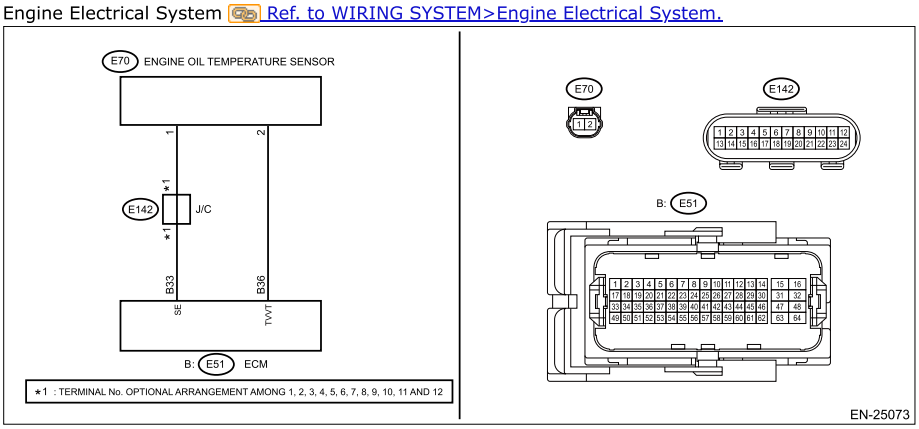
# DTC P0198 ENGINE OIL TEMPERATURE SENSOR "A" CIRCUIT HIGH

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Hard to start
- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| ↓ yes | | |
| 2. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| ↓ yes | | |
| 4. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Oil Temperature].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oil Temperature] −40[°C] (−40°F) or less?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK FOR POOR CONTACT.

Check for poor contact between the ECM and engine oil temperature sensor connectors.

Is there poor contact of the ECM or engine oil temperature sensor connectors?

Yes — Repair the poor contact of ECM or engine oil temperature sensor connector.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine oil temperature sensor.
4. Measure the resistance of the harness between the ECM connector and engine oil temperature sensor connector.

**Connector & terminal**
(E51) No. 33 — (E70) No. 1:
(E51) No. 36 — (E70) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between ECM connector and engine oil temperature sensor connector
- Poor contact of J/C

### 4. CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**
(E51) No. 36 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power in harness between ECM connector and engine oil temperature sensor connector.

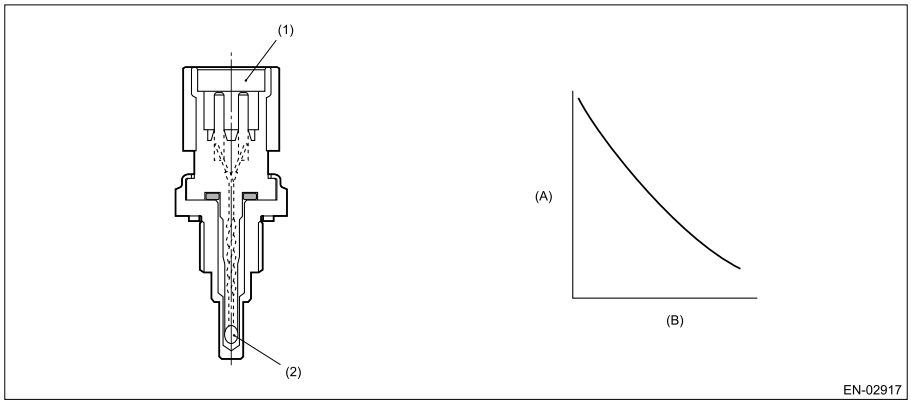
No — Replace the engine oil temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Oil Temperature Sensor.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the engine oil temperature sensor.
Judge as NG when outside of the judgment value.

**COMPONENT DESCRIPTION**




(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Connector
(2) Thermistor element

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.71 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

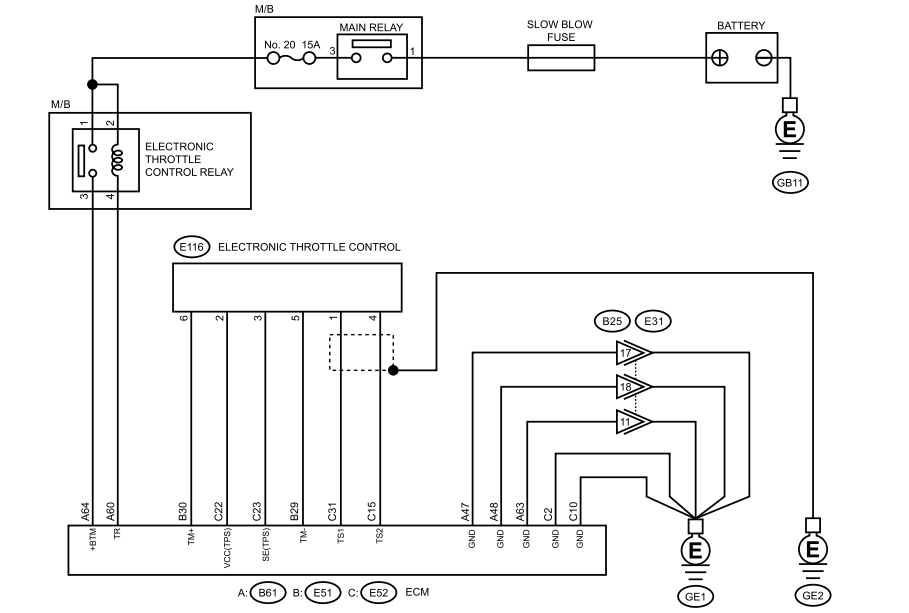
## DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW

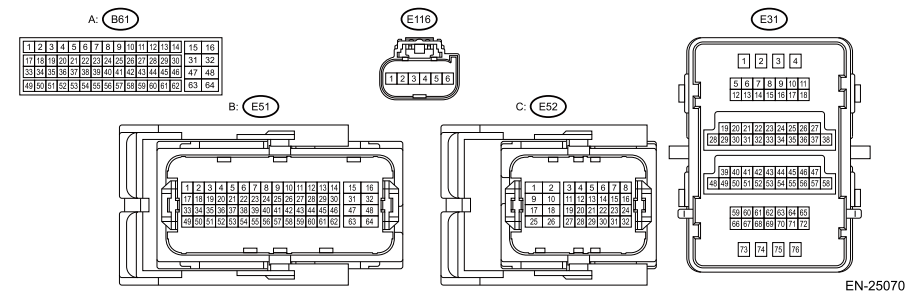
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine stall

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

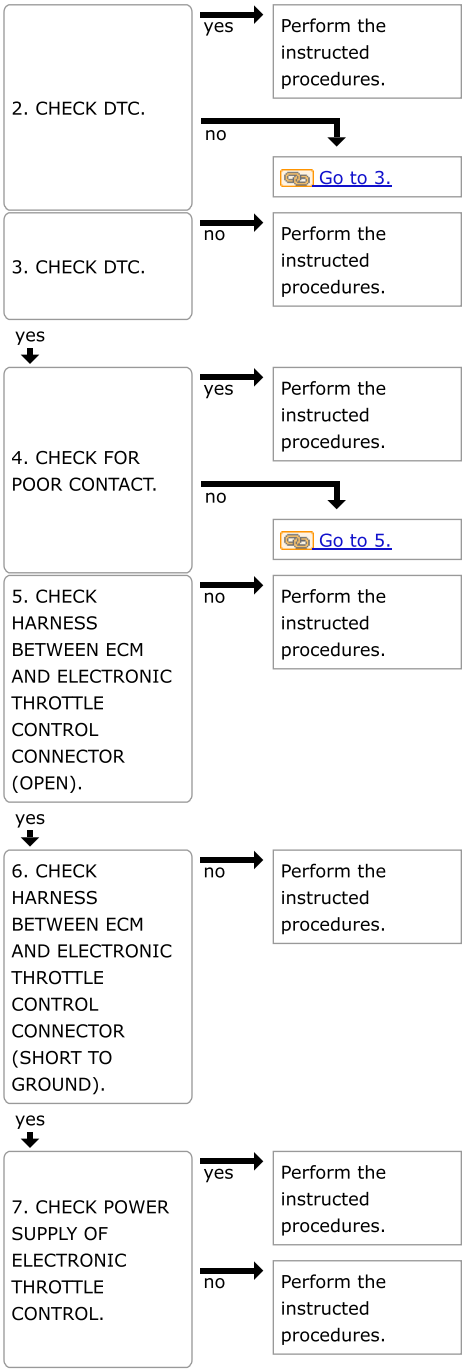



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

## 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

## 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0222 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

## 4. CHECK FOR POOR CONTACT.

1. Turn the ignition switch to OFF.
2. Check for poor contact of ECM and electronic throttle control connector.

Is there poor contact in ECM or electronic throttle control connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM or electronic throttle control connector. |
| No | Go to 5. |

## 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connectors from electronic throttle control.
3. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 22 — (E116) No. 2:
   (E52) No. 15 — (E116) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit of harness between ECM connector and electronic throttle control connector. |

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(E52) No. 22 — Engine ground:
(E52) No. 15 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 7. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 2 — Engine ground:

Is the voltage 4.5 — 5.5 V?

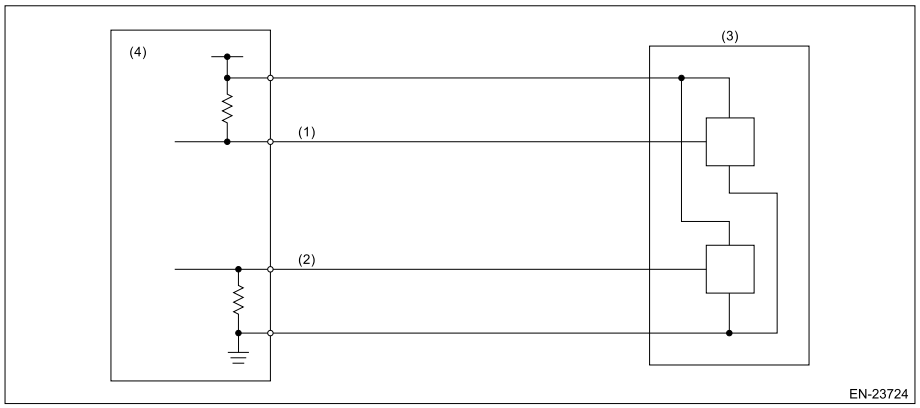
Yes — Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit of throttle position sensor 2.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 2 input voltage | Less than 0.185 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

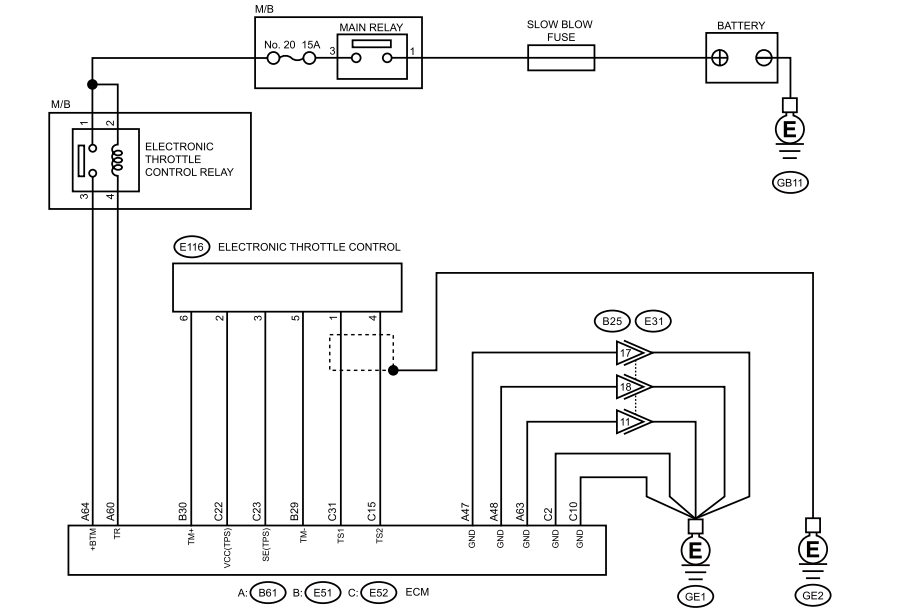
## DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH

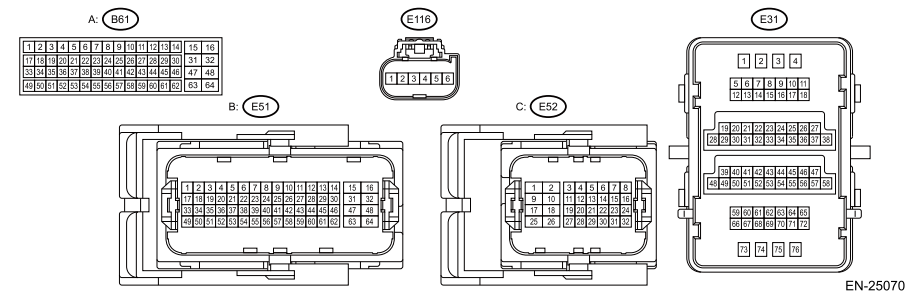
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine stall

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

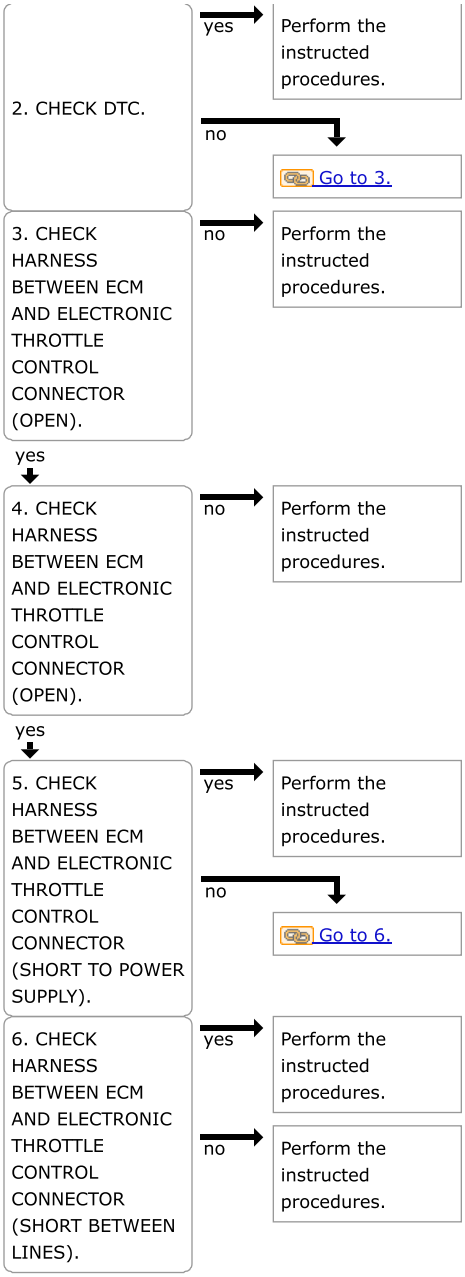



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

## 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

## 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.

**Connector & terminal**

(E52) No. 23 — (E116) No. 3:
(E52) No. 15 — (E116) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

## 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 5.

No — Repair the following item.

- Open circuit of harness between ECM connector and engine ground
- Poor contact of ECM connector

## 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 6.

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E52) No. 22 — (E52) No. 15:

Is the resistance 1 MΩ or more?

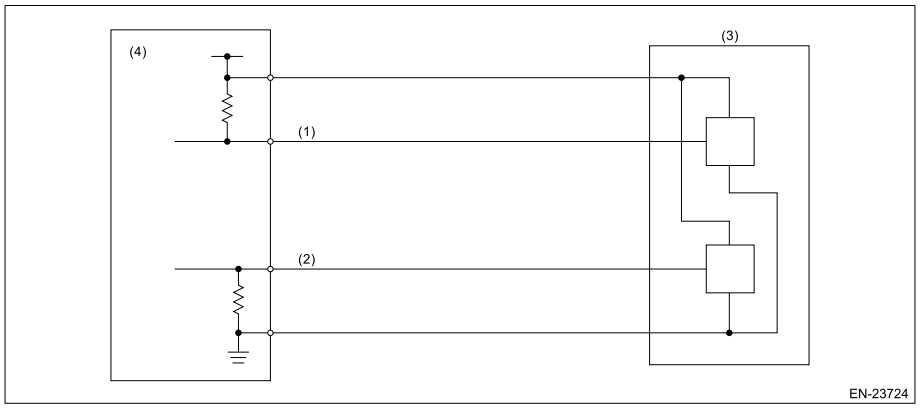
| | |
|---|---|
| Yes | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |
| No | Repair the line-to-line short circuit between ECM connector and electronic throttle control connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

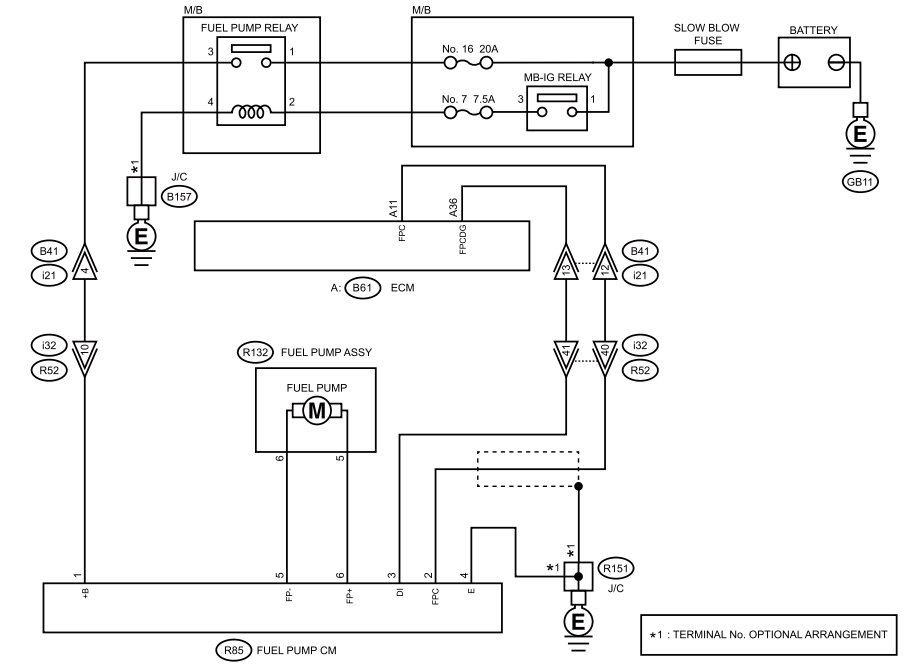
| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 2 input voltage | More than 4.631 V |

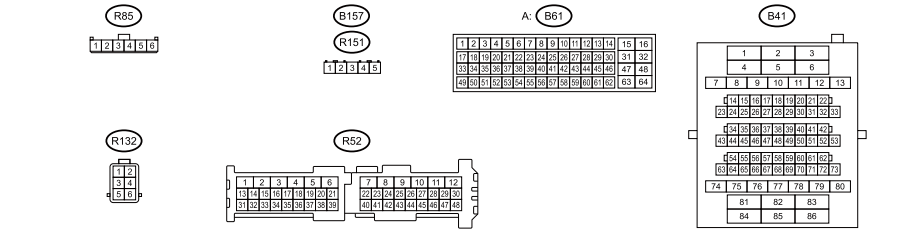
**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0230 FUEL PUMP PRIMARY CIRCUIT

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



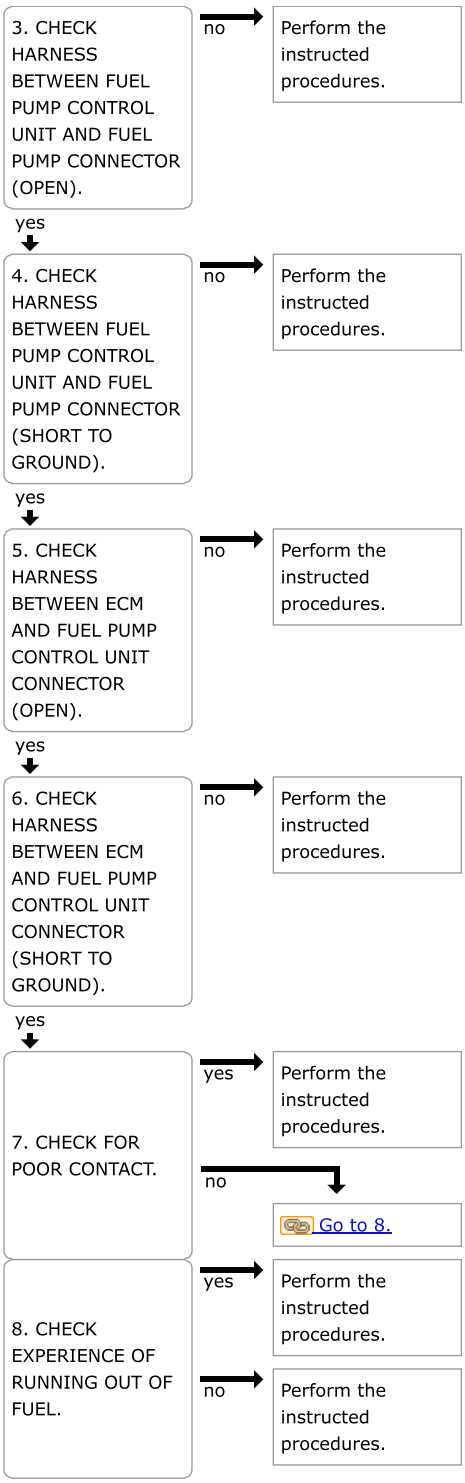




EN-25074

**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FUEL PUMP CONTROL UNIT POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |


3. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
4. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
5. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
6. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
7. CHECK FOR POOR CONTACT.
yes
Perform the instructed procedures.
no
Go to 8.
8. CHECK EXPERIENCE OF RUNNING OUT OF FUEL.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

### 1. CHECK FUEL PUMP CONTROL UNIT POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel pump control unit.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel pump control unit connector and chassis ground.
   **Connector & terminal**
   (R85) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between fuel pump relay connector and fuel pump control unit connector
- Poor contact of fuel pump relay connector
- Poor contact of coupling connector
- Defective fuel pump relay
- Blown out of fuse

### 2. CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between fuel pump control unit connector and chassis ground.
   **Connector & terminal**
   (R85) No. 4 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit between fuel pump control unit connector and chassis ground
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR (OPEN).

1. Disconnect the connector from fuel pump.
2. Measure the resistance of harness between fuel pump control unit and fuel pump connector.
   **Connector & terminal**
   (R85) No. 5 — (R132) No. 6:
   (R85) No. 6 — (R132) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit in harness between fuel pump control unit connector and fuel pump connector.

### 4. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR (SHORT TO GROUND).

Measure the resistance between fuel pump control unit connector and chassis ground.
**Connector & terminal**
(R85) No. 5 — Chassis ground:
(R85) No. 6 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Go to 5.

No — Repair the short circuit to ground in harness between fuel pump control unit connector and fuel pump connector.

### 5. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and fuel pump control unit connector.

**Connector & terminal**
(B61) No. 11 — (R85) No. 2:
(B61) No. 36 — (R85) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pump control unit connector
- Poor contact of coupling connector

### 6. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR (SHORT TO GROUND).

Measure the resistance between fuel pump control unit connector and chassis ground.

**Connector & terminal**
(R85) No. 2 — Chassis ground:
(R85) No. 3 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the short circuit to ground in harness between ECM connector and fuel pump control unit connector.

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and fuel pump control unit connector.

Is there poor contact of ECM or fuel pump control unit connector?

Yes — Repair the poor contact of ECM or fuel pump control unit connector.

No — Go to 8.

### 8. CHECK EXPERIENCE OF RUNNING OUT OF FUEL.

Check if there was an experience of running out of fuel using Check List for Interview. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Check List for Interview.

Has the vehicle experienced running out of fuel?

Yes — Finish the diagnosis.

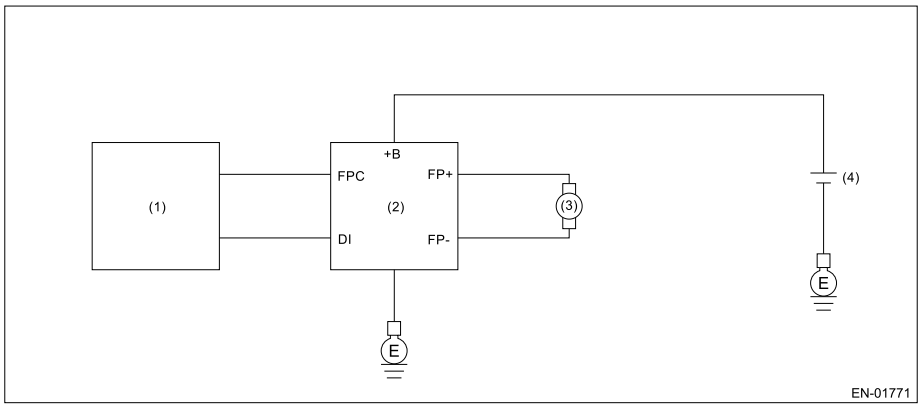
**Note:**
**DTC may be recorded as a result of fuel pump idling while running out of fuel.**

No — Replace the fuel pump control unit. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Control Unit.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of fuel pump control unit.
Judge as NG when the NG signal is sent through a diagnostic line coming from the fuel pump control unit.
Fuel pump control unit detects the open or short circuit malfunction for each line, and then sends NG signals if one of them is found NG.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM) (3) Fuel pump (4) Battery
(2) Fuel pump control unit

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Fuel pump control | ON |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fuel pump control unit output diagnosis voltage | Less than 1.5 V |

**Time needed for diagnosis:** 2520 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0234 TURBOCHARGER/SUPERCHARGER "A" OVERBOOST CONDITION

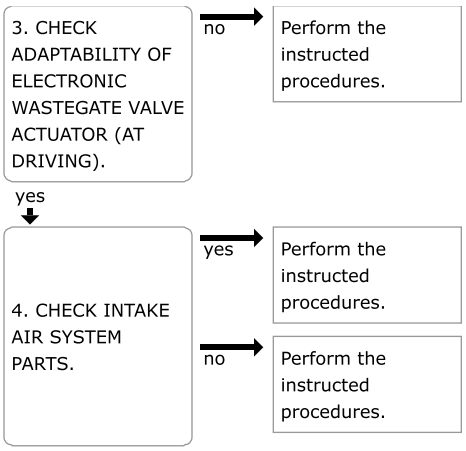
### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT IDLING). | no → | Perform the instructed procedures. |

yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P0234 and P0244 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT IDLING).

1. Turn the A/C switch to OFF.
2. Turn all the accessory switches to OFF.
3. Using the Subaru Select Monitor, select [Electric Waste Gate Valve Control] of [Active Test].

**Note:**
- **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
- **Electronic wastegate valve actuator repeats open and closed every 3 seconds with [Electric Waste Gate Valve Control] selected.**

4. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 mm (0.25 in) or less?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

### 3. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT DRIVING).

1. Start monitoring of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

2. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

3. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 [mm] (0.25 in) or less?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

### 4. CHECK INTAKE AIR SYSTEM PARTS.

Check the intake air system parts.
Check the following items.
- Intercooler Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>INSPECTION.
- Intake duct Ref. to INTAKE (INDUCTION)(H4DOTC)>Intake Duct>INSPECTION.
- Intake manifold Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly>INSPECTION.
- Air cleaner element Ref. to INTAKE (INDUCTION)(H4DOTC)>Air Cleaner Element>INSPECTION.
- Electronic throttle control Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body>INSPECTION.
- Turbocharger Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger>INSPECTION.

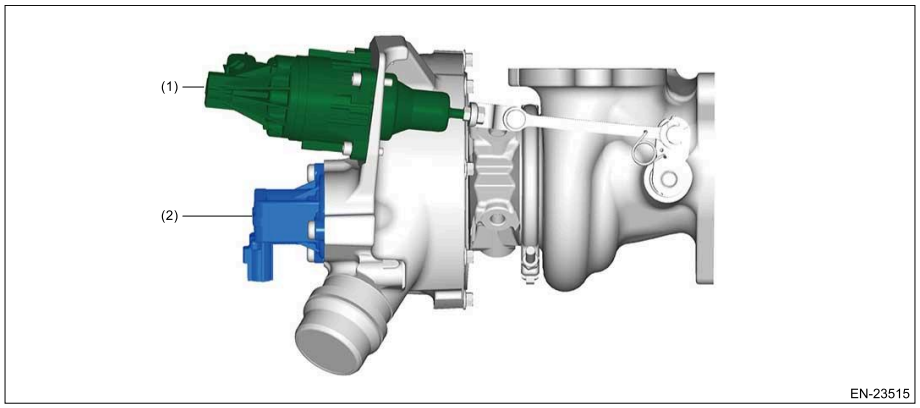
Is the check result OK?

| | |
|---|---|
| Yes | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |
| No | Repair or replace faulty parts. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect malfunction of electronic wastegate valve actuator function and boost pressure control.
Judge as NG when the difference shows a large value when the boost pressure calculated in the ECM is compared with the actual intake pressure outputted from the intake pressure sensor.

**COMPONENT DESCRIPTION**




(1) Electronic wastegate valve (2) Electronic air by-pass valve

**EXECUTION CONDITION**
**P0234**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Intake air temperature | 0°C (32°F) or more<br>and<br>Less than 70°C (158°F) |
| Boost pressure feedback | In operation |
| Target boost pressure | Value of Map1 or more |
| Fuel shut-off function | Not in operation |
| Throttle position | More than 64% |

**P0299**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Intake air temperature | −10°C (14°F) or more<br>and<br>Less than 70°C (158°F) |
| Boost pressure feedback | In operation |
| Engine speed | 2500 rpm or more |
| Target boost pressure | Value of Map2 or more |
| Throttle position | More than 64% |
| Fuel shut-off function | Not in operation |

**Map1**

| Engine speed (rpm) | 1200 | 1600 | 2000 | 2400 | 2800 | 3200 | 3600 |
|---|---|---|---|---|---|---|---|
| Target boost pressure (kPa (mmHg, inHg)) | 103.3 (774.9, 30.5) | 108.6 (814.7, 32.1) | 111.3 (835, 32.9) | 116.3 (872.5, 34.3) | 120.4 (903.2, 35.6) | 131.2 (984.2, 38.7) | 141 (1057.8, 41.6) |

| Engine speed (rpm) | 4000 | 4400 | 4800 | 5200 | 5600 | 6000 |
|---|---|---|---|---|---|---|
| Target boost pressure (kPa (mmHg, inHg)) | 140.9 (1057, 41.6) | 143.2 (1074.3, 42.3) | 149.3 (1120, 44.1) | 149.5 (1121.5, 44.2) | 150.1 (1126, 44.3) | 150.7 (1130.5, 44.5) |

**Map2**

| Engine speed (rpm) | 2500 | 2800 | 3200 | 3600 | 4000 |
|---|---|---|---|---|---|
| Target boost pressure (kPa (mmHg, inHg)) | 120.6 (904.7, 35.6) | 120.2 (901.7, 35.5) | 124.2 (931.7, 36.7) | 127 (952.7, 37.5) | 130 (975.2, 38.4) |

| Engine speed (rpm) | 4400 | 4800 | 5200 | 5600 | 6000 |
|---|---|---|---|---|---|
| Target boost pressure (kPa (mmHg, inHg)) | 131 (982.7, 38.7) | 129 (967.7, 38.1) | 131.2 (984.2, 38.7) | 129.2 (969.2, 38.2) | 123.2 (924.2, 36.4) |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (P0234)**

| Malfunction Criteria | Threshold Value |
|---|---|
| (Target intake absolute pressure − Actual intake absolute pressure) | −33.3 kPa (−249.8 mmHg, −9.8 inHg) or less |

**Judgment value (P0299)**

| Malfunction Criteria | Threshold Value |
|---|---|
| (Target intake absolute pressure − Actual intake absolute pressure) | 37.5 kPa (281.3 mmHg, 11.1 inHg) or more |

**Time needed for diagnosis**

**P0234:** 1.9 s
**P0299:** Map3
**Map3**

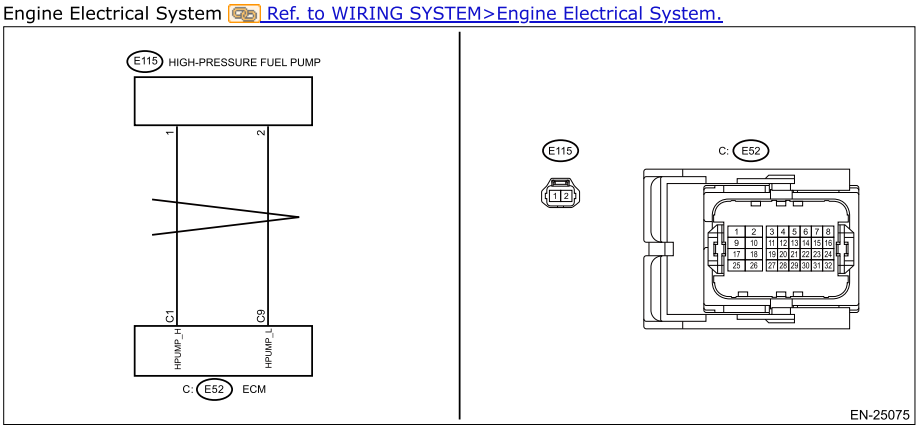
| **Atmospheric pressure (kPa (mmHg, inHg))** | **75.06 (563.1, 22.2)** | **96.73 (725.7, 28.6)** | **112 (840.2, 33.1)** |
|---|---|---|---|
| Time needed for diagnosis (s) | 5 | 2 | 2 |

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P023F FUEL PUMP SECONDARY CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HIGH-PRESSURE FUEL PUMP. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORTED BETWEEN LINES). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |

| | | |
|---|---|---|
| 5. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HIGH-PRESSURE FUEL PUMP.

Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump. |

### 2. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORTED BETWEEN LINES).

1. Disconnect the connector from ECM.
2. Disconnect the connector from high-pressure fuel pump.
3. Measure the resistance of harness between ECM connectors.

**Connector & terminal**

(E52) No. 1 — (E52) No. 9:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the short between lines in harness between ECM connector and high-pressure fuel pump connector. |

### 3. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and high-pressure fuel pump connector.

**Connector & terminal**

(E52) No. 1 — (E115) No. 1:

(E52) No. 9 — (E115) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the open circuit in harness between ECM connector and high-pressure fuel pump connector. |

### 4. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORT TO GROUND).

Measure the resistance between high-pressure fuel pump connector and engine ground.

**Connector & terminal**

(E115) No. 1 — Engine ground:

(E115) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and high-pressure fuel pump connector. |

**5. CHECK HARNESS BETWEEN ECM AND HIGH-PRESSURE FUEL PUMP CONNECTOR (SHORT TO POWER SUPPLY).**

Measure the voltage of harness between ECM connector and engine ground.

**Connector & terminal**

(E52) No. 1 (+) — Engine ground (−):

(E52) No. 9 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power supply in harness between ECM connector and high-pressure fuel pump connector.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of high pressure fuel pump circuit function.

Judge as NG when ECM detects any malfunction in the diagnostic items listed below.

| Diagnostic item | Malfunction Criteria |
|---|---|
| Power supply short | ECM low side terminal voltage of the high pressure fuel pump circuit is high. |
| Ground short | ECM low side terminal voltage of the high pressure fuel pump circuit is low. |
| Open circuit | High pressure fuel pump current is low. |
| Overcurrent | High pressure fuel pump current is high. |
| Short circuit | The time when the high pressure fuel pump current reaches the target current is short. |

**EXECUTION CONDITION**

**Diagnosis 1 (power supply short)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status A |

**Diagnosis 2 (ground short)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status B |

**Diagnosis 3 (open circuit)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status A (condition 1)<br>Status B (condition 2) |

**Diagnosis 4 (short circuit, overcurrent)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status C |

**FET and SW statuses**

| Condition | FET1 | FET2 | SW1 | SW2 |
|---|---|---|---|---|
| Status A | OFF | OFF | OFF | ON |
| Status B | OFF | OFF | ON | OFF |
| Status C | ON | ON | OFF | OFF |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

**Diagnosis 1 (power supply short)**

| Malfunction Criteria | Threshold Value |
|---|---|
| High-pressure fuel pump supply voltage − High-pressure fuel pump terminal voltage (+) | 2 V or less |

**Diagnosis 2 (ground short)**

| Malfunction Criteria | Threshold Value |
|---|---|
| High-pressure fuel pump terminal voltage (−) − Ground | 2 V or less |

**Diagnosis 3 (open circuit)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Condition 1 and condition 2 are continuously detected | |
| Condition 1: | |
| High-pressure fuel pump supply voltage − High-pressure fuel pump terminal voltage (+) | 2 V or less |
| Condition 2: | |
| High-pressure fuel pump terminal voltage (−) − Ground | 2 V or less |

**Diagnosis 4 (short circuit, overcurrent)**

| Malfunction Criteria | Threshold Value |
|---|---|
| High-pressure fuel pump current 4 µs after driving IC command ON | 3 A or more |

**Time needed for diagnosis:** 75 times

**Map**

| Engine speed (rpm) | Time needed for 75 times of diagnosis (sec) |
|---|---|
| 500 | 4.5 |
| 2000 | 1.125 |
| 4000 | 0.5625 |
| 6000 | 0.375 |

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0244 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE

## 1. —

**DTC detecting condition:**

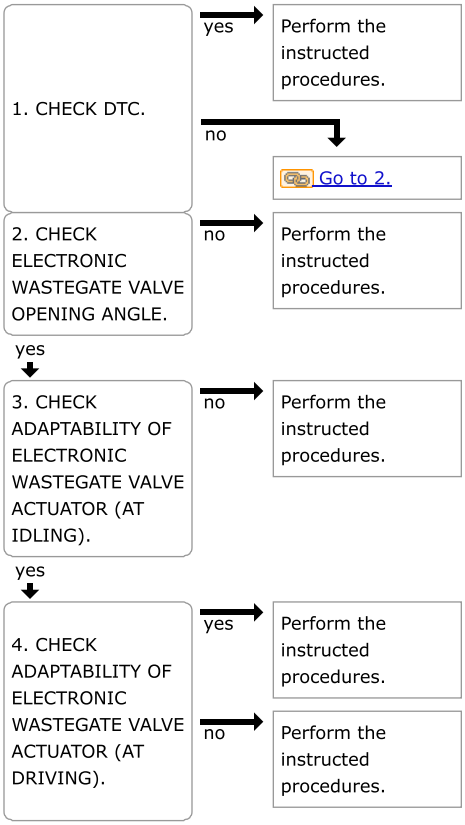
Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0244 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

## 2. CHECK ELECTRONIC WASTEGATE VALVE OPENING ANGLE.

1. Turn the A/C switch to OFF.
2. Turn all the accessory switches to OFF.
3. Using the Subaru Select Monitor, read the values in [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] 6.4 [mm] (0.25 in) or less?

Yes — Go to 3.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## 3. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT IDLING).

1. Using the Subaru Select Monitor, select [Electric Waste Gate Valve Control] of [Active Test].

**Note:**
- **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
- **Electronic wastegate valve actuator repeats open and closed every 3 seconds with [Electric Waste Gate Valve Control] selected.**

2. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 mm (0.25 in) or less?

Yes — Go to 4.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## 4. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT DRIVING).

1. Start monitoring of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

2. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

**Warning:**
- **Performing inspection mode needs a driver along with a checker who should check the data.**
- **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

3. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 [mm] (0.25 in) or less?

Yes — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

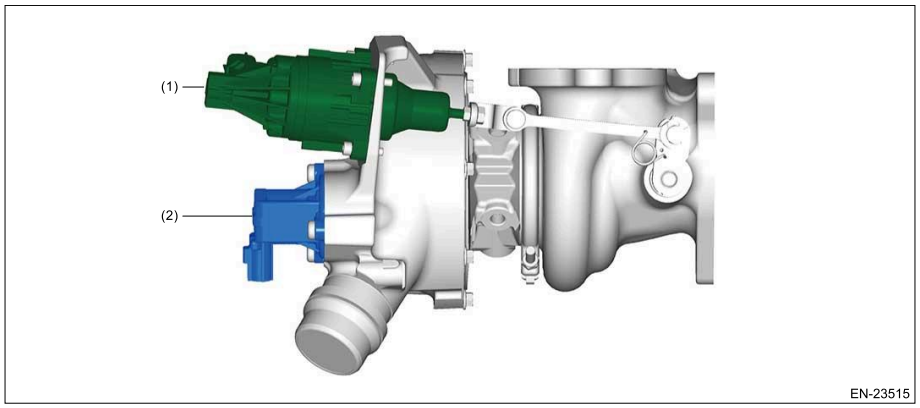
No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect malfunction of electronic wastegate valve actuator function.
Judge as NG when the difference shows a large value when the wastegate valve request stroke value calculated in the ECM is compared with the actual wastegate valve stroke value outputted from the sensor.

**COMPONENT DESCRIPTION**




(1) Electronic wastegate valve (2) Electronic air by-pass valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Shaft position feedback | Experienced |
| Elapsed time after change of target shaft position | Value of Map or more |
| **Note:** **When the target shaft position change amount* is less than 2 mm (0.08 in), status of the elapsed time becomes invalid.** | |

*: Target shaft position change amount (mm) = Target shaft position − Target shaft position 10 ms before

**Map**

| **Target shaft position change amount (mm (in))** | **−15 (−0.59)** | **−3 (−0.12)** | **−2 (−0.08)** | **0 (0)** | **2 (0.08)** | **3 (0.12)** | **14 (0.55)** | **15 (0.59)** |
|---|---|---|---|---|---|---|---|---|
| Elapsed time after change of target shaft position (ms) | 330 | 132 | 112 | 0 | 112 | 132 | 313 | 330 |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Target shaft position − Actual shaft position | Less than −6.4 mm (−0.25 in)<br>Or,<br>6.4 mm (0.25 in) or more |

**Time needed for diagnosis:** 5000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P0299 TURBOCHARGER/SUPERCHARGER "A" UNDERBOOST CONDITION

### 1. —

**DTC detecting condition:**

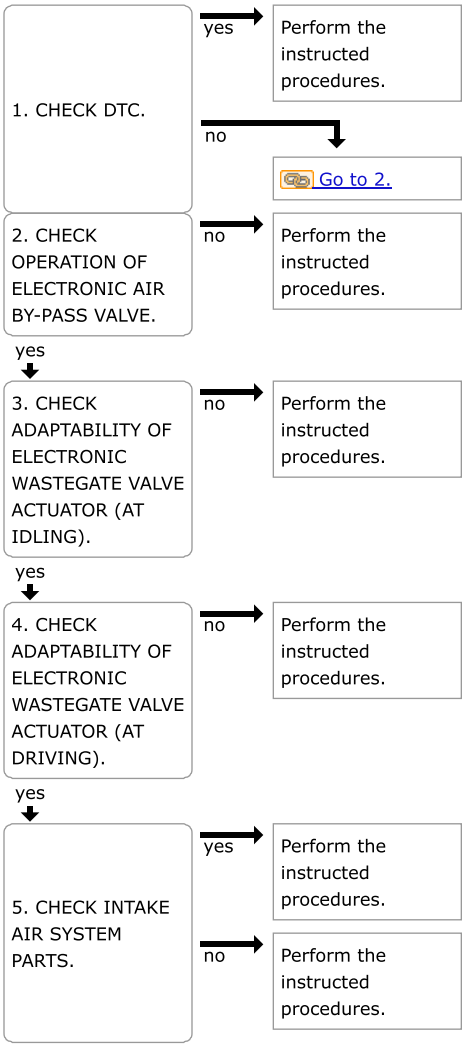
Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

Poor acceleration

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs other than P0244 and P0299 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

## 2. CHECK OPERATION OF ELECTRONIC AIR BY-PASS VALVE.

1. Turn the A/C switch to OFF.
2. Turn all the accessory switches to OFF.
3. Using the Subaru Select Monitor, select [Electric Air Bypass Valve Control] of [Active Test].

   **Note:**
   **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
4. Check if operating sound (clatter) occurs in the electronic air by-pass valve according to ON/OFF switching operation of [Electric Air Bypass Valve Status].

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

## 3. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT IDLING).

1. Using the Subaru Select Monitor, select [Electric Waste Gate Valve Control] of [Active Test].

   **Note:**
   - **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
   - **Electronic wastegate valve actuator repeats open and closed every 3 seconds with [Electric Waste Gate Valve Control] selected.**
2. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 mm (0.25 in) or less?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

## 4. CHECK ADAPTABILITY OF ELECTRONIC WASTEGATE VALVE ACTUATOR (AT DRIVING).

1. Start monitoring of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] using Subaru Select Monitor.

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
2. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

   **Warning:**
   - **Performing inspection mode needs a driver along with a checker who should check the data.**
   - **When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**
3. Record the values of [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value].

Is the difference between [Electric Waste Gate Valve Request Position Value] and [Electric Waste Gate Valve Actual Position Value] (except immediately after the change) 6.4 [mm] (0.25 in) or less?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |

### 5. CHECK INTAKE AIR SYSTEM PARTS.

Check the intake air system parts.
Check the following items.

- Intercooler Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>INSPECTION.
- Intake duct Ref. to INTAKE (INDUCTION)(H4DOTC)>Intake Duct>INSPECTION.
- Intake manifold Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly>INSPECTION.
- Air cleaner element Ref. to INTAKE (INDUCTION)(H4DOTC)>Air Cleaner Element>INSPECTION.
- Electronic throttle control Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body>INSPECTION.
- Turbocharger Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |
| No | Repair or replace faulty parts. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0234. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0234 TURBOCHARGER/SUPERCHARGER "A" OVERBOOST CONDITION.**

## DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

### 1. —

**DTC detecting condition:**

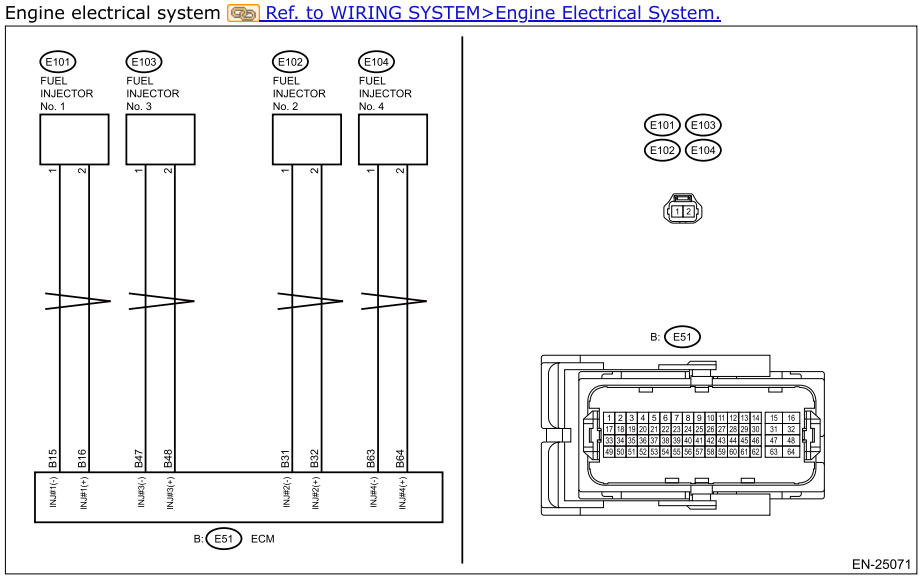
- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

**Trouble symptom:**

- Engine stall
- Improper idling
- Rough driving

**Wiring diagram:**

Engine electrical system Ref. to WIRING SYSTEM>Engine Electrical System.



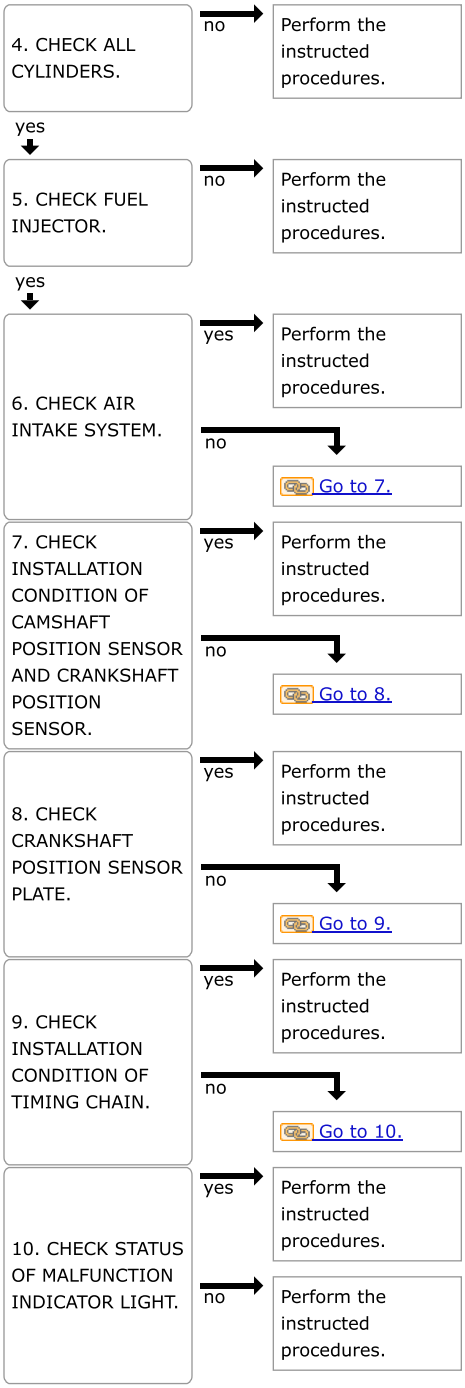

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK PCV HOSE. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |




**1. CHECK PCV HOSE.**

Check the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair or replace the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose. |

## 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from all fuel injectors.
4. Measure the resistance between all fuel injector connectors and engine ground.

**Connector & terminal**

#1 (E101) No. 1 — Engine ground:
#1 (E101) No. 2 — Engine ground:
#2 (E102) No. 1 — Engine ground:
#2 (E102) No. 2 — Engine ground:
#3 (E103) No. 1 — Engine ground:
#3 (E103) No. 2 — Engine ground:
#4 (E104) No. 1 — Engine ground:
#4 (E104) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the short circuit to ground in harness between ECM and fuel injector connector.

## 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

Measure the resistance of harness between ECM and fuel injector connector on all cylinders.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

## 4. CHECK ALL CYLINDERS.

Check the following items for cylinder.

- Spark plug
- Ignition coil
- Fuel injector
- Compression pressure
- Skipping timing chain teeth

Is there a fault in any cylinder?

Yes — Repair or replace the faulty part of the faulty cylinder.
Go to 5.

No — Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

### 5. CHECK FUEL INJECTOR.

Check all fuel injectors. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 6. |
| No | Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 6. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 7. |

### 7. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.

Check the installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

| | |
|---|---|
| Yes | Tighten the camshaft position sensor or crankshaft position sensor.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |
| No | Go to 8. |

### 8. CHECK CRANKSHAFT POSITION SENSOR PLATE.

Check the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate>INSPECTION.

Is the crankshaft position sensor plate rusted or does it have broken teeth?

| | |
|---|---|
| Yes | Replace the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate. |
| No | Go to 9. |

### 9. CHECK INSTALLATION CONDITION OF TIMING CHAIN.

Turn the crankshaft using the Subaru ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Is the timing chain dislocated from its proper position?

| | |
|---|---|
| Yes | Correct the installation condition of timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly. |
| No | Go to 10. |

### 10. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Start the engine, and drive the vehicle at 60 km/h (37.3 MPH) or more for 10 minutes or more.

**Warning:**
**Observe the traffic law on the public road and prioritize safety driving.**

**Note:**
**Refill the fuel before driving so that the fuel level meter indicates above "Lower" level.**

Does the malfunction indicator light illuminate or blink?

Yes — Repair the following item.
- Poor contact of ignition coil connector
- Poor contact of fuel injector connector on faulty cylinders
- Poor contact of ECM connector

No — Finish the diagnosis.

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

**Note:**
**For the detection standard, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0301 CYLINDER 1 MISFIRE DETECTED

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0302 CYLINDER 2 MISFIRE DETECTED

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0303 CYLINDER 3 MISFIRE DETECTED

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.**

## DTC P0304 CYLINDER 4 MISFIRE DETECTED

### 1. —

**DTC detecting condition:**

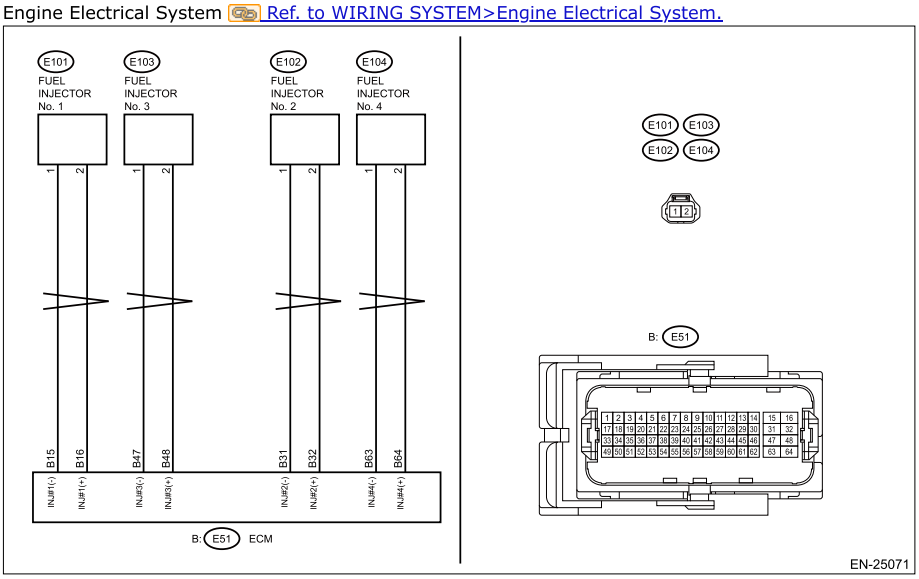
- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

**Trouble symptom:**

- Engine stall
- Improper idling
- Rough driving

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



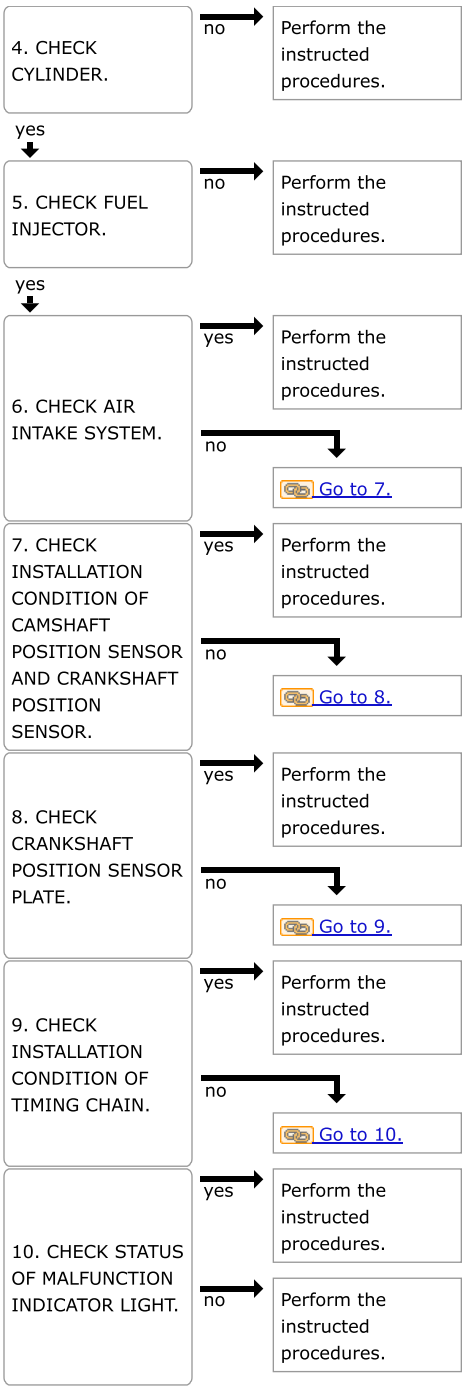

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK PCV HOSE.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓




**1. CHECK PCV HOSE.**

Check the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair or replace the PCV hose. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose. |

## 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector on faulty cylinders.
4. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.

**Connector & terminal**

#1 (E101) No. 1 — Engine ground:
#1 (E101) No. 2 — Engine ground:
#2 (E102) No. 1 — Engine ground:
#2 (E102) No. 2 — Engine ground:
#3 (E103) No. 1 — Engine ground:
#3 (E103) No. 2 — Engine ground:
#4 (E104) No. 1 — Engine ground:
#4 (E104) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

## 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and fuel injector connector on faulty cylinders.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

## 4. CHECK CYLINDER.

Check the following items for cylinder.

- Spark plug
- Ignition coil
- Fuel injector
- Compression pressure
- Skipping timing chain teeth

Is there any fault in the cylinder?

Yes — Repair or replace faulty parts.
Go to 5.

No — Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

### 5. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 6. |
| No | Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 6. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 7. |

### 7. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.

Check the installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

| | |
|---|---|
| Yes | Tighten the camshaft position sensor or crankshaft position sensor.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |
| No | Go to 8. |

### 8. CHECK CRANKSHAFT POSITION SENSOR PLATE.

Check the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate>INSPECTION.

Is the crankshaft position sensor plate rusted or does it have broken teeth?

| | |
|---|---|
| Yes | Replace the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate. |
| No | Go to 9. |

### 9. CHECK INSTALLATION CONDITION OF TIMING CHAIN.

Turn the crankshaft using the Subaru ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Is the timing chain dislocated from its proper position?

| | |
|---|---|
| Yes | Correct the installation condition of timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly. |
| No | Go to 10. |

### 10. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Start the engine, and drive the vehicle at 60 km/h (37.3 MPH) or more for 10 minutes or more.

**Warning:**
**Use special care with the traffic condition on the public road and prioritize safety driving.**

**Note:**
**Refill the fuel before driving so that the fuel level meter indicates above "Lower" level.**

Does the malfunction indicator light illuminate or blink?

Yes — Repair the following item.
- Poor contact of ignition coil connector
- Poor contact of fuel injector connector on faulty cylinders
- Poor contact of ECM connector

No — Finish the diagnosis.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the presence of misfire occurrence. (Revolution fluctuation method)
Monitoring misfire which influences exhaust deterioration (exhaust gas misfire) and catalyst damage is made obligatory by the law. Misfire affecting these two has two patterns below:

- Intermittent misfire (a single cylinder misfires at random times, or different cylinders misfire at random): Exhaust gas misfire
- Every time misfire (a single cylinder misfires every time): Exhaust gas misfire, catalyst damaging misfire

The following detecting methods are adopted for these detection.

1. Intermittent misfire: Exhaust gas misfire
   - 180° Interval Difference Method
   - 360° Interval Difference Method
   - 720° Interval Difference Method
2. Every time misfire: Exhaust gas misfire, catalyst damaging misfire
   - 180° Interval Difference Method
   - 360° Interval Difference Method

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Fuel shut-off function | Not in operation |
| Engine speed | 400 rpm — 6041 rpm |
| Intake manifold pressure | |
| • Normal ignition<br>(Changes based on the engine speed and atmospheric pressure.) | 17.7 kPa (132.8 mmHg, 5.2 inHg) — 42.7 kPa (320.3 mmHg, 12.6 inHg) |
| • Idle ignition<br>(Changes based on the engine speed and atmospheric pressure.) | 19.7 kPa (147.8 mmHg, 5.8 inHg) — 44.7 kPa (335.3 mmHg, 13.2 inHg) |
| Elapsed time after first engine start | 2 crankshaft rotations or more |
| Following condition A or B is met | |
| A: Engine coolant temperature at engine start | More than −7°C (19.4°F) |
| B: Following conditions (b1) and (b2) are met | |
| (b1) Engine coolant temperature at engine starting | −7°C (19.4°F) or less |
| (b2) Engine coolant temperature | 21°C (69.8°F) or more |

**GENERAL DRIVING CYCLE**

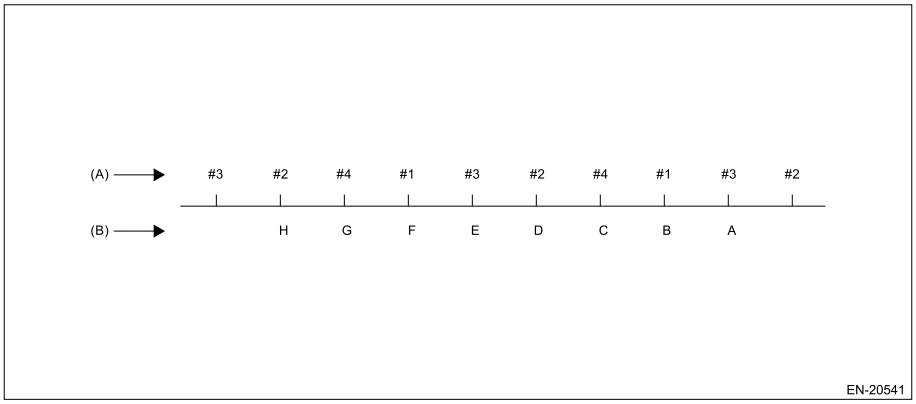
- If conditions are met, it is possible to detect the misfires from idling to high engine speed. However, in case any engine load or breakage occurs, perform with the engine at idle.
- Perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

When a misfire occurs, the engine speed will decrease and the crankshaft position speed will change. Calculate the interval difference value (diagnostic value) from crankshaft position speed by the following formula, and judge whether a misfire is occurring or not comparing the calculated result with judgment value. Count the number of misfires, if the misfire ratio is higher during 1000 revs. or 200 revs., judge corresponding cylinders as NG.

| Diagnostic value calculation (Calculate from angle speed) → | Misfire detection in every single ignition (Compare diagnostic value with judgment value) → | NG judgment (Misfire occurrence judgment required by the law) (Compare number of misfire with judgment value) |
|---|---|---|
| | • 180 Degree Interval Difference Method<br>• 360 Degree Interval Difference Method<br>• 720 Degree Interval Difference Method | • NG judgment for exhaust gas misfire<br>• NG judgment for catalyst-damaging misfire |

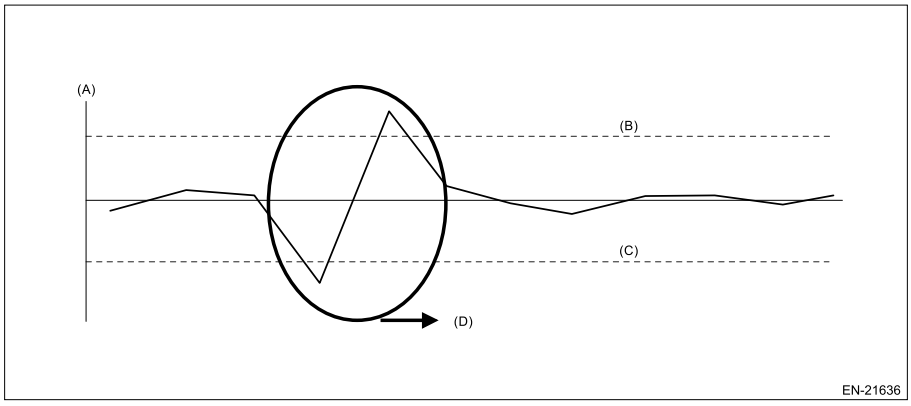
As shown in the following figure, pick a cylinder as the standard and name it A. And the former crankshaft position speed is named B, the second former crankshaft position speed is named C, the third is named D •••, etc.




(A) Ignition order (B) Crankshaft position speed

**<180° Interval Difference Method>**

| Diagnostic value | 180 degree interval difference = (A − B) − (B − C) |
|---|---|
| Judge as a misfire in the following cases.<br>• 180 degree interval difference ≥ Judgment value of positive side<br>• 180 degree interval difference ≤ Judgment value of negative side<br>(Diagnostic value before 180°CA) | |

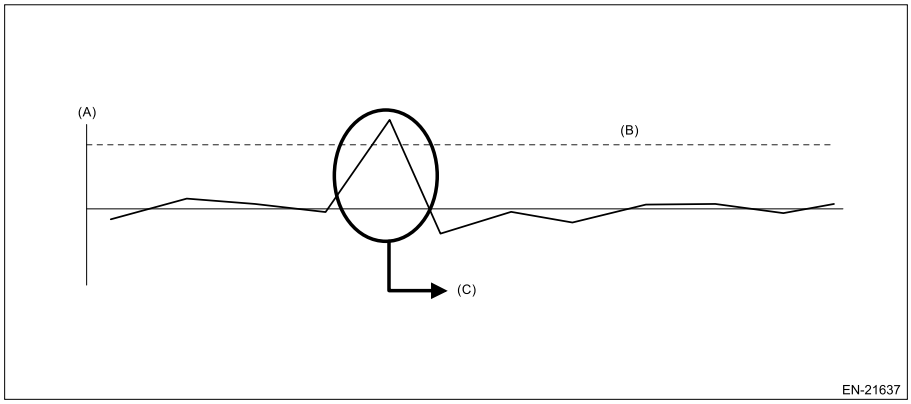



(A) 180 degree interval difference (C) Threshold valve (negative number) (D) Judged as misfire.

(B) Threshold valve (positive number)

**<360° Interval Difference Method>**

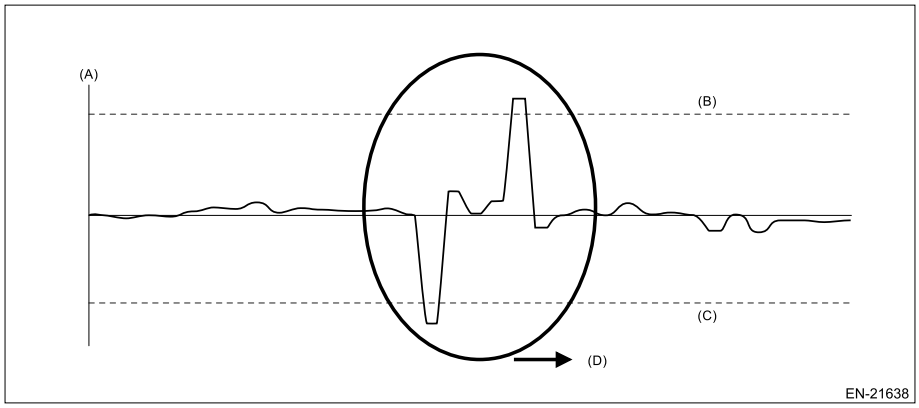
| Diagnostic value | 360 degree interval difference = (B − A) − (D − C) |
|---|---|
| Misfire judgment | 360 degree interval difference > Judgment value → Judged as misfire |




(A) 360 degree interval difference (B) Threshold valve (C) Judged as misfire.

**<720° Interval Difference Method>**

| **Diagnostic value** | **720 degree interval difference = (A − B) − (E − F)** |
|---|---|
| Judge as a misfire in the following cases.<br>• 720 degree interval difference ≥ Judgment value of positive side<br>• 720 degree interval difference ≤ Judgment value of negative side<br>(Diagnostic value before 720°CA) | |




(A) 720 degree interval difference (C) Threshold valve (negative number) (D) Judged as misfire.

(B) Threshold valve (positive number)

**<Exhaust gas misfire (misfire occurrence level which influences exhaust gas)>**
**Judgment value (judge that malfunction occurs when the misfire ratio is high in 1000 engine revs.)**

| **Malfunction Criteria** | **Threshold Value** |
|---|---|
| Diagnostic value of exhaust gas misfire | 3% or more in 1000 revs. |

**Time needed for diagnosis:** 1000 engine revs.
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.
**<Catalyst-damaging misfire (misfire occurrence level that will damage catalyst)>**
**Judgment value**

| **Malfunction Criteria** | **Threshold Value** |
|---|---|
| Catalyst-damaging misfire diagnostic value | Value of Map or more |

**Map**

| **Percentage (%)** | | **Charging efficiency (%)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **15** | **30** | **45** | **60** | **75** | **90** | **105** | **120** | **135** | **150** | **165** | **180** |
| Engine speed (rpm) | 700 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | 1000 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | 1500 | 20 | 20 | 20 | 20 | 16.5 | 16.5 | 14.25 | 14.25 | 12.5 | 12.5 | 12.5 | 12.5 |
| | 2000 | 20 | 20 | 20 | 20 | 16.5 | 14.25 | 11 | 10 | 9 | 9 | 9 | 9 |

| Percentage (%) | | Charging efficiency (%) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **15** | **30** | **45** | **60** | **75** | **90** | **105** | **120** | **135** | **150** | **165** | **180** |
| | 2500 | 20 | 20 | 20 | 16.5 | 14.25 | 12.5 | 10 | 9 | 9 | 9 | 9 | 9 |
| | 3000 | 20 | 20 | 20 | 16.5 | 12.5 | 11 | 9 | 8.25 | 9 | 9 | 9 | 9 |
| | 3500 | 20 | 16.5 | 16.5 | 12.5 | 10 | 9 | 8.25 | 8.25 | 8.25 | 8.25 | 8.25 | 8.25 |
| | 4000 | 20 | 16.5 | 16.5 | 11 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 4500 | 20 | 16.5 | 14.25 | 11 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 5000 | 20 | 16.5 | 12.5 | 10 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 5500 | 20 | 16.5 | 12.5 | 10 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 6000 | 20 | 16.5 | 12.5 | 10 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 6100 | 20 | 16.5 | 12.5 | 10 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |

**Time needed for diagnosis:** 200 engine revs.
**Malfunction indicator light illumination:** Blinks as soon as a malfunction occurs.

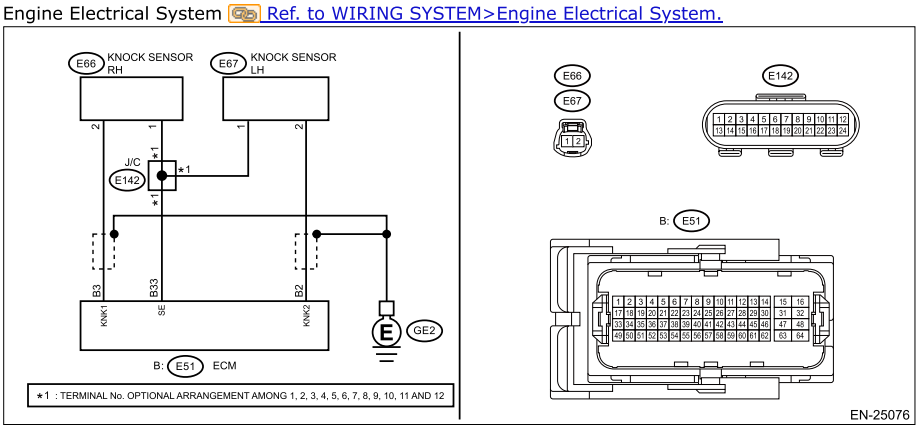
# DTC P0327 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Poor driving performance
- Knocking occurs

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.
   - no → Go to 3.
   - yes ↓

2. CHECK KNOCK SENSOR.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

3. CHECK INPUT SIGNAL OF ECM.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E51) No. 3 — (E51) No. 33:

Is the resistance less than 500 kΩ?

Yes — Go to 2.

No — Go to 3.

### 2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor connectors.
   **Terminals**
   No. 1 — No. 2:

Is the resistance less than 500 kΩ?

Yes — Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Knock Sensor.

No — Repair the short circuit between lines in the harness between the ECM connector and knock sensor connector.

**Note:**
**The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

### 3. CHECK INPUT SIGNAL OF ECM.

1. Connect the ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 3 (+) — Engine ground (−):

Is the voltage 2 V or more?

Yes — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

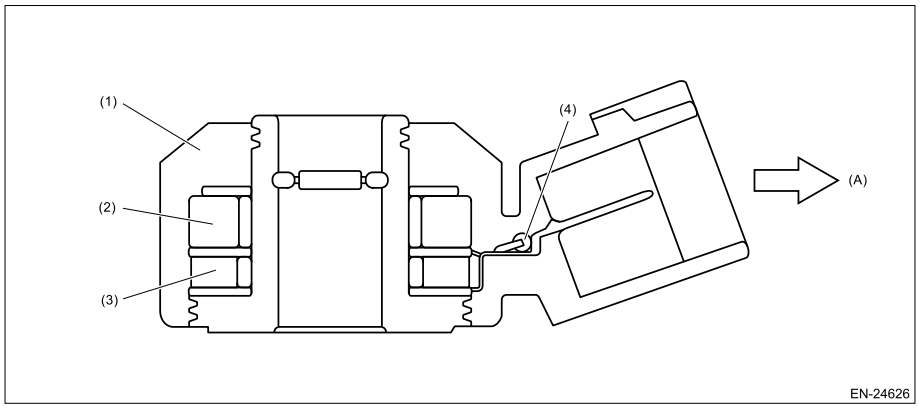
No — Repair the short circuit to ground in harness between ECM connector and knock sensor connector.

**Note:**
**The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit of knock sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Resistance

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.22 V |

**Time needed for diagnosis:** 1 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

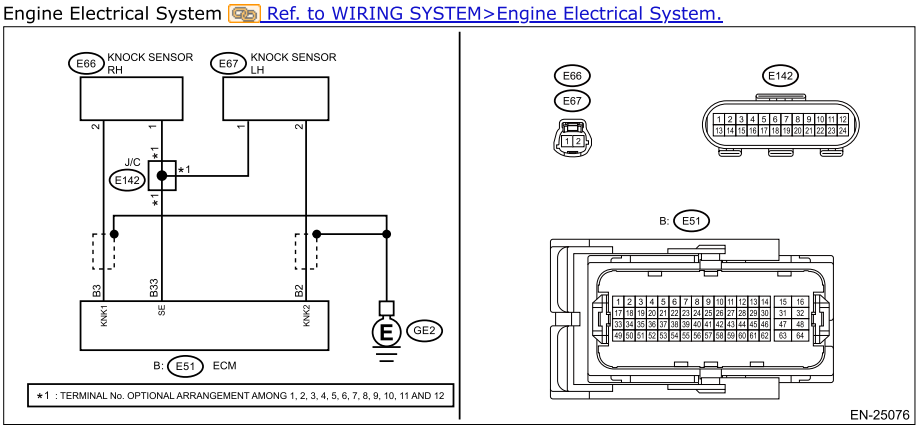
# DTC P0328 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Poor driving performance
- Knocking occurs

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK KNOCK SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E51) No. 3 — (E51) No. 33:

Is the resistance 600 kΩ or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the poor contact of ECM connector. |

### 2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor terminals.

**Terminals**

No. 1 — No. 2:

Is the resistance 600 kΩ or more?

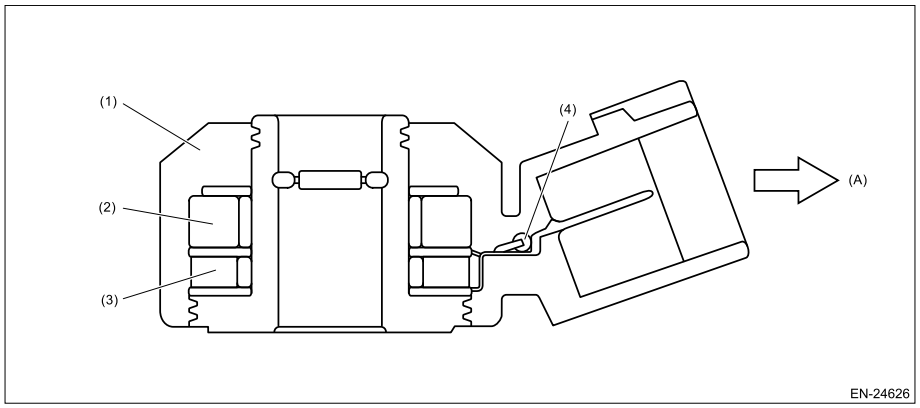
| | |
|---|---|
| Yes | Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Knock Sensor. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and knock sensor connector<br>• Poor contact of J/C |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of knock sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Resistance

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.73 V |

**Time needed for diagnosis:** 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

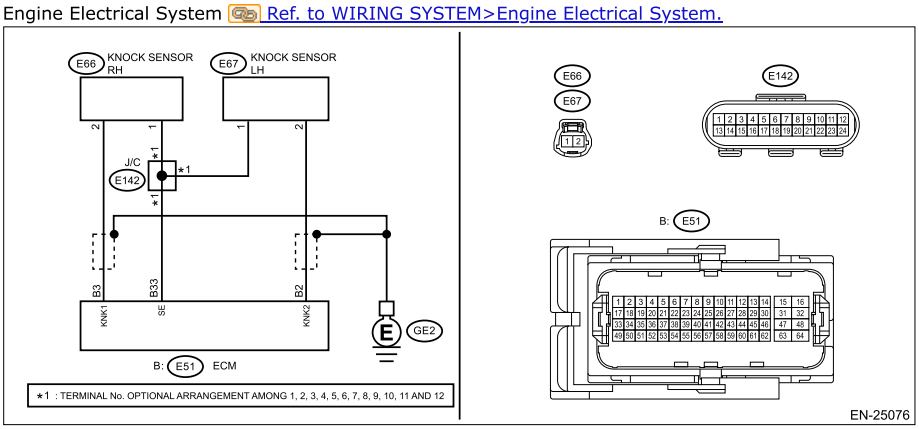
## DTC P0332 KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT LOW BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Driving performance problem
- Knocking occurs

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.
   - no → Go to 3.
   - yes ↓

2. CHECK KNOCK SENSOR.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

3. CHECK INPUT SIGNAL OF ECM.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E51) No. 2 — (E51) No. 33:

Is the resistance less than 500 kΩ?

Yes — Go to 2.

No — Go to 3.

### 2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor connectors.
   **Terminals**
   No. 1 — No. 2:

Is the resistance less than 500 kΩ?

Yes — Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Knock Sensor.

No — Repair the short circuit between lines in the harness between the ECM connector and knock sensor connector.

**Note:**
**The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

### 3. CHECK INPUT SIGNAL OF ECM.

1. Connect the ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 2 (+) — Engine ground (−):

Is the voltage 2 V or more?

Yes — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

No — Repair the short circuit to ground in harness between ECM connector and knock sensor connector.

**Note:**
**The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0327. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0327 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR.**

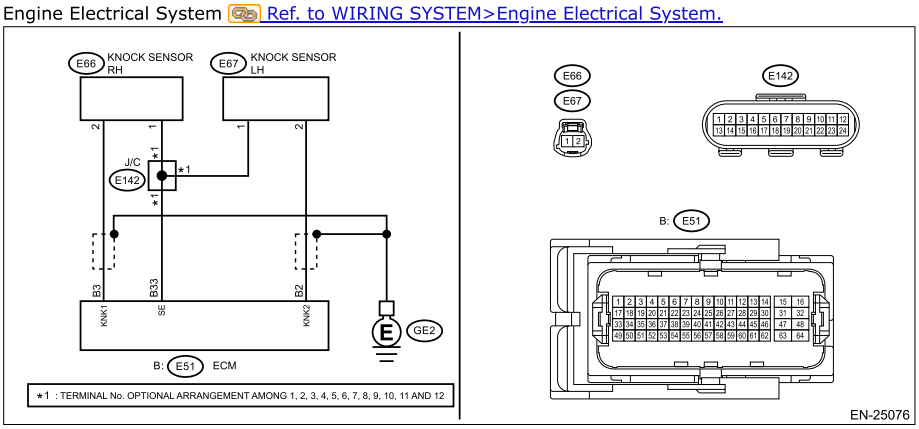
## DTC P0333 KNOCK/COMBUSTION VIBRATION SENSOR 2 CIRCUIT HIGH BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Driving performance problem
- Knocking occurs

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK KNOCK SENSOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E51) No. 2 — (E51) No. 33:

Is the resistance 600 kΩ or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the poor contact of ECM connector. |

### 2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor terminals.

**Terminals**

No. 1 — No. 2:

Is the resistance 600 kΩ or more?

| | |
|---|---|
| Yes | Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Knock Sensor. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and knock sensor connector<br>• Poor contact of J/C |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

**Note:**

**For the detection standard, refer to DTC P0328. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0328 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR.**

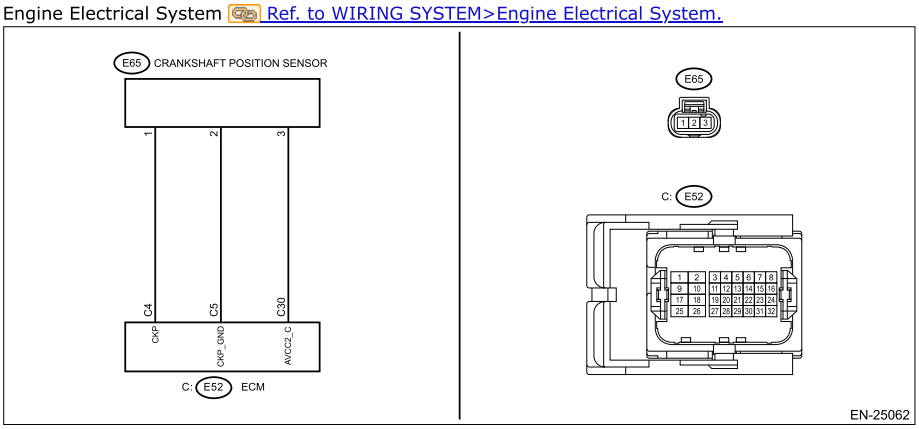
## DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine stall
- Failure of engine to start

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



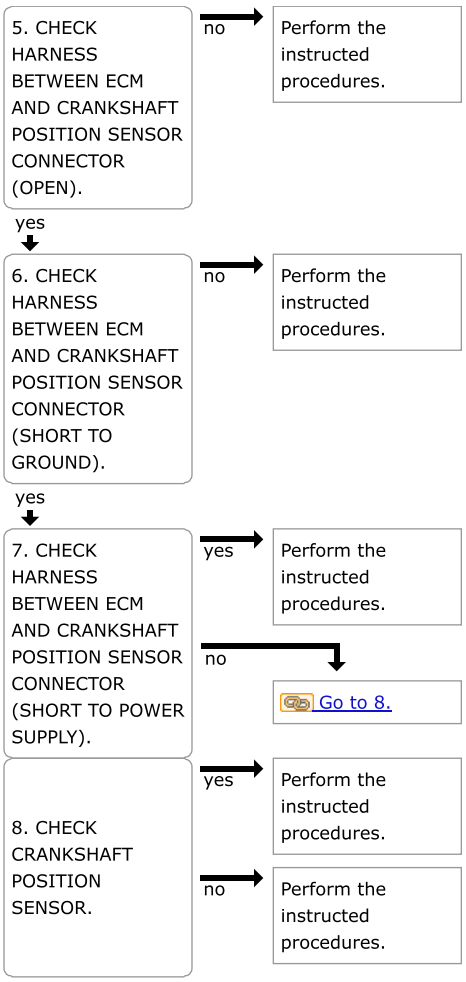

**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR. | no | Perform the instructed procedures. |
| 4. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR. | no | Perform the instructed procedures. |

yes

yes




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

**2. CHECK DTC.**

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installation bolt tightened securely?

| | |
|---|---|
| Yes | Go to 4. |
| No | Tighten the crankshaft position sensor installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 4. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Disconnect the connector from the crankshaft position sensor.
2. Turn the ignition switch to ON.
3. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and crankshaft position sensor connector<br>• Poor contact of ECM connector |

### 5. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:
   (E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector. |

### 6. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.
**Connector & terminal**
(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector. |

### 7. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 1 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and crankshaft position sensor connector. |
| No | Go to 8. |

### 8. CHECK CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Connect all connectors.
3. Check waveform of crankshaft position sensor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is there any abnormality in waveform?

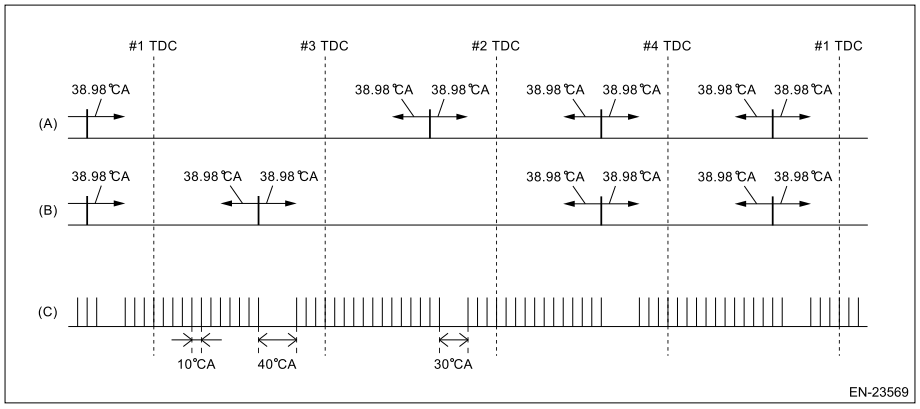
| | |
|---|---|
| Yes | Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |
| No | Repair the following item.<br>• Poor contact of ECM connector<br>• Poor contact of crankshaft position sensor connector |

## GENERAL DESCRIPTION

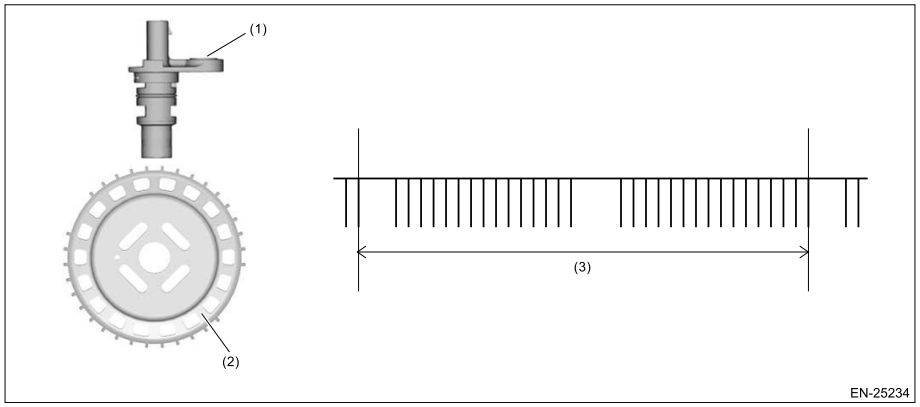
**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the crankshaft position sensor.
Judge as NG when the crank signal is not input even though the starter was rotated.

**COMPONENT DESCRIPTION**




(A) Intake cam signal RH (B) Intake cam signal LH (C) Crankshaft signal




(1) Crankshaft position sensor (2) Crankshaft position sensor plate (3) 1 crankshaft rotation

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Number of crankshaft position sensor signals during cranking | 0 |

**Time needed for diagnosis:** 3 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**

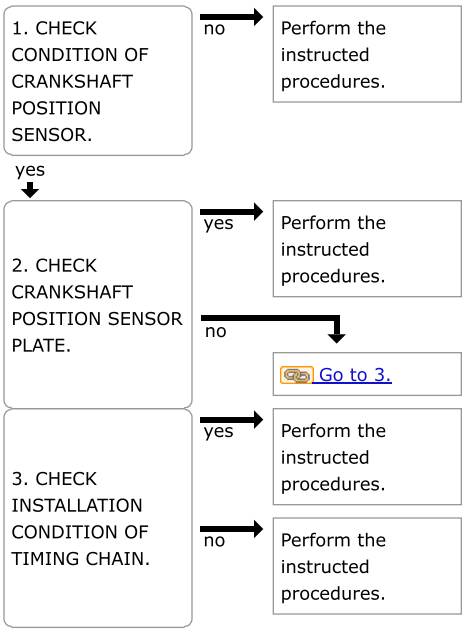
Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Engine stall
- Failure of engine to start

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installation bolt tightened securely?

| | |
|---|---|
| Yes | Go to 2. |
| No | Tighten the crankshaft position sensor installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

#### 2. CHECK CRANKSHAFT POSITION SENSOR PLATE.

Check the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate>INSPECTION.

Is there crack or damage in the crankshaft position sensor plate teeth?

| | |
|---|---|
| Yes | Replace the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate. |
| No | Go to 3. |

### 3. CHECK INSTALLATION CONDITION OF TIMING CHAIN.

Turn the crankshaft using the Subaru ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Is the timing chain dislocated from its proper position?

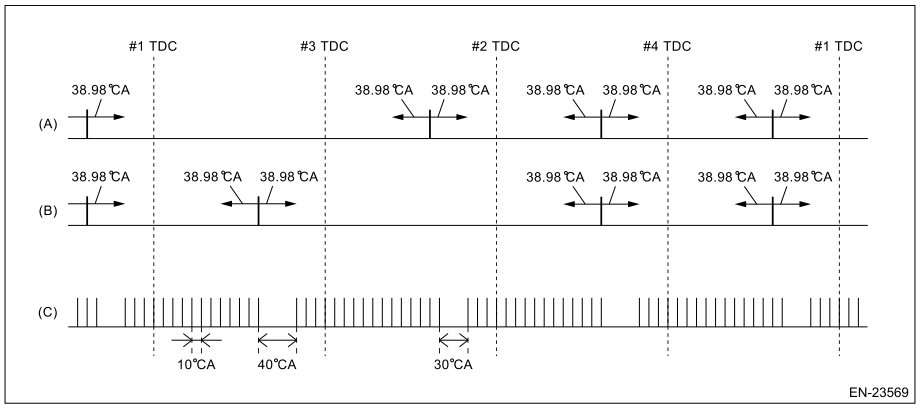
| | |
|---|---|
| Yes | Correct the installation condition of timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly. |
| No | Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

## GENERAL DESCRIPTION

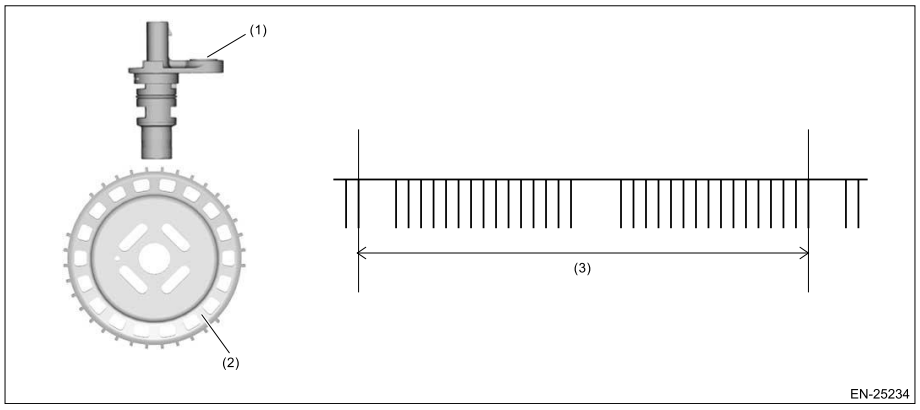
**OUTLINE OF DIAGNOSIS**

Detect for faults in crankshaft position sensor output properties.
Judge as NG when there is a problem in the number of crankshaft signals for every revolution of crankshaft.

**COMPONENT DESCRIPTION**




(A) Intake cam signal RH (B) Intake cam signal LH (C) Crankshaft signal




(1) Crankshaft position sensor (2) Crankshaft position sensor plate (3) 1 crankshaft rotation

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of crankshaft position sensor signals during 0.5 revs of crankshaft | Less than 13<br>Or,<br>19 or more |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Present value of diagnosis 1) − (Previous value of diagnosis 1)\| | Not equal to 1 |

**Time needed for diagnosis:** 10 crankshaft rotations
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR

### 1. —

**DTC detecting condition:**

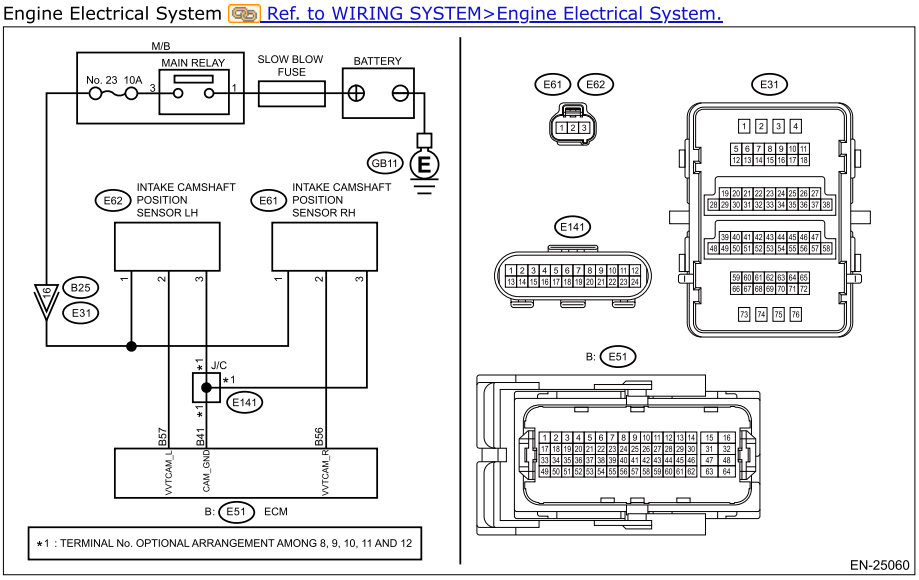
Immediately at fault recognition

**Trouble symptom:**

- Engine stall
- Failure of engine to start

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



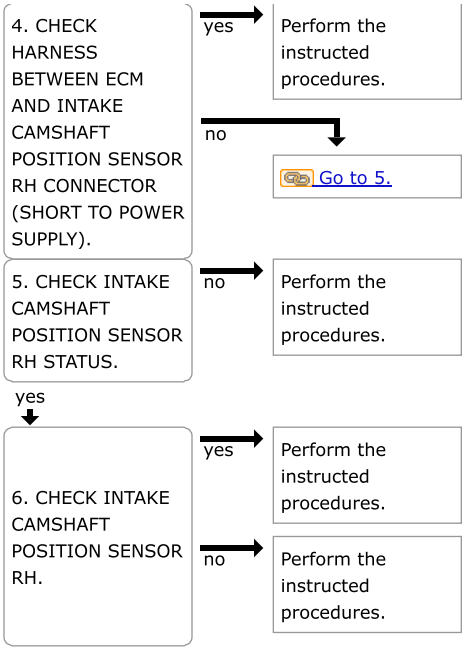

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INTAKE CAMSHAFT POSITION SENSOR RH POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR RH CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK INTAKE CAMSHAFT POSITION SENSOR RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake camshaft position sensor RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake camshaft position sensor RH connector and engine ground.
   **Connector & terminal**
   (E61) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and intake camshaft position sensor RH connector
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and intake camshaft position sensor RH connector.
   **Connector & terminal**
   (E51) No. 56 — (E61) No. 2:
   (E51) No. 41 — (E61) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and intake camshaft position sensor RH connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake camshaft position sensor RH connector and engine ground.

**Connector & terminal**

(E61) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and intake camshaft position sensor RH connector. |

### 4. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between intake camshaft position sensor RH connector and engine ground.

**Connector & terminal**

(E61) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and intake camshaft position sensor RH connector. |
| No | Go to 5. |

### 5. CHECK INTAKE CAMSHAFT POSITION SENSOR RH STATUS.

Check the installation condition of the intake camshaft position sensor RH.

Is the mounting bolt of the intake camshaft position sensor RH tightened securely?

| | |
|---|---|
| Yes | Go to 6. |
| No | Securely tighten the mounting bolt of the intake camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |

### 6. CHECK INTAKE CAMSHAFT POSITION SENSOR RH.

Check the waveform of the intake camshaft position sensor RH. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is there any abnormality in waveform?

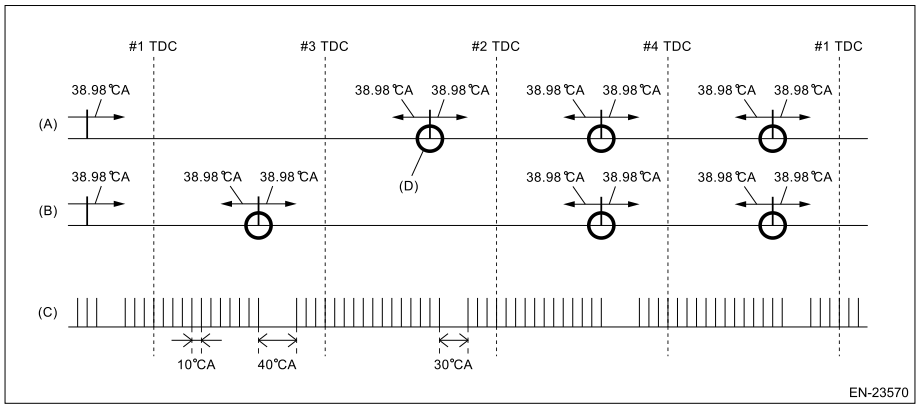
| | |
|---|---|
| Yes | Replace the camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |
| No | Repair the following item.<br>• Poor contact of ECM connector<br>• Poor contact of intake camshaft position sensor RH connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

**COMPONENT DESCRIPTION**




(A) Intake cam signal RH (B) Intake cam signal LH (C) Crankshaft signal

(D) Camshaft position signal: When normal, there will be three camshaft position signals for every two crankshaft revolutions.

**EXECUTION CONDITION**

**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Elapsed time after starting the engine | 200 ms or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when no input status of camshaft position sensor signal continues for 3000 ms during cranking.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Number of camshaft position sensor signals during cranking | 0 |

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of camshaft position sensor signals during 1.5 revs of crankshaft | 0 |

**Time needed for diagnosis**

Diagnosis 1: 3 s

Diagnosis 2: 6 crankshaft rotations

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

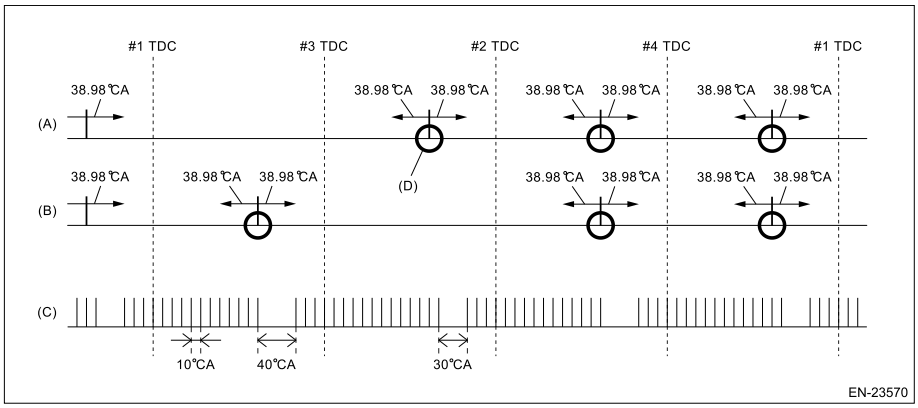
# DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR

**Note:**
**For the diagnostic procedure, refer to DTC P0340. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.**

## 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

## 2. COMPONENT DESCRIPTION




(A) Intake cam signal RH
(B) Intake cam signal LH
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be three camshaft position signals for every two crankshaft revolutions.

## 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of camshaft sensor signal during 2 revs of crankshaft | Not equal to 3 times |

**Time needed for diagnosis:** 8 crankshaft rotations
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

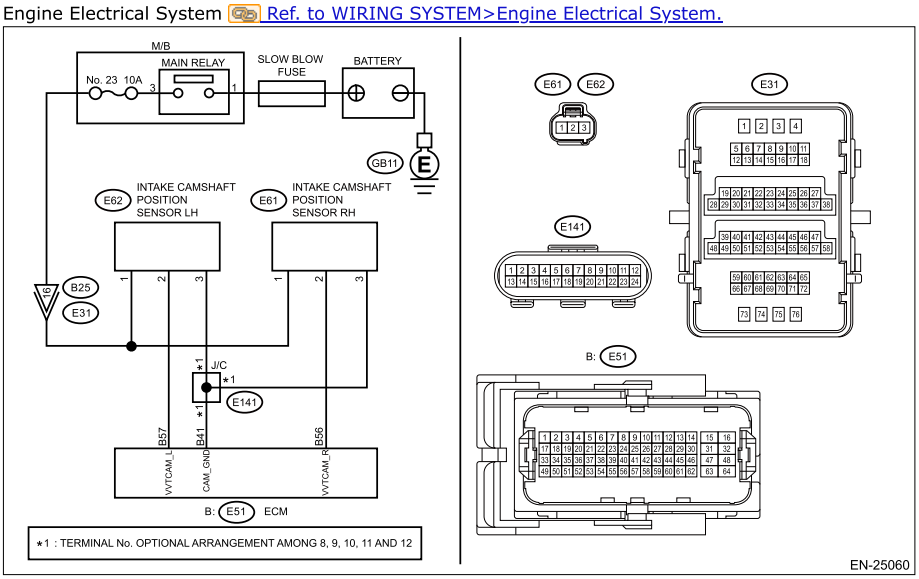
## DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine stall
- Failure of engine to start

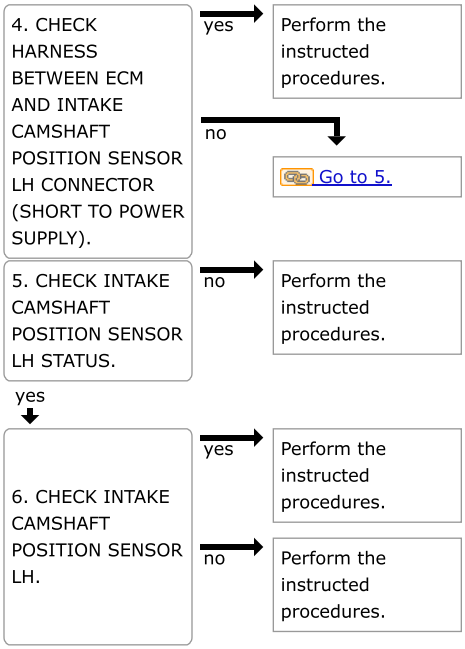
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INTAKE CAMSHAFT POSITION SENSOR LH POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR LH CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK INTAKE CAMSHAFT POSITION SENSOR LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from intake camshaft position sensor LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake camshaft position sensor LH connector and engine ground.
   **Connector & terminal**
   (E62) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and intake camshaft position sensor LH connector
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and intake camshaft position sensor LH connector.
   **Connector & terminal**
   (E51) No. 57 — (E62) No. 2:
   (E51) No. 41 — (E62) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and intake camshaft position sensor LH connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake camshaft position sensor LH connector and engine ground.

**Connector & terminal**

(E62) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and intake camshaft position sensor LH connector. |

### 4. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between intake camshaft position sensor LH connector and engine ground.

**Connector & terminal**

(E62) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and intake camshaft position sensor LH connector. |
| No | Go to 5. |

### 5. CHECK INTAKE CAMSHAFT POSITION SENSOR LH STATUS.

Check the installation condition of the intake camshaft position sensor LH.

Is the mounting bolt of the intake camshaft position sensor LH tightened securely?

| | |
|---|---|
| Yes | Go to 6. |
| No | Securely tighten the mounting bolt of the intake camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |

### 6. CHECK INTAKE CAMSHAFT POSITION SENSOR LH.

Check the waveform of the intake camshaft position sensor LH. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is there any abnormality in waveform?

| | |
|---|---|
| Yes | Replace the intake camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |
| No | Repair the following item.<br>• Poor contact of ECM connector<br>• Poor contact of intake camshaft position sensor LH connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**

**For the detection standard, refer to DTC P0340. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.**

## DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2

**Note:**

- **For the diagnostic procedure, refer to DTC P0345. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2.**
- **For the detection standard, refer to DTC P0341. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR.**

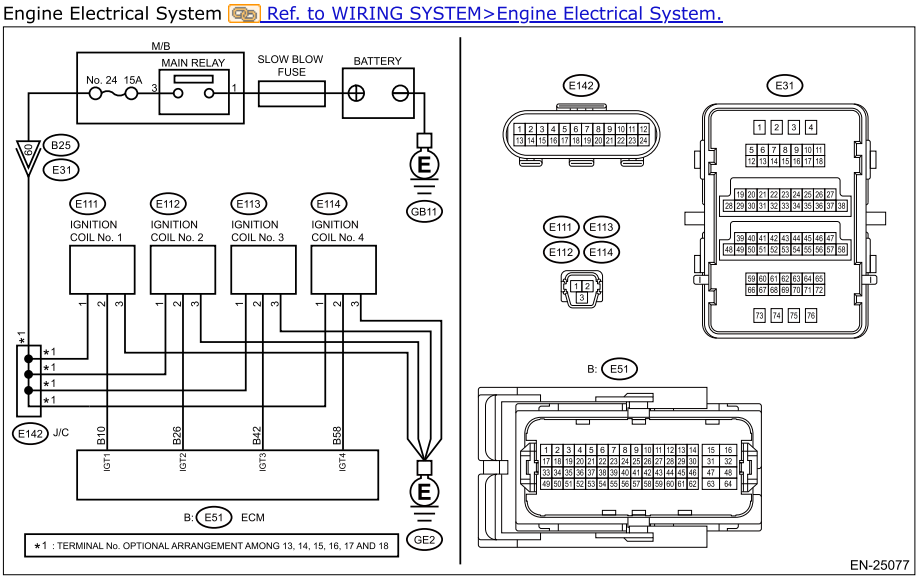
## DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

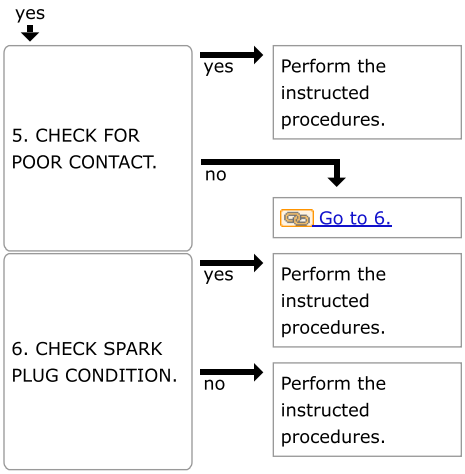
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK IGNITION COIL POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (OPEN). | no → | Perform the instructed procedures. |




### 1. CHECK IGNITION COIL POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition coil.
3. Turn the ignition switch to ON.
4. Measure the voltage between ignition coil connector and engine ground.

**Connector & terminal**

DTC P0351; (E111) No. 1 (+) — Engine ground (−):
DTC P0352; (E112) No. 1 (+) — Engine ground (−):
DTC P0353; (E113) No. 1 (+) — Engine ground (−):
DTC P0354; (E114) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.

- Open circuit or short circuit to ground in harness between M/B and ignition coil connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 2. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between ignition coil connector and engine ground.

**Connector & terminal**

DTC P0351; (E111) No. 3 — Engine ground:
DTC P0352; (E112) No. 3 — Engine ground:
DTC P0353; (E113) No. 3 — Engine ground:
DTC P0354; (E114) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 3.

No — Repair the open circuit in harness between ignition coil connector and engine ground terminal.

### 3. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from ECM.
2. Measure the resistance between ignition coil connector and engine ground.

**Connector & terminal**

DTC P0351; (E111) No. 2 — Engine ground:
DTC P0352; (E112) No. 2 — Engine ground:
DTC P0353; (E113) No. 2 — Engine ground:
DTC P0354; (E114) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the ground short circuit of harness between ECM connector and ignition coil connector. |

### 4. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and ignition coil connector.

**Connector & terminal**

DTC P0351; (E51) No. 10 — (E111) No. 2:
DTC P0352; (E51) No. 26 — (E112) No. 2:
DTC P0353; (E51) No. 42 — (E113) No. 2:
DTC P0354; (E51) No. 58 — (E114) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the open circuit in harness between ECM connector and ignition coil connector. |

### 5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 6. |

### 6. CHECK SPARK PLUG CONDITION.

1. Remove the spark plug of the corresponding cylinder. Ref. to IGNITION(H4DOTC)>Spark Plug.
2. Check the spark plug condition. Ref. to IGNITION(H4DOTC)>Spark Plug>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Replace the ignition coil. Ref. to IGNITION(H4DOTC)>Ignition Coil. |
| No | Replace the spark plug. Ref. to IGNITION(H4DOTC)>Spark Plug. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Based on the self-diagnostic result of the ignition coil driving IC, judge the ignition coil driving circuit as normal or abnormal.
The ignition coil driving IC detects "no ignition" status as a malfunction.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | More than 0 rpm |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Malfunction signal from ignition drive IC | ON |

**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0352 IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN

**Note:**

**For the diagnostic procedure and detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0353 IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN

**Note:**

**For the diagnostic procedure and detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0354 IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN

**Note:**

**For the diagnostic procedure and detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.**

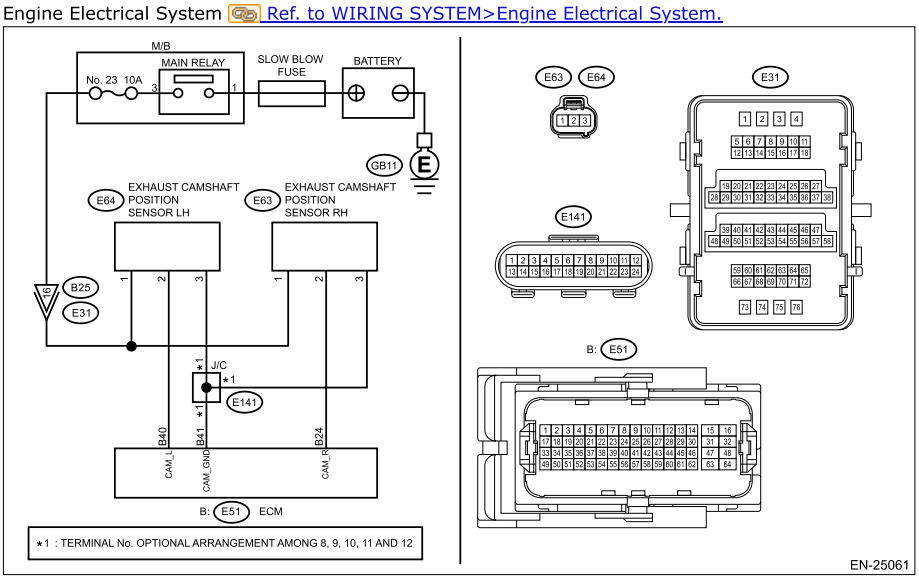
## DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine stall
- Failure of engine to start

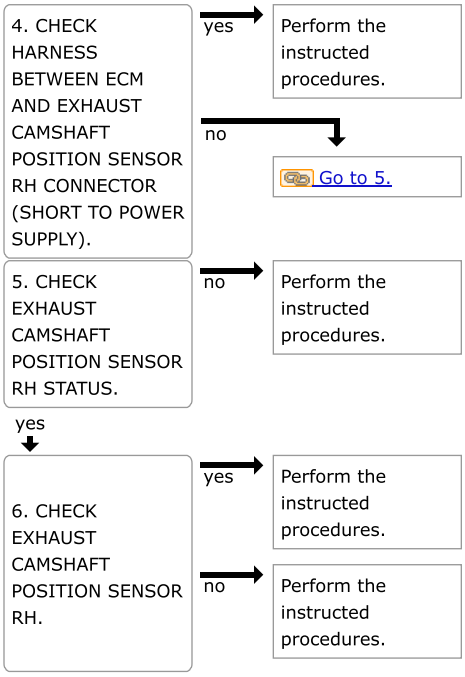
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK EXHAUST CAMSHAFT POSITION SENSOR RH POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR RH CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK EXHAUST CAMSHAFT POSITION SENSOR RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust camshaft position sensor RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust camshaft position sensor RH connector and engine ground.
   **Connector & terminal**
   (E63) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the following item.<br>• Open circuit in harness between M/B and exhaust camshaft position sensor RH connector<br>• Poor contact of coupling connector<br>• Blown out of fuse |

### 2. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and exhaust camshaft position sensor RH connector.
   **Connector & terminal**
   (E51) No. 24 — (E63) No. 2:
   (E51) No. 41 — (E63) No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and exhaust camshaft position sensor RH connector<br>• Poor contact of J/C |

### 3. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust camshaft position sensor RH connector and engine ground.

**Connector & terminal**

(E63) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and exhaust camshaft position sensor RH connector. |

### 4. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR RH CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between exhaust camshaft position sensor RH connector and engine ground.

**Connector & terminal**

(E63) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and exhaust camshaft position sensor RH connector. |
| No | Go to 5. |

### 5. CHECK EXHAUST CAMSHAFT POSITION SENSOR RH STATUS.

Check the installation condition of the exhaust camshaft position sensor RH.

Is the mounting bolt of the exhaust camshaft position sensor RH tightened securely?

| | |
|---|---|
| Yes | Go to 6. |
| No | Securely tighten the mounting bolt of the exhaust camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |

### 6. CHECK EXHAUST CAMSHAFT POSITION SENSOR RH.

Check the waveform of the exhaust camshaft position sensor RH. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is there any abnormality in waveform?

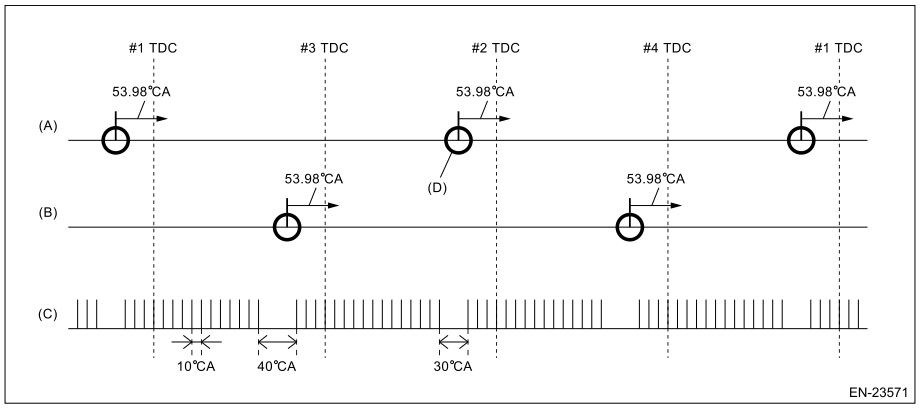
| | |
|---|---|
| Yes | Replace the exhaust camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |
| No | Repair the following item.<br>• Poor contact of ECM connector<br>• Poor contact of exhaust camshaft position sensor RH connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

**COMPONENT DESCRIPTION**




(A) Exhaust cam signal RH

(B) Exhaust cam signal LH

(C) Crankshaft signal

(D) Camshaft position signal: When normal, there will be two camshaft position signals for every two crankshaft revolutions.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Elapsed time after starting the engine | 200 ms or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of camshaft position sensor signals during 1.5 revs of crankshaft | 0 |

**Time needed for diagnosis:** 6 crankshaft rotations

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

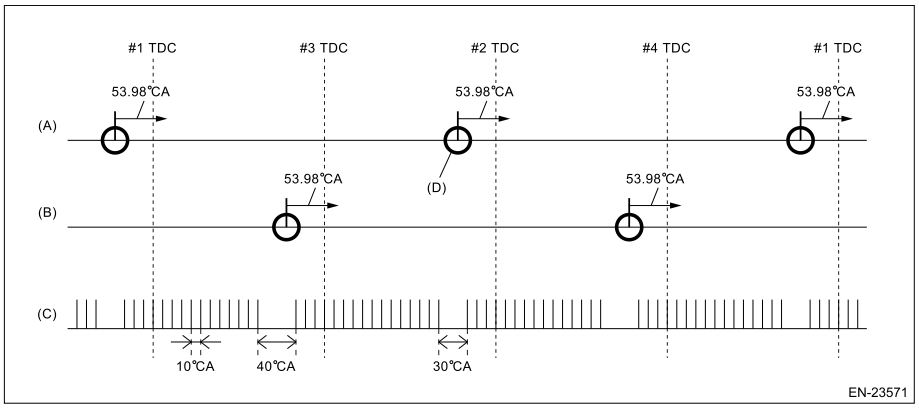
# DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1

**Note:**
**For the diagnostic procedure, refer to DTC P0365. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1.**

## 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

## 2. COMPONENT DESCRIPTION




(A) Exhaust cam signal RH
(B) Exhaust cam signal LH
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be two camshaft position signals for every two crankshaft revolutions.

## 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of camshaft sensor signal during 2 revs of crankshaft | Not equal to 2 times |

**Time needed for diagnosis:** 8 crankshaft rotations
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

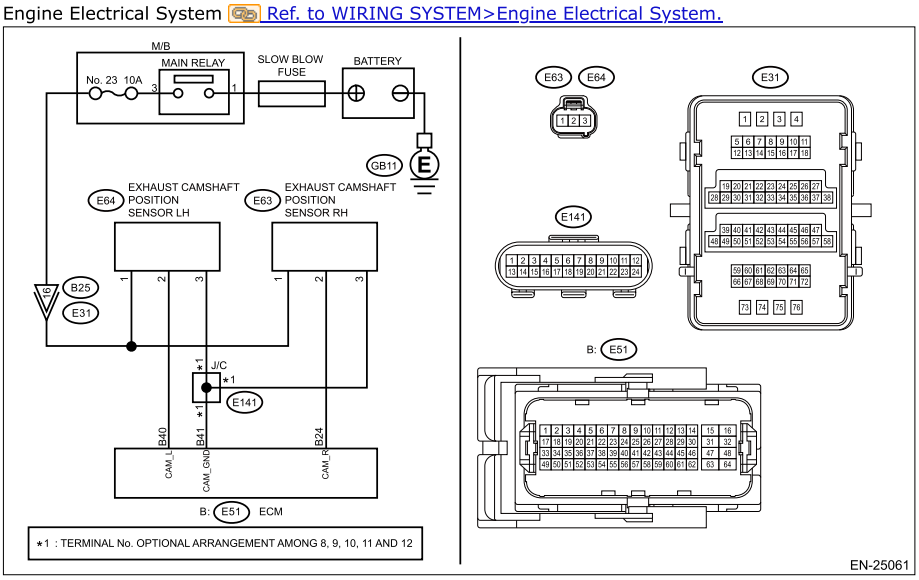
## DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine stall
- Failure of engine to start

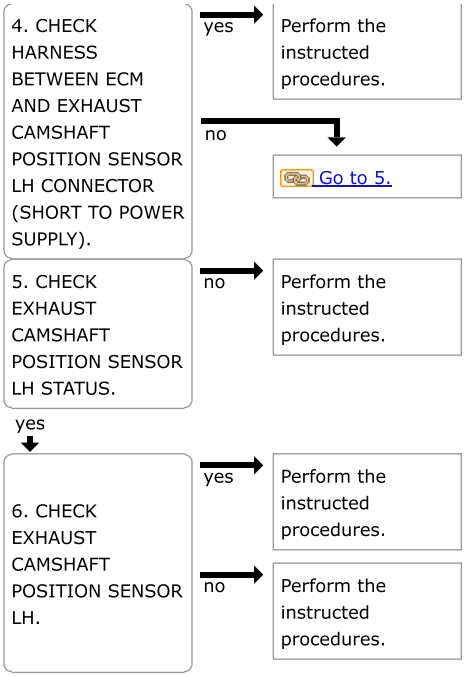
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK EXHAUST CAMSHAFT POSITION SENSOR LH POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR LH CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK EXHAUST CAMSHAFT POSITION SENSOR LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from exhaust camshaft position sensor LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust camshaft position sensor LH connector and engine ground.
   **Connector & terminal**
   (E64) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and exhaust camshaft position sensor LH connector
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and exhaust camshaft position sensor LH connector.
   **Connector & terminal**
   (E51) No. 40 — (E64) No. 2:
   (E51) No. 41 — (E64) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and exhaust camshaft position sensor LH connector
- Poor contact of J/C

### 3. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust camshaft position sensor LH connector and engine ground.

**Connector & terminal**

(E64) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the short circuit to ground in harness between ECM connector and exhaust camshaft position sensor LH connector.

### 4. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR LH CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between exhaust camshaft position sensor LH connector and engine ground.

**Connector & terminal**

(E64) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in harness between ECM connector and exhaust camshaft position sensor LH connector.

No — Go to 5.

### 5. CHECK EXHAUST CAMSHAFT POSITION SENSOR LH STATUS.

Check the installation condition of the exhaust camshaft position sensor LH.

Is the mounting bolt of the exhaust camshaft position sensor LH tightened securely?

Yes — Go to 6.

No — Securely tighten the mounting bolt of the exhaust camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.

### 6. CHECK EXHAUST CAMSHAFT POSITION SENSOR LH.

Check the waveform of the exhaust camshaft position sensor LH. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is there any abnormality in waveform?

Yes — Replace the exhaust camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.

No — Repair the following item.

- Poor contact of ECM connector
- Poor contact of exhaust camshaft position sensor LH connector
- Poor contact of coupling connector
- Poor contact of J/C

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**

**For the detection standard, refer to DTC P0365. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1.**

## DTC P0391 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2

**Note:**

- **For the diagnostic procedure, refer to DTC P0390. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2.**
- **For the detection standard, refer to DTC P0366. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1.**



## DTC P0401 EGR ABNORMAL (EGR AMOUNT TOO SMALL)

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Infrequent knocking (P0401)
- Improper idling (P0402)
- Movement performance problem (P0402)

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | choice | Perform the instructed procedures. |
| | choice | Go to 2. |
| | choice | Go to 3. |
| 2. CHECK DTC P0401. | yes | Go to 4. |
| | no | Perform the instructed procedures. |
| 3. CHECK DTC P0402. | no | Perform the instructed procedures. |
| | yes | |
| 4. CHECK FOR REPRODUCTION OF FAILURE. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

## 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

When a code other than DTC P0401 (current code) or P0402 (current code) is displayed, go to A.
When DTC P0401 (current code) is displayed, go to B.
When DTC P0402 (current code) is displayed, go to C.

| | |
|---|---|
| A | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| B | Go to 2. |
| C | Go to 3. |

## 2. CHECK DTC P0401.

1. Turn the ignition switch to OFF.
2. Check for clogging in the pipes consisting of EGR system.

**Note:**
**Check the following items.**
- **Throttle valve**
- **EGR cooler**
- **EGR control valve**
- **EGR pipe**
- **EGR pipe adapter**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Clean and replace the faulty parts. |

## 3. CHECK DTC P0402.

1. Turn the ignition switch to OFF.
2. Check for leakage in the pipes consisting of the EGR system.

**Note:**
**Check the following items.**
- **Looseness of each flange connection**
- **Improper installation of the electronic throttle control**
- **Improper installation of manifold absolute pressure and intake air temperature sensor**
- **Foreign matter attached to EGR valve**

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Clean and replace the faulty parts. |

### 4. CHECK FOR REPRODUCTION OF FAILURE.

Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

Does the malfunction indicator light illuminate?

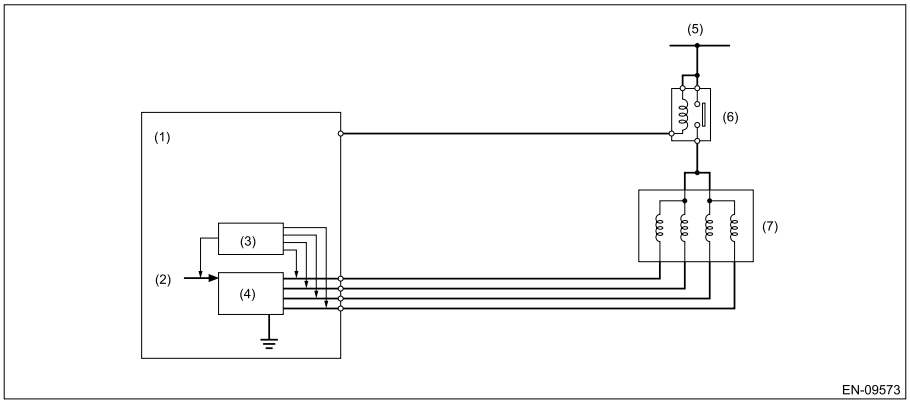
| | |
|---|---|
| Yes | Replace the EGR control valve and manifold absolute pressure and intake air temperature sensor.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor. |
| No | End. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of EGR system.
Intake manifold pressure is constant because the throttle valve is fully closed during deceleration fuel cut.
At this time, when the EGR control valve is opened/closed, the intake manifold pressure will change.
The ECM compares the difference between the intake manifold pressure assumed at the time of EGR control valve opening or closing command and the actually measured intake manifold pressure to judge whether the EGR system is normal/over flow rate/under flow rate.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switch circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Ambient air temperature | 7°C (44.6°F) or more |
| Engine speed | Value of 1200 rpm — 2800 rpm |
| Vehicle speed | 32 km/h (19.9 MPH) or more |
| Neutral switch | OFF |
| Time while the fuel shut-off function is in operation | 3000 ms or more |
| Compulsory drive of EGR valve open delay time (low flow rate monitor only) | 800 ms or more |

**GENERAL DRIVING CYCLE**

During deceleration fuel cut from 32 km/h (19.9 MPH) or more, perform diagnosis only once.
Be careful of vehicle speed and engine speed. (Diagnosis will not be completed if the vehicle speed and engine speed become out of condition due to deceleration.)

**DIAGNOSTIC METHOD**

The assumed intake manifold pressure (reference pressure) is calculated from engine speed, throttle opening angle and atmospheric pressure when the execution condition is established.

1. When the execution condition is satisfied and the EGR valve sends the opening command (57 steps), EGR under flow rate (P0401) is detected when the difference between the measured intake manifold pressure and the reference pressure (for 57 steps) is equal to or more than the judgment value.
2. When the execution condition is satisfied and the EGR valve sends the closing command (0 step), EGR over flow rate (P0402) is detected when the difference between the measured intake manifold pressure and the reference pressure (for 0 step) is equal to or more than the judgment value.
3. Both P0401 and P0402 are detected if both judgment values are exceeded.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| <Low flow rate monitor><br>Intake manifold absolute pressure for reference − Average value of intake manifold absolute pressure | More than value of Map1 | P0401 |
| <High flow rate monitor><br>Average value of intake manifold absolute pressure − Intake manifold absolute pressure for reference | More than value of Map2 | P0402 |

**Map1**

| | | Engine speed (rpm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 |
| Barometric pressure (kPa (mmHg, inHg)) | 75.06 (563.1, 22.2) | 26.5 (198.8, 7.8) | 22.5 (168.8, 6.6) | 19.5 (146.3, 5.8) | 17.5 (131.3, 5.2) | 15.5 (116.3, 4.6) | 14 (105, 4.1) | 13 (97.5, 3.8) | 12 (90, 3.5) | 11 (82.5, 3.2) |
| | 80 (600.2, 23.6) | 30 (225.1, 8.9) | 26 (195, 7.7) | 23 (172.5, 6.8) | 21 (157.5, 6.2) | 19 (142.5, 5.6) | 17 (127.5, 5) | 15.5 (116.3, 4.6) | 13.5 (101.3, 4) | 12 (90, 3.5) |
| | 90 (675.2, 26.6) | 33.5 (251.3, 9.9) | 28.5 (213.8, 8.4) | 25 (187.5, 7.4) | 22 (165, 6.5) | 20 (150, 5.9) | 18.5 (138.8, 5.5) | 16.5 (123.8, 4.9) | 14.5 (108.8, 4.3) | 13 (97.5, 3.8) |
| | 101.33 (760.2, 22.2) | 41.9 (314.3, 7.8) | 35.3 (264.8, 6.6) | 30.3 (227.3, 5.8) | 26.5 (198.8, 5.2) | 23.7 (177.8, 4.6) | 21.6 (162, 4.1) | 19.8 (148.5, 3.8) | 18.2 (136.5, 3.5) | 16.3 (122.3, 3.2) |
| (kPa (mmHg, inHg)) | | | | | | | | | | |

**Map2**

| | | Engine speed (rpm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 |
| Barometric pressure (kPa (mmHg, inHg)) | 75.06 (563.1, 22.2) | 12 (90, 3.5) | 9 (67.5, 2.7) | 7.3 (54.8, 2.2) | 6 (45, 1.8) | 5.6 (42, 1.7) | 5 (37.5, 1.5) | 4.8 (36, 1.4) | 4.6 (34.5, 1.4) | 4.4 (33, 1.3) |
| | 80 (600.2, 23.6) | 13.5 (101.3, 4) | 10 (75, 3) | 8.2 (61.5, 2.4) | 7 (52.5, 2.1) | 6.3 (47.3, 1.9) | 5.6 (42, 1.7) | 5.2 (39, 1.5) | 5 (37.5, 1.5) | 4.8 (36, 1.4) |
| | 90 (675.2, 26.6) | 15 (112.5, 4.4) | 12 (90, 3.5) | 10 (75, 3) | 8.2 (61.5, 2.4) | 7.2 (54, 2.1) | 6.4 (48, 1.9) | 5.8 (43.5, 1.7) | 5.6 (42, 1.7) | 5.4 (40.5, 1.6) |
| | 101.33 (760.2, 22.2) | 17 (127.5, 3.5) | 13.5 (101.3, 2.7) | 11 (82.5, 2.2) | 9.2 (69, 1.8) | 8 (60, 1.7) | 7.2 (54, 1.5) | 6.4 (48, 1.4) | 6.2 (46.5, 1.4) | 6 (45, 1.3) |
| (kPa (mmHg, inHg)) | | | | | | | | | | |

**Time needed for diagnosis:** 3200 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0402 EGR "A" FLOW EXCESSIVE DETECTED

**Note:**

**For the diagnostic procedure and detection standard, refer to DTC P0401. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0401 EGR ABNORMAL (EGR AMOUNT TOO SMALL).**

## DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Trouble symptom:**

- Engine stall
- Idle mixture is out of specifications

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC AND FREEZE FRAME DATA. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK ENGINE OIL CONSUMPTION. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK EGR SYSTEM. | no | Perform the instructed procedures. |
| | yes | |
| 4. CHECK EXHAUST SYSTEM. | yes | Perform the instructed procedures. |
| | no | Go to 5. |
| 5. CHECK FRONT OXYGEN (A/F) SENSOR. | no | Go to 7. |
| | yes | |
| 6. CHECK FRONT OXYGEN (A/F) SENSOR. | yes | Perform the instructed procedures. |
| | no | Go to 7. |
| 7. CHECK CATALYTIC CONVERTER. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

## 1. CHECK DTC AND FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).
3. Read the freeze frame data.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

4. Save the displayed DTC and freeze frame data.

Is DTC other than P0420 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

## 2. CHECK ENGINE OIL CONSUMPTION.

Check the engine oil amount. Ref. to LUBRICATION(H4DOTC)>Engine Oil.

Is white smoke emitted from the muffler?

Yes — Check the engine, and repair the defective part. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes.
After repairing the engine, replace all the catalytic converters.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Front Catalytic Converter.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Rear Catalytic Converter.

No — Go to 3.

## 3. CHECK EGR SYSTEM.

Check for leakage in the pipes consisting of the EGR system.

**Note:**
**Check the following items.**
- **Looseness of each flange connection**
- **Improper installation of the electronic throttle control**
- **Improper installation of manifold absolute pressure and intake air temperature sensor**
- **Foreign matter adhering to EGR control valve**

Is the check result OK?

Yes — Go to 4.

No — Repair or replace faulty parts.

## 4. CHECK EXHAUST SYSTEM.

Check the following items regarding exhaust system.
- Loose or detached nut and bolt
- Exhaust gas leakage
- Air suction
- Hole on exhaust pipe

Is there any trouble?

Yes — Repair or replace the exhaust system. Ref. to EXHAUST(H4DOTC)>General Description.

No — Go to 5.

## 5. CHECK FRONT OXYGEN (A/F) SENSOR.

Visually check the front oxygen (A/F) sensor and the vicinity of front oxygen (A/F) sensor.

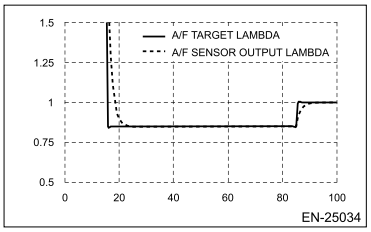
Is there any trace of oil on the front oxygen (A/F) sensor or in the vicinity of the front oxygen (A/F) sensor?

Yes — Go to 6.

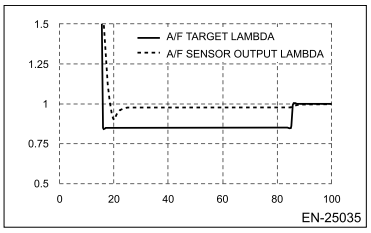
No — Go to 7.

## 6. CHECK FRONT OXYGEN (A/F) SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, decelerate by accelerator OFF from driving at a constant speed of 60 km/h (37.3 MPH), and read the waveform data of [A/F Sensor #1] and [Target Equivalence Ratio] while the vehicle is stopped.
   - At normal condition




   - In malfunction



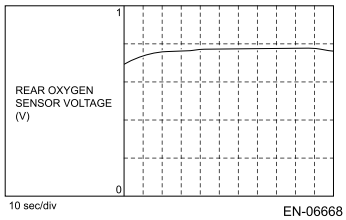

Is an abnormal waveform displayed?

Yes — Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor.

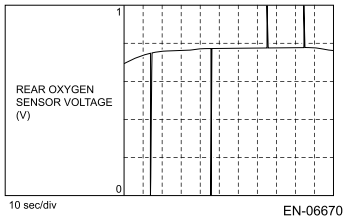
No — Go to 7.

### 7. CHECK CATALYTIC CONVERTER.

1. Start the engine and warm up completely.
2. Read the waveform data of rear oxygen sensor during idling using an oscilloscope.
3. Check the waveform by waggling the connector between ECM and rear oxygen sensor.
   - At normal condition




   - At abnormal condition 2 (noise input)




Is an abnormal waveform displayed?

| | |
|---|---|
| Yes | Connect the connector after checking the following items, and check the waveform again while waggling.<br>• Check the contact point of the connector that caused disturbed waveform. If faulty, repair or replace it.<br>• If any problem is not found, it is possible that a temporary poor contact occurs in the connector. |
| No | Replace all the catalytic converters.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Front Catalytic Converter.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Rear Catalytic Converter. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

To confirm the performance of Three-way Catalytic Converter (TWC), measure Oxygen Storage Capacity (OSC) using A/F sensor and rear oxygen sensor.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Amount of intake air | Less than 8.5 g/s (0.3 oz/s) |
| Accelerator pedal position | While idling |
| Rear oxygen sensor output voltage after fuel cut | 0.15 V or less |
| Estimated catalyst temperature | 475°C (887°F) or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |
| (Integrated intake air amount during fuel cut | More than 19.3 g/s (0.7 oz/s) |
| Fuel shut-off function thereafter) | Not in operation |
| A/F element impedance | 206 Ω or less |

**GENERAL DRIVING CYCLE**

When the TWC, the A/F sensor, and the rear oxygen sensor are fully warmed up, perform diagnosis if the following operations are experienced once respectively: a 10-second idling after the deceleration fuel cut for the predetermined time or longer, and a 10-second driving with the accelerator ON after the deceleration fuel cut for the predetermined time or longer.

**DIAGNOSTIC METHOD**

When TWC performance degrade, OSC performance also degrades. A malfunction is detected by diagnosis that estimates OSC performance based on the time and air volume required from the deceleration fuel cut for the predetermined time or longer until the start of increase in the rear oxygen sensor voltage.

**Judgment value**

| Malfunction Criteria | Threshold Value |
| --- | --- |
| Oxygen Storage Capacity (OSC) of Catalytic | Less than 0.15 g (0.005 oz) |

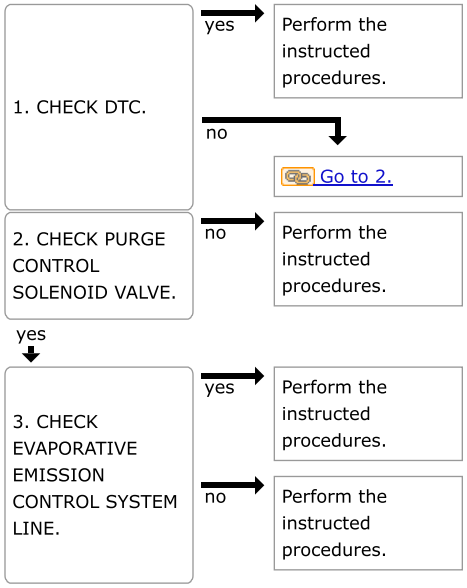
**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

# DTC P0441 EVAP SYSTEM (CPC) INCORRECT PURGE FLOW

## 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Improper idling

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0441 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK PURGE CONTROL SOLENOID VALVE.

Select [CPC Solenoid Valve] in [Active Test] to operate the purge control solenoid valve using the Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the purge control solenoid valve operate?

Yes — Go to 3.

No — Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve.

### 3. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

1. Turn the ignition switch to OFF.
2. Check the evaporative emission control system line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

| | |
|---|---|
| Yes | Repair or replace the hoses or pipes. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect purge flow malfunction before and after purge induction according to a change of the output value of the pressure sensor in the leak check valve assembly.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Integrated purge gas amount since engine starting | 23.8 g (0.84 oz)* or more |
| (Duration of purge control duty ratio = 0% Purge control duty ratio from above) | 4000 ms or more Not equal to 0% |
| Ambient air temperature | More than 4.4 °C (40°F) |
| Time when the switching valve in the leak check valve assembly is closed | Less than 20 s |

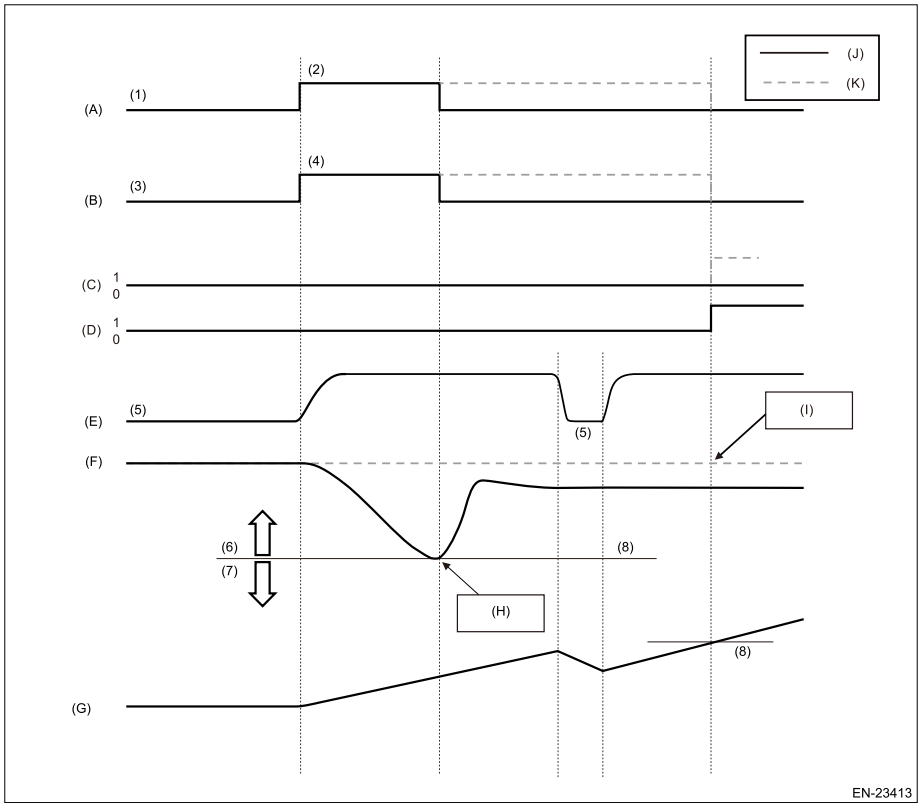
*: It is approximately 2 sec per the integration of purge to reach 1 g (0.04 oz) at vehicle speed of 64.4 km/h (40 MPH).

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once during ordinary driving.

**DIAGNOSTIC METHOD**

Close the switching valve in the leak check valve assembly, and close the fuel tank completely, and perform the forced purging. If pressure change amount is 667 Pa (5 mmHg, 0.2 inHg) or less, judge as malfunction of purge flow.




(1) Disable
(2) Enable
(3) Open
(4) Close
(5) 0%
(6) Fail
(7) Pass
(8) Threshold

(A) Monitoring
(B) Evaporative leak system switching valve
(C) Malfunction flag
(D) Molecule
(E) Purge control duty ratio
(F) Evaporative leak system pressure (gauge)
(G) Sum value (Purge gas − Generated evaporating gas)
(H) Pass judgment
(I) Abnormality judgment
(J) Normal
(K) Trouble

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Evaporative leak system pressure (gauge) | More than −400 Pa (3 mmHg, 0.1 inHg) |
| Integrated purge gas amount | 3 g (0.11 oz)* or more |

*: It is approximately 2 sec per the integration of purge to reach 1 g (0.04 oz) at vehicle speed of 64.4 km/h (40 MPH).

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK)

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

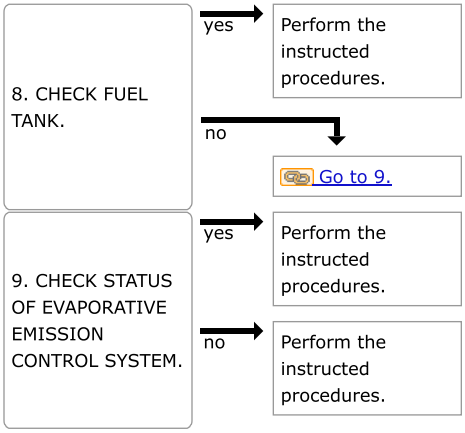
**Trouble symptom:**

- Fuel odor
- There is a hole of more than 1 mm (0.04 in) dia. in evaporation system or fuel tank.
- Fuel filler cap loose or lost

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK FUEL FILLER CAP.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK FUEL FILLER CAP.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK FUEL FILLER CAP.
   - yes → Perform the instructed procedures.
   - no → Go to 4.
4. CHECK PURGE CONTROL SOLENOID VALVE.
   - no → Perform the instructed procedures.
   - yes ↓
5. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.
   - yes → Perform the instructed procedures.
   - no → Go to 6.
6. CHECK CANISTER.
   - yes → Perform the instructed procedures.
   - no → Go to 7.
7. CHECK LEAK CHECK VALVE ASSEMBLY.
   - yes → Perform the instructed procedures.
   - no → Go to 8.




### 1. CHECK FUEL FILLER CAP.

1. Turn the ignition switch to OFF.
2. Check the fuel filler cap.

**Note:**
**The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.**

Is the fuel filler cap tightened securely?

| | |
|---|---|
| Yes | Go to 2. |
| No | Tighten fuel filler cap securely. |

### 2. CHECK FUEL FILLER CAP.

Check the fuel filler cap.

Is the fuel filler cap genuine?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace with a genuine fuel filler cap. |

### 3. CHECK FUEL FILLER CAP.

Check the gasket of fuel filler cap.

Does the gasket of fuel filler cap have any damage?

| | |
|---|---|
| Yes | Replace the fuel filler cap. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Filler Cap. |
| No | Go to 4. |

### 4. CHECK PURGE CONTROL SOLENOID VALVE.

Check air-tightness of the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 5. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Check the evaporative emission control system line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

Are there holes on the evaporation line?

| | |
|---|---|
| Yes | Repair or replace the evaporation line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines. |
| No | Go to 6. |

### 6. CHECK CANISTER.

Check the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister>INSPECTION.

Are there holes on the canister?

| | |
|---|---|
| Yes | Replace the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister. |
| No | Go to 7. |

### 7. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Are there damage or holes on the leak check valve assembly?

| | |
|---|---|
| Yes | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |
| No | Go to 8. |

### 8. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Remove the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Are there damage or holes on the fuel tank?

| | |
|---|---|
| Yes | Repair or replace the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank. |
| No | Go to 9. |

### 9. CHECK STATUS OF EVAPORATIVE EMISSION CONTROL SYSTEM.

Check the condition of evaporative emission control system for other mechanical defects.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

| | |
|---|---|
| Yes | Repair or replace the hoses or pipes. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

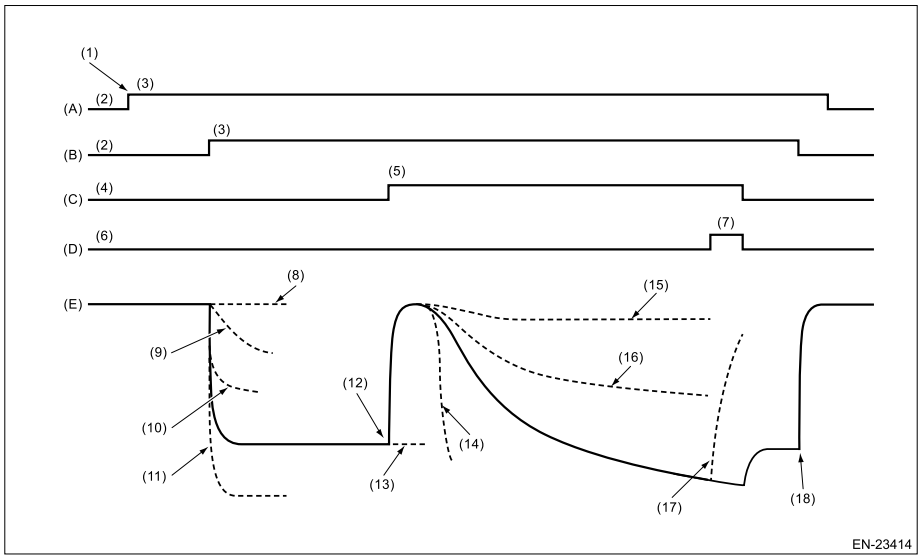
This diagnosis judges whether the leak check valve assembly operation is normal or not, and whether the evaporative emission system has leak and clogging or not.

To purge the canister, after driving, perform the five hours soaking after ignition switch OFF in order to stabilize the evaporative gas status. *After 5, 7 or 9.5 hours passed, ECM is activated by soaking timer, and the leak check starts.
Judges whether the leak check valve assembly operation is normal or not, by measuring the reference pressure status via reference orifice (0.02 inch orifice). Judge as malfunction if the reference pressure is out of specified range. Then, judge whether there is a leak or not, by comparing the pressure (leak pressure) when the reference pressure and the evaporative emission system are in negative pressure condition. Judge as system leak in the evaporative emission system if the leak pressure is higher than reference pressure. Judge as clogging of pipe if the leak pressure becomes lower than the reference pressure within the specified amount of time.
0.02 inch leak and 0.04 inch leak can be distinguished by measuring the leak pressure.
The diagnosis results are stored inside ECM until the engine is started again.

*: When the test conditions are not met in 5 hours, diagnosis is performed at elapsed time of 7 hours. When the test conditions are not met in 7 hours, diagnosis is performed at elapsed time of 9.5 hours.

| Diagnostic item | |
|---|---|
| Evaporative Leak Check Module system (leak check valve assembly main body) | Vacuum pump stuck<br>Switching valve stuck to open<br>Switching valve stuck to close<br>Reference orifice flow large<br>Reference orifice flow small |
| Leak check | Large leak<br>• 0.04 inch leak<br>• Fuel cap loose<br>• Fuel cap off<br>• System malfunction |
| | Very small leak<br>• 0.02 inch leak |
| Clogging of pipe | — |
| Check valve | Check valve open stuck |

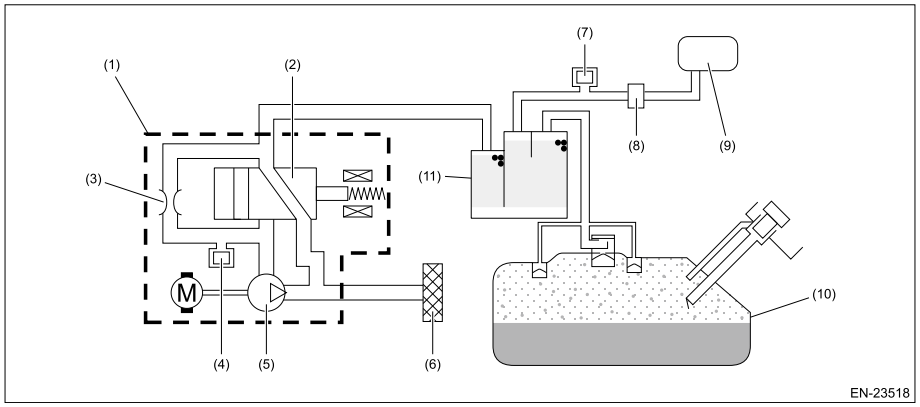
OUTLINE OF DIAGNOSIS




| | | |
|---|---|---|
| (A) ECM | (C) Switching Valve | (E) ELCM Pressure |
| (B) Vacuum Pump | (D) Solenoid valve for secondary purge | |
| (1) 5 hours after ignition switch turned | (7) Open | (13) Vent valve stuck open |
| (2) OFF | (8) Leak detection pump stuck | (14) Pipe clogging |
| (3) ON | (9) Vent valve stuck close | (15) Large leak |
| (4) OFF: Open orifice side | (10) Reference orifice high flow | (16) Very small leak |
| (5) ON: Close Evap. side | (11) Reference orifice low flow | (17) Check valve stuck open |
| (6) Close | (12) Pref | (18) Reference pressure (Pref) |

**COMPONENT DESCRIPTION**

Leak check valve assembly consists of the pressure sensor, the reference orifice (diameter of 0.02 inch), the vacuum pump which introduces the negative pressure into evaporative emission system, and the switching valve which switches the passage to introduce the negative pressure.




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Activation of soaking timer | Completed |
| Intake air temperature | 4.4 °C (39.9°F) or more |
| Engine oil temperature | 4.4 °C (39.9°F) or more |
| Engine coolant temperature | 4.4 °C (39.9°F) or more<br>and<br>Less than 45°C (113°F) |
| Accumulated purge amount during previous driving cycle | Value of Map1 or more |

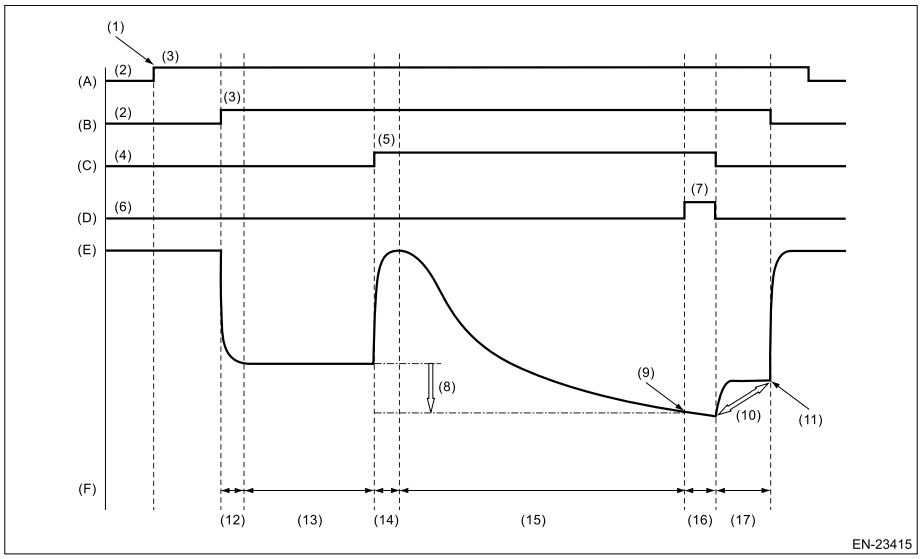
**Map1**

| **Engine coolant temperature when ECM is activated after soak time (°C (°F))** | **0 (32)** | **25 (77)** | **30 (86)** | **35 (95)** | **40 (104)** | **45 (113)** |
|---|---|---|---|---|---|---|
| Accumulated purge amount during previous driving cycle (g (oz)) | 160.8 (5.7) | 160.8 (5.7) | 389.6 (13.7) | 618.3 (21.8) | 1198.8 (42.3) | 1779.3 (62.8) |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once when 5 or 7 or 9.5 hours has passed after ignition switch is OFF. For more detail, refer to "OUTLINE OF DIAGNOSIS". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK)>General description>OUTLINE OF DIAGNOSIS.

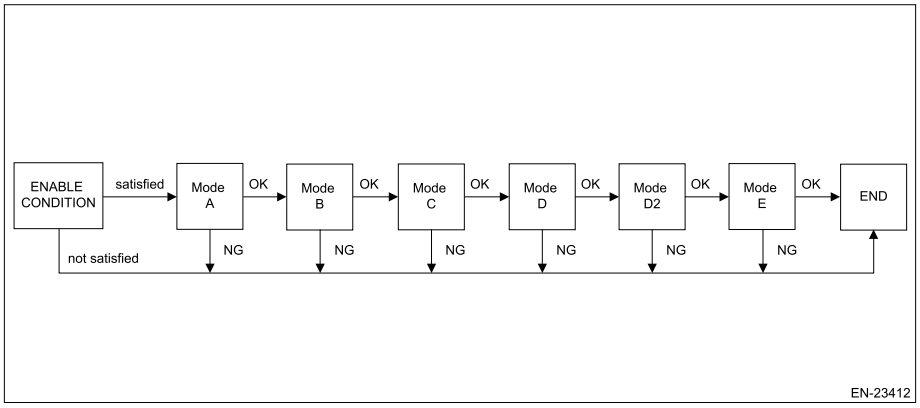
**DIAGNOSTIC METHOD**




(A) ECM
(B) Vacuum Pump
(C) Switching Valve
(D) Solenoid valve for secondary purge
(E) Pressure Sensor
(F) Mode

(1) Activated by soak timer
(2) OFF
(3) ON
(4) OFF: Open orifice side
(5) ON: Close Evap. side
(6) Close
(7) Open
(8) Evap. System target pressure calculation
(9) Tank pressure (P tank)
(10) Judge the leak is occurred or not by comparing the pressures.
(11) Reference pressure (P ref)
(12) Mode A
(13) Mode B
(14) Mode C
(15) Mode D
(16) Mode D2
(17) Mode E

| Mode | Explanation of Mode | DTC | Diagnosis period |
|---|---|---|---|
| A | Vacuum pump operation confirmation and characteristics stability | P2404 | 7 s or less |
| B | Measurement of reference pressure for setting the target negative pressure | P2404 | 350 s or less |
| C | Switching valve operation confirmation | P2404 | 12 s or less |
| D | Clogging of pipe diagnosis and leak pressure measurement | P1451 | 1100 s or less |
| D2 | Check valve open stuck | P04AE | 30 s or less |
| E | 0.04 inch leak pressure measurement | P0455 | 50 s or less |
| | 0.02 inch leak pressure measurement | P0456 | |
| | Reference pressure measurement for judgment | P2401 | |




**<Mode A (vacuum pump operation confirmation and characteristics stability)>**
Purpose: Detect the vacuum pump operation trouble.
Judge as NG when the following conditions are established.

Judge as OK if the following conditions are not established, and warm up for five minutes to stabilize the vacuum pump characteristics.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Pressure sensor output value | More than −0.22 kPa (−1.7 mmHg, −0.1 inHg) | P2404 |

**<Mode B (measurement of reference pressure for setting the target negative pressure)>**

Diagnosis 1

Purpose: Judge the reference pressure stability.

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| \|Pressure sensor maximum output value − Pressure sensor minimum output value\| | More than 0.49 kPa (3.7 mmHg, 0.1 inHg) | P2404 |

Diagnosis 2 and 3

Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions.

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Reference pressure for setting the target negative pressure | Less than value of Map2 | P2404 |

**Map2**

| Barometric pressure (kPa (mmHg, inHg)) | 70 (525, 20.7) | 80 (600, 23.6) | 90 (675, 26.6) | 100 (750, 29.5) |
|---|---|---|---|---|
| Reference pressure for setting the target negative pressure (kPa (mmHg, inHg)) | −3.97 (−30, −1.2) | −4.08 (−31, −1.2) | −4.19 (−31, −1.2) | −4.29 (−32, −1.3) |

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Reference pressure for judgment | More than value of Map3 | P2404 |

**Map3**

| Barometric pressure (kPa (mmHg, inHg)) | 70 (525, 20.7) | 80 (600, 23.6) | 90 (675, 26.6) | 100 (750, 29.5) |
|---|---|---|---|---|
| Reference pressure for setting the target negative pressure (kPa (mmHg, inHg)) | −0.94 (−7.1, −0.3) | −1.05 (−7.9, −0.3) | −1.16 (−8.7, −0.3) | −1.26 (−9.5, −0.4) |

**<Mode C (Switching valve operation confirmation)>**

Purpose: Measure the pressure increase when switching valve is changed from open to close, and detect the stuck to open/close malfunctions of the switching valve.

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Pressure sensor output value − Reference pressure for setting the target negative pressure | Less than 0.22 kPa (1.7 mmHg, 0.1 inHg) | P2404 |

**<Mode D (Clogging of pipe diagnosis and leak pressure measurement)>**

1. **Clogging of pipe**

   Purpose: Measure the time required for the evaporative emission system to reach the target negative pressure by the vacuum pump, and detect the clogging of pipe trouble.

   Judge as clogging of pipe malfunction if the evaporative emission system reaches to the target negative pressure within the specified time.

2. **Leak pressure measurement**

   Purpose: Measure the pressure (leak pressure) when the evaporative emission system becomes the negative pressure by the vacuum pump.

   Store the pressure as a leak pressure while the following conditions are met.

**Judgment value (clogging of pipe and leak pressure measurement)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Time required to reach to the target negative pressure | 31 s or less | P1451 |

**Judgment value (check valve open stuck)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Reference pressure for judgment of the target negative pressure | More than −0.18 kPa (−1.4 mmHg, −0.1 inHg) | P04AE |

**Judgment value (large leak)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Leak pressure | Value of Map4 or more | P0455 |

**Judgment value (very small leak)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Leak pressure | More than 0.018 inch reference pressure<br>and<br>Less than value of Map4 | P0456 |

**Map4**

| **Reference pressure (Pa)** | **−4856** | **−4000** | **−2750** | **−1500** | **−824** |
|---|---|---|---|---|---|
| Threshold Value (Pa) | −1785 | −1463 | −991 | −520 | −265 |

Formula for threshold value = Reference pressure × 0.377 − 0.341

**<Mode E (Measurement of reference pressure for judgment)>**

Diagnosis 1

Purpose: Judge the reference pressure stability.

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| \|Pressure sensor maximum output value − Pressure sensor minimum output value\| | More than 0.49 kPa (3.7 mmHg, 0.1 inHg) | P2404 |

Diagnosis 2

Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions. Judge the vacuum pump performance stability.

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Reference pressure for judgment | Less than value of Map5<br>Or,<br>More than value of Map6 | P2404 |

**Map5**

| **Barometric pressure (kPa (mmHg, inHg))** | **70 (525, 20.7)** | **80 (600, 23.6)** | **90 (675, 26.6)** | **100 (750, 29.5)** |
|---|---|---|---|---|
| Reference pressure for judgment (kPa (mmHg, inHg)) | −4.54 (−34.1, −1.3) | −4.64 (−34.8, −1.4) | −4.75 (−35.6, −1.4) | −4.86 (−36.5, −1.4) |

**Map6**

| **Barometric pressure (kPa (mmHg, inHg))** | **70 (525, 20.7)** | **80 (600, 23.6)** | **90 (675, 26.6)** | **100 (750, 29.5)** |
|---|---|---|---|---|
| Reference pressure for judgment (kPa (mmHg, inHg)) | −0.82 (−6.15, −0.2) | −0.93 (−6.98, −0.3) | −1.04 (−7.8, −0.3) | −1.14 (−8.55, −0.3) |

Diagnosis 3

Purpose: Judge the presence of evaporative emission system leak.

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| \|Reference pressure for setting the target negative pressure − Reference pressure for judgment\| | More than 0.94 kPa (7.1 mmHg, 0.3 inHg) | P2404 |

**Time needed for diagnosis:** 27 min

Confirm the malfunction at next engine start.

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0456 EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK)

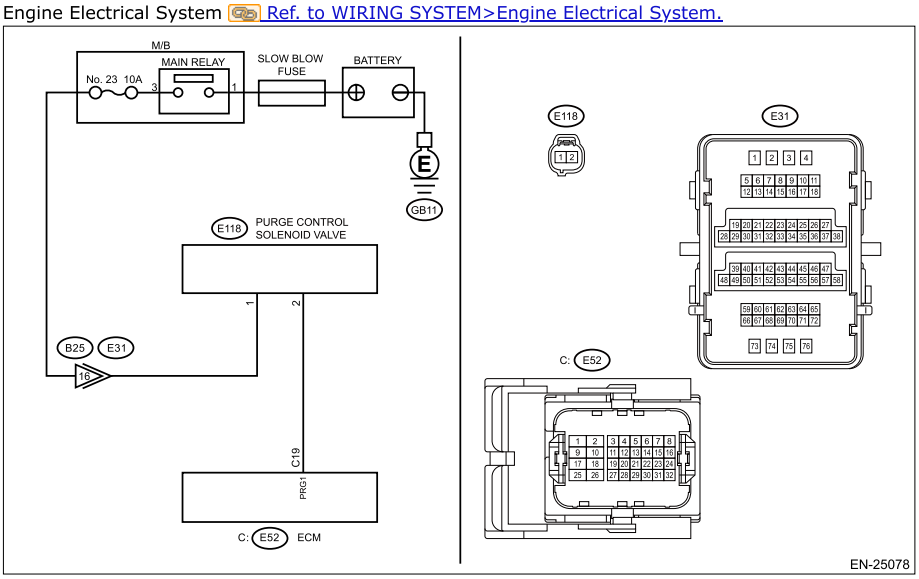
**Note:**

**For the diagnostic procedure and detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).**

## DTC P0458 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK OUTPUT SIGNAL OF ECM. | no | Go to 3. |
| yes ↓ | | |
| 2. CHECK FOR POOR CONTACT. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 3. CHECK POWER SUPPLY FOR PURGE CONTROL SOLENOID VALVE CONNECTOR. | no | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (SHORT TO GROUND). | no | Perform the instructed procedures. |

yes

5. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (OPEN). → no → Perform the instructed procedures.

yes

6. CHECK PURGE CONTROL SOLENOID VALVE. → yes → Perform the instructed procedures.

→ no → Perform the instructed procedures.

### 1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 19 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Go to 3. |

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 3. CHECK POWER SUPPLY FOR PURGE CONTROL SOLENOID VALVE CONNECTOR.

Measure the voltage between purge control solenoid valve connector and engine ground.
**Connector & terminal**
(E118) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground of harness between M/B and purge control solenoid valve connector<br>• Poor contact of coupling connector<br>• Blown out of fuse |

### 4. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the purge control solenoid valve.
4. Measure the resistance between the purge control solenoid valve connector and engine ground.
   **Connector & terminal**
   (E118) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and purge control solenoid valve connector. |

### 5. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and purge control solenoid valve connector.
**Connector & terminal**
(E52) No. 19 — (E118) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and purge control solenoid valve connector. |

### 6. CHECK PURGE CONTROL SOLENOID VALVE.

1. Remove the purge control solenoid valve.
2. Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

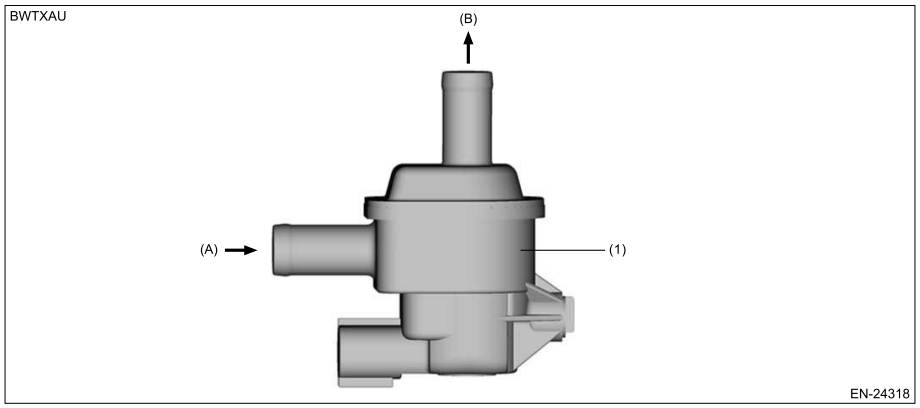
Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of purge control solenoid valve connector. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect open or short circuit of the purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

**COMPONENT DESCRIPTION**




(A) IN (B) OUT

(1) Purge control solenoid valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Purge control solenoid valve control duty | 80% or less |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis after starting the engine.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | 1.9 V or less |
| Or, | |
| Output voltage<br>Output current | More than 2.3 V<br>Less than 0.03 mA |

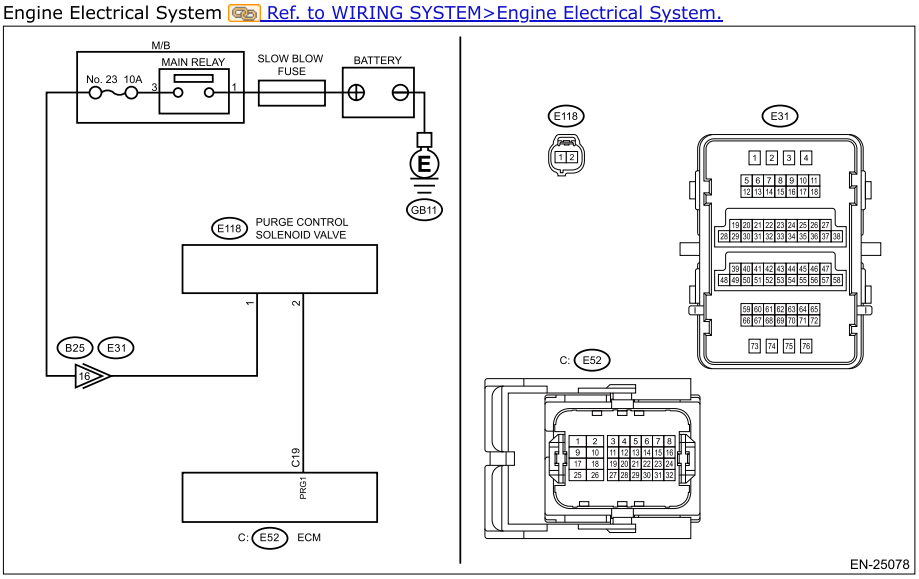
**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0459 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK PURGE CONTROL SOLENOID VALVE. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the purge control solenoid valve.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 19 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and purge control solenoid valve connector. |
| No | Go to 2. |

### 2. CHECK PURGE CONTROL SOLENOID VALVE.

1. Turn the ignition switch to OFF.
2. Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

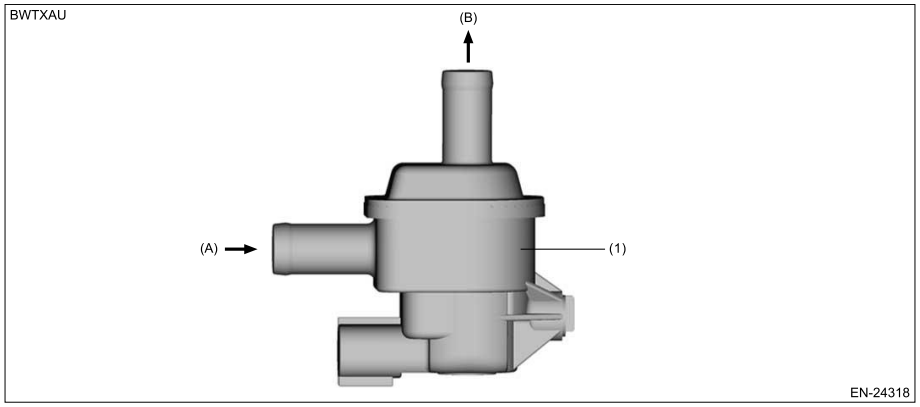
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

**COMPONENT DESCRIPTION**




(A) IN (B) OUT

(1) Purge control solenoid valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Purge control solenoid valve control duty | 20% or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis after starting the engine.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output current | 15.2 A or more |

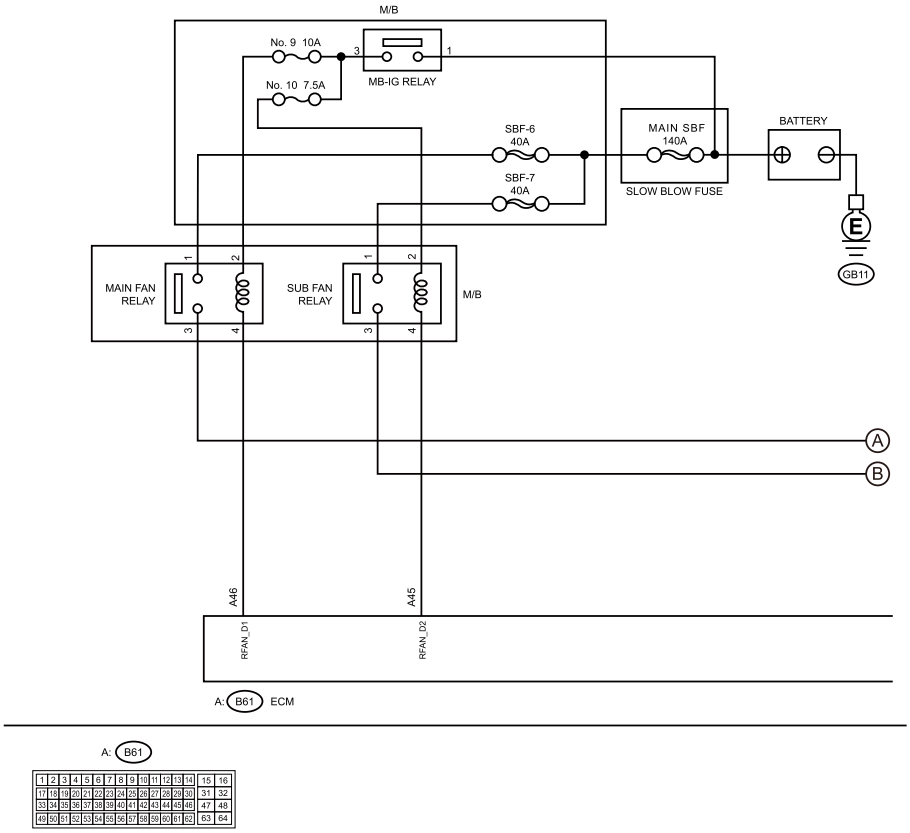
**Time needed for diagnosis:** 220 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P0480 FAN 1 CONTROL CIRCUIT

### 1. —

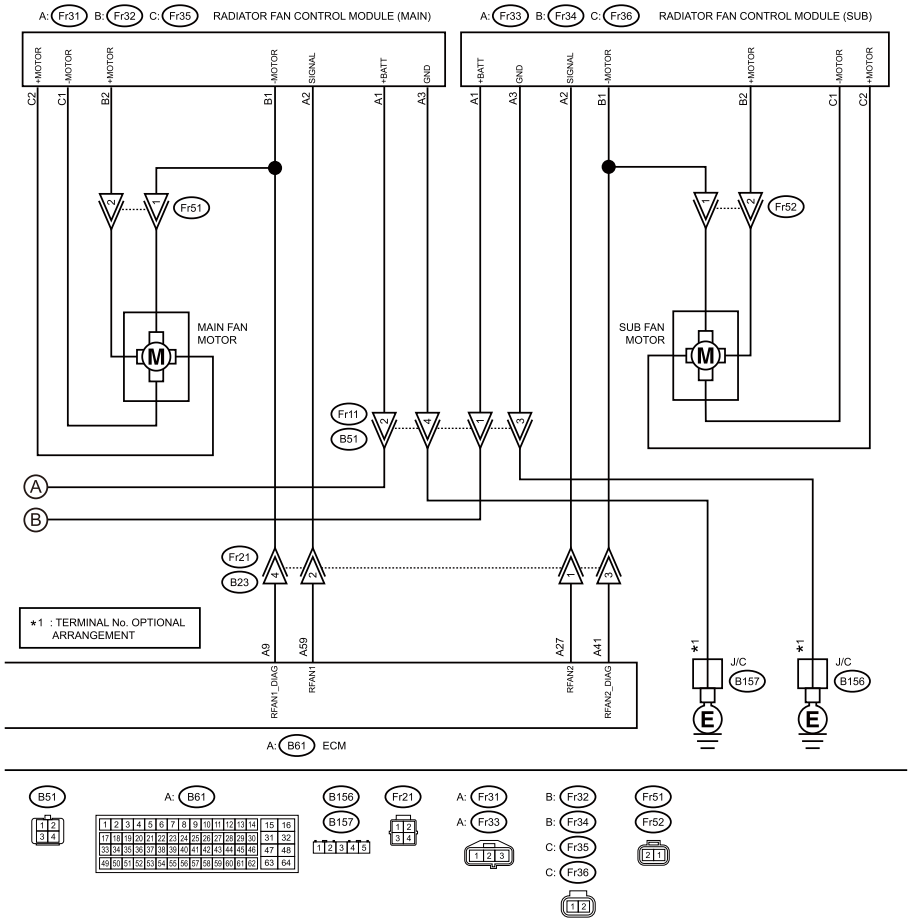
**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
The radiator fan keeps rotating.
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.







EN-25079




EN-25080

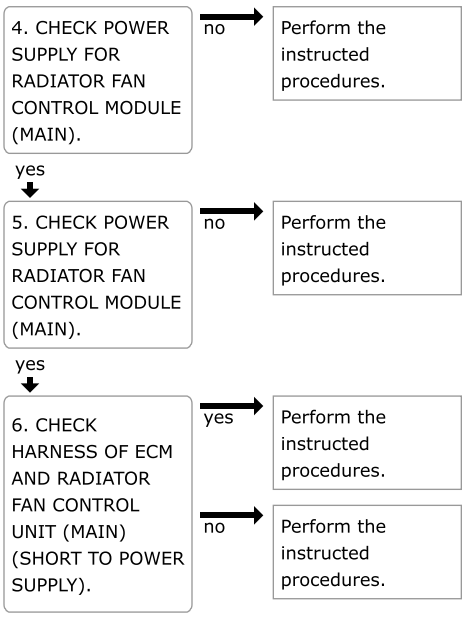
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS OF RADIATOR MAIN FAN DIAGNOSTIC SIGNAL (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK HARNESS OF RADIATOR MAIN FAN DIAGNOSTIC SIGNAL (SHORT TO GROUND).
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK MAIN FAN RELAY.
   - no → Perform the instructed procedures.
   - yes ↓




### 1. CHECK HARNESS OF RADIATOR MAIN FAN DIAGNOSTIC SIGNAL (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the main fan motor.
4. Disconnect the connector from radiator fan control module (main).
5. Measure the resistance between ECM connector and main fan motor connector.
   **Connector & terminal**
   (B61) No. 9 — (Fr51) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between ECM connector and main fan motor connector
- Poor contact of coupling connector

### 2. CHECK HARNESS OF RADIATOR MAIN FAN DIAGNOSTIC SIGNAL (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 9 (+) — Engine ground (−):

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the short circuit to ground in harness between ECM Connector and main fan motor or radiator fan control module (main) connector.

### 3. CHECK MAIN FAN RELAY.

1. Remove the main fan relay from M/B.
2. Check the main fan relay. Ref. to COOLING(H4DOTC)>Radiator Fan Relay>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the main fan relay. Ref. to COOLING(H4DOTC)>Radiator Fan Relay. |

### 4. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL MODULE (MAIN).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between the main fan relay and engine ground.
   **Terminals**
   No. 1 (+) — Engine ground (−):
   No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B and main fan relay<br>• Blown out of fuse<br>• Poor contact of MB-IG relay |

### 5. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL MODULE (MAIN).

1. Turn the ignition switch to OFF.
2. Install the main fan relay.
3. Turn the ignition switch to ON.
4. Measure the voltage between radiator fan control module (main) connector and engine ground.
   **Connector & terminal**
   (Fr32) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between the main fan relay and radiator fan control module (main) connector<br>• Open circuit or short circuit to ground in harness between the main fan relay and ECM connector<br>• Poor contact of coupling connector<br>• Poor contact of main fan relay |

### 6. CHECK HARNESS OF ECM AND RADIATOR FAN CONTROL UNIT (MAIN) (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 59 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the power supply short circuit of harness between ECM and radiator fan control unit (main) connector. |
| No | Replace the radiator fan control module (main). Ref. to COOLING(H4DOTC)>Radiator Fan Control Unit. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the radiator fan ON stuck malfunction when the radiator fan command duty is 0% or when the actual duty equal to or more than predetermined value.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| (Radiator fan command time) | OFF<br>5 s or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Radiator fan duty monitor | 80% or more |

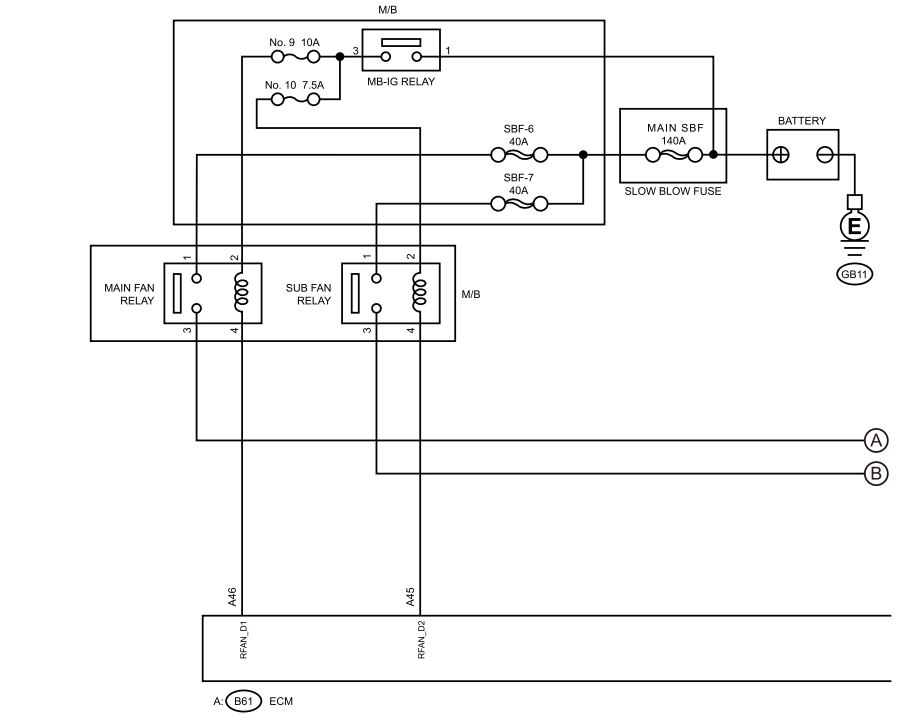
**Time needed for diagnosis:** 2520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0481 FAN 2 CONTROL CIRCUIT

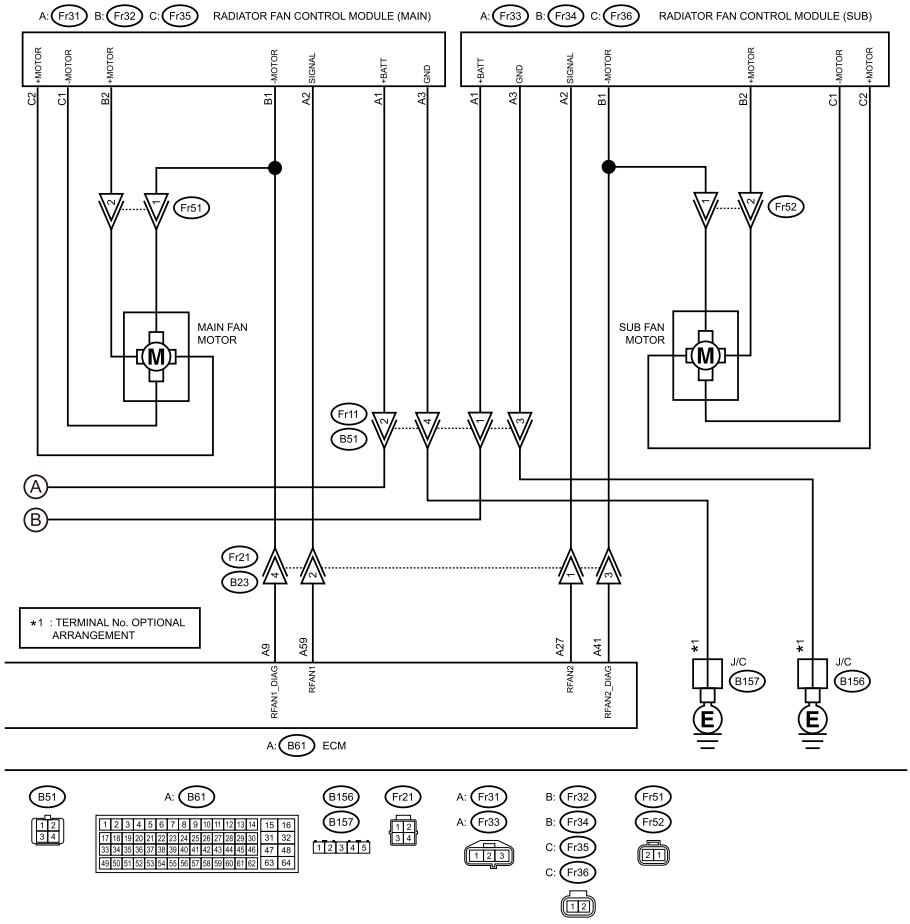
### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
The radiator fan keeps rotating.
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




A: B61

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 |




EN-25080

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS OF RADIATOR SUB FAN DIAGNOSTIC SIGNAL (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK HARNESS OF RADIATOR SUB FAN DIAGNOSTIC SIGNAL (SHORT TO GROUND).
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK SUB FAN RELAY.
   - no → Perform the instructed procedures.
   - yes ↓

4. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT (SUB). → no → Perform the instructed procedures.

yes ↓

5. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT (SUB). → no → Perform the instructed procedures.

yes ↓

6. CHECK HARNESS OF ECM AND RADIATOR FAN CONTROL UNIT (SUB) (SHORT TO POWER SUPPLY).
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

### 1. CHECK HARNESS OF RADIATOR SUB FAN DIAGNOSTIC SIGNAL (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the sub fan motor.
4. Disconnect the connector from radiator fan control module (sub).
5. Measure the resistance between ECM connector and sub fan motor connector.

**Connector & terminal**

(B61) No. 41 — (Fr52) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between ECM connector and sub fan motor connector
- Poor contact of coupling connector

### 2. CHECK HARNESS OF RADIATOR SUB FAN DIAGNOSTIC SIGNAL (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(B61) No. 41 (+) — Engine ground (−):

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the short circuit to ground in harness between ECM connector and sub fan motor or radiator fan control unit (sub) connector.

### 3. CHECK SUB FAN RELAY.

1. Remove the sub fan relay from M/B.
2. Check the sub fan relay. Ref. to COOLING(H4DOTC)>Radiator Fan Relay>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the sub fan relay. Ref. to COOLING(H4DOTC)>Radiator Fan Relay. |

### 4. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT (SUB).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between the sub fan relay and engine ground.
   **Terminals**
   No. 1 (+) — Engine ground (−):
   No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B and sub fan relay<br>• Blown out of fuse<br>• Poor contact of MB-IG relay |

### 5. CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT (SUB).

1. Turn the ignition switch to OFF.
2. Install the sub fan relay.
3. Turn the ignition switch to ON.
4. Measure the voltage between radiator fan control unit (sub) connector and engine ground.
   **Connector & terminal**
   (Fr33) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between the sub fan relay and radiator fan control module (sub) connector<br>• Open circuit or short circuit to ground in harness between the sub fan relay and ECM connector<br>• Poor contact of coupling connector<br>• Poor contact of sub fan relay |

### 6. CHECK HARNESS OF ECM AND RADIATOR FAN CONTROL UNIT (SUB) (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 27 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the power supply short circuit of harness between ECM and radiator fan control unit (sub) connector. |
| No | Replace the radiator fan control module (sub). Ref. to COOLING(H4DOTC)>Radiator Fan Control Unit. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0480. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0480 FAN 1 CONTROL CIRCUIT.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P04AE EVAP SYSTEM PURGE CONTROL VALVE "B" PERFORMANCE/STUCK OPEN

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

- Improper idling
- Fuel odor

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FUEL FILLER CAP. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK FUEL FILLER CAP. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK FUEL FILLER CAP. | yes → | Perform the instructed procedures. |
| | no ↓ | Go to 4. |
| 4. CHECK CHECK VALVE 1 AND 2. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 5. CHECK PIPES. | no → | Perform the instructed procedures. |
| yes ↓ | | |

6. CHECK PURGE CONTROL SOLENOID VALVE.
→ no → Perform the instructed procedures.
↓ yes

7. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.
→ yes → Perform the instructed procedures.
↓ no → Go to 8.

8. CHECK CANISTER.
→ yes → Perform the instructed procedures.
↓ no → Go to 9.

9. CHECK LEAK CHECK VALVE ASSEMBLY.
→ yes → Perform the instructed procedures.
↓ no → Go to 10.

10. CHECK FUEL TANK.
→ yes → Perform the instructed procedures.
↓ no → Go to 11.

11. CHECK STATUS OF EVAPORATIVE EMISSION CONTROL SYSTEM.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK FUEL FILLER CAP.

1. Turn the ignition switch to OFF.
2. Check the fuel filler cap.

**Note:**
**The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.**

Is the fuel filler cap tightened securely?

| | |
|---|---|
| Yes | Go to 2. |
| No | Tighten fuel filler cap securely. |

### 2. CHECK FUEL FILLER CAP.

Check the fuel filler cap.

Is the fuel filler cap genuine?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace with a genuine fuel filler cap. |

### 3. CHECK FUEL FILLER CAP.

Check the gasket of fuel filler cap.

Does the gasket of fuel filler cap have any damage?

| | |
|---|---|
| Yes | Replace the fuel filler cap. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Filler Cap. |
| No | Go to 4. |

### 4. CHECK CHECK VALVE 1 AND 2.

Check the check valve 1 and 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the defective check valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

### 5. CHECK PIPES.

Check that there is no dislocation and damage in the pipes between purge control solenoid valve and check valve 1 and between purge control solenoid valve and check valve 2. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair or replace faulty parts. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

### 6. CHECK PURGE CONTROL SOLENOID VALVE.

Check air-tightness of the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 7. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 7. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Check the evaporative emission control system line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines.

Are there holes on the evaporation line?

Yes — Repair or replace the evaporation line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines.

No — Go to 8.

### 8. CHECK CANISTER.

Check the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister>INSPECTION.

Are there holes on the canister?

Yes — Replace the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister.

No — Go to 9.

### 9. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Are there damage or holes on the leak check valve assembly?

Yes — Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

No — Go to 10.

### 10. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Remove the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Are there damage or holes on the fuel tank?

Yes — Repair or replace the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

No — Go to 11.

### 11. CHECK STATUS OF EVAPORATIVE EMISSION CONTROL SYSTEM.

Check the condition of evaporative emission control system for other mechanical defects.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

Yes — Repair or replace the hoses or pipes.

No — Repair the poor contact of ECM connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

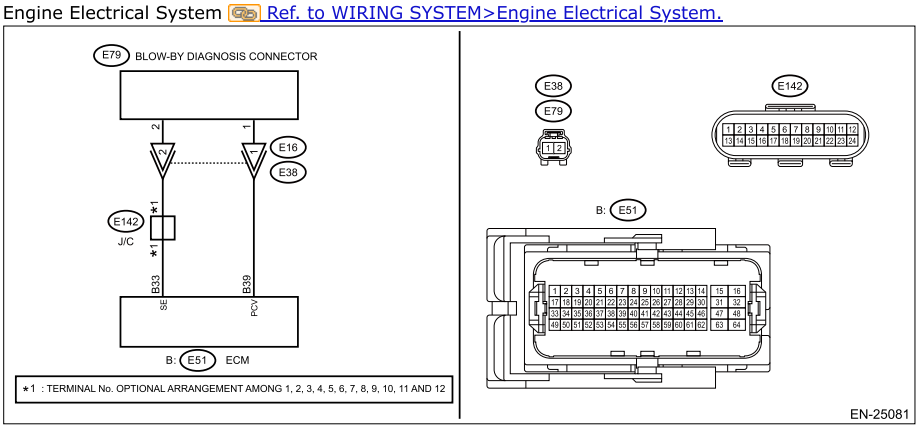
**Note:**

**For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).**

## DTC P04DB CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK BLOW-BY HOSE. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND BLOW-BY DIAGNOSIS CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND BLOW-BY DIAGNOSIS CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK PCV HOSE ASSEMBLY. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK BLOW-BY HOSE.

Check the blow-by hose condition.

Is there any disconnection or crack in blow-by hose?

| | |
|---|---|
| Yes | Install or replace the blow-by hose. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND BLOW-BY DIAGNOSIS CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from blow-by diagnosis connector.
4. Measure the resistance of harness between ECM connector and blow-by diagnosis connector.

**Connector & terminal**

(E51) No. 39 — (E79) No. 1:

(E51) No. 33 — (E79) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and blow-by diagnosis connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

### 3. CHECK HARNESS BETWEEN ECM AND BLOW-BY DIAGNOSIS CONNECTOR (SHORT TO GROUND).

Measure the resistance between the blow-by diagnosis connector and engine ground.

**Connector & terminal**

(E51) No. 33 — Engine ground:

(E51) No. 39 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and blow-by diagnosis connector. |

### 4. CHECK PCV HOSE ASSEMBLY.

Measure the resistance between blow-by diagnosis connector terminals.

**Terminals**

No. 1 — No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Repair the poor contact of ECM and blow-by diagnosis connector. |
| No | Replace the PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose Assembly. |

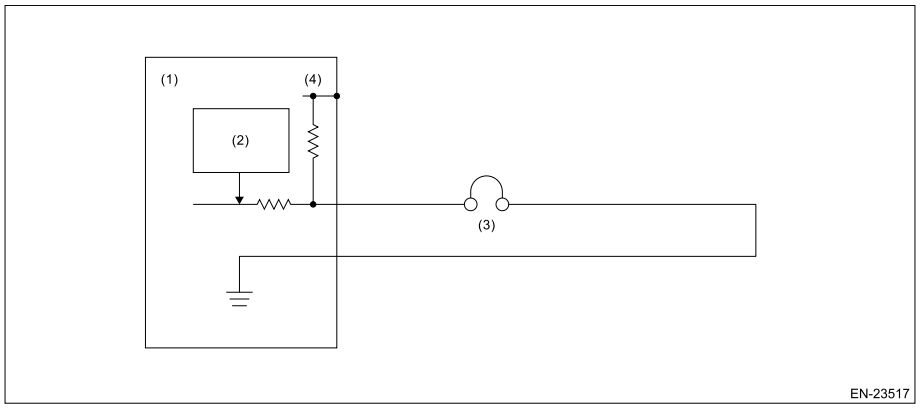
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the blow-by hose disconnection abnormality.

Judge as NG when the diagnosis terminal voltage is high.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM) (3) Blow-by diagnosis connector (4) 5 V
(2) Detecting circuit

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Positive crankcase ventilation diagnosis voltage | 3.59 V or more |

**Time needed for diagnosis:** 2500 ms

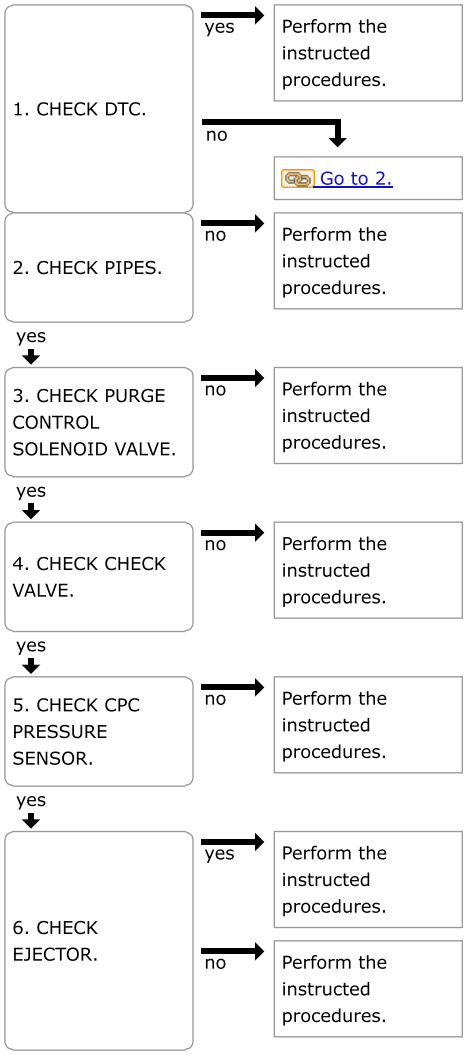
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P04F0 EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Fuel odor

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P04F0 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

## 2. CHECK PIPES.

1. Turn the ignition switch to OFF.
2. Check for disconnection or damage in the following pipes. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT.
   - Between leak check valve assembly and purge control solenoid valve
   - Between purge control solenoid valve and check valve No. 2
   - Between check valve No. 2 and intake duct No. 1

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair or replace faulty parts.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

## 3. CHECK PURGE CONTROL SOLENOID VALVE.

Check that the purge control solenoid valve has no open or close stuck. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

## 4. CHECK CHECK VALVE.

Check the check valves No. 1 and No. 2 for stuck. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the check valve No. 1 or No. 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

## 5. CHECK CPC PRESSURE SENSOR.

Check the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 6. |
| No | Replace the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor. |

## 6. CHECK EJECTOR.

Check the ejector mechanism of the intake duct No. 1 for clogging and breakage. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intake Duct.

Is the check result OK?

| | |
|---|---|
| Yes | End. |
| No | Replace the intake duct No. 1 with ejector. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intake Duct. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

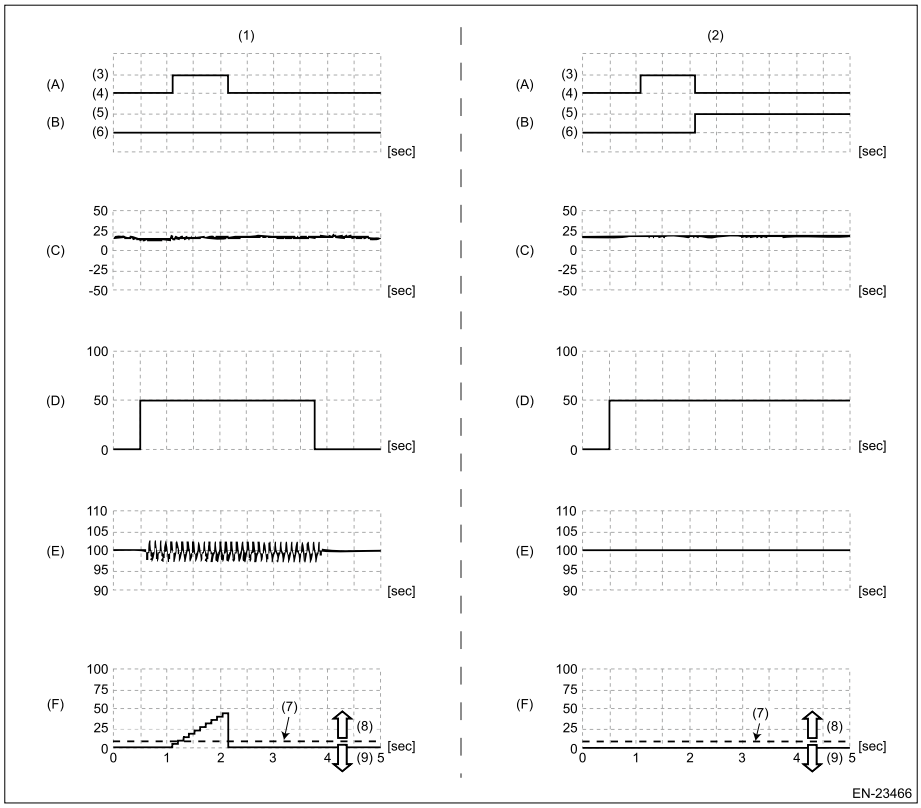
When a negative pressure is generated in the ejector mechanism of the intake manifold or the intake duct No. 1, the purge control solenoid valve performs opening/closing operation.

As a result, pressure pulsation occurs in the CPC pressure sensor area.

If pressure pulsation does not occur and the monitoring value (integral of pressure fluctuation) has not reached the threshold value, ECM judges that it is malfunctioning.

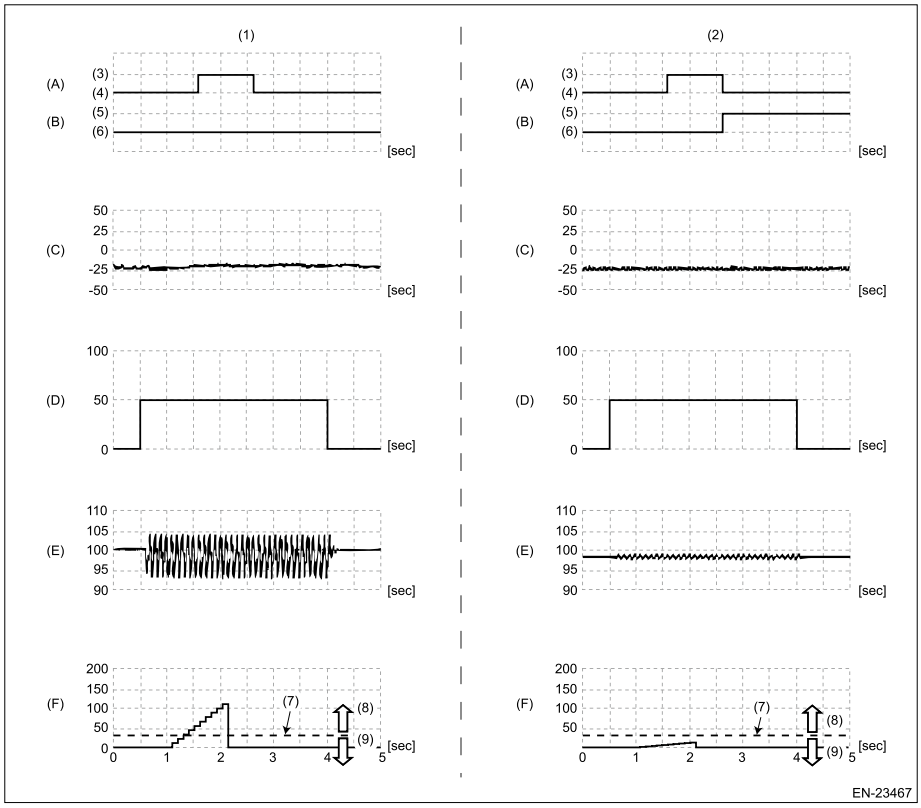
The monitor of P04F1 is executed when the intake manifold is at negative pressure, and when the pressure rises and the ejector mechanism functions, the monitoring of P04F0 is executed.

High pressure side pressure system (P04F0)




| | | |
|---|---|---|
| (A) Monitor | (C) Intake manifold gauge pressure (kPa) | (E) Purge line pressure (kPa) |
| (B) Fail flag | (D) Purge control valve commanded DUTY (%) | (F) Monitoring value (integration of pressure variation) |
| (1) Normal Condition | (4) Disable | (7) Threshold |
| (2) Malfunction Condition | (5) Malfunction not detected | (8) Pass |
| (3) Enable | (6) Malfunction detected | (9) Fail |

Low pressure side pressure system (P04F1)




(A) Monitor
(B) Fail flag
(C) Intake manifold gauge pressure (kPa)
(D) Purge control valve commanded DUTY (%)
(E) Purge line pressure (kPa)
(F) Monitoring value (integration of pressure variation)

(1) Normal Condition
(2) Malfunction Condition
(3) Enable
(4) Disable
(5) Malfunction not detected
(6) Malfunction detected
(7) Threshold
(8) Pass
(9) Fail

**EXECUTION CONDITION**

**P04F0**

| Secondary parameters | Execution condition |
|---|---|
| <High pressure side pressure system> | |
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Intake manifold absolute pressure − Barometric pressure | 30.05 kPa (225.4 mmHg, 8.9 inHg) or more |
| Ambient air temperature | More than 4.4 °C (39.9°F) |
| Purge control duty ratio | 40% or more |
| Elapsed time after the switching valve in the leak check valve assembly opened | 4 s or more |

**P04F1**

| Secondary parameters | Execution condition |
|---|---|
| <Low pressure side pressure system> | |
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Barometric pressure − Intake manifold absolute pressure | 25.05 kPa (187.9 mmHg, 7.4 inHg) or more |
| Estimated ejector generation negative pressure | 1.5 kPa (11.3 mmHg, 0.4 inHg) or less |
| Ambient air temperature | More than 4.4 °C (39.9°F) |
| Purge control duty ratio | 40% or more |
| Elapsed time after the switching valve in the leak check valve assembly opened | 4 s or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after starting the engine.

**DIAGNOSTIC METHOD**

When the purge control solenoid valve is duty controlled in the boost region where negative pressure is generated in the intake manifold, negative pressure reaches the CPC pressure sensor as pulsation.

ECM integrates the amount of change of the pulsation, judges as OK when it is equal to or more than the predetermined value, and judges as NG when it is less than the predetermined value.

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| <High pressure side pressure system> Pressure pulsation valve | Less than value of Map1 | P04F0 |
| <Low pressure side pressure system> Pressure pulsation valve | Less than value of Map2 | P04F1 |

**Map1**

| **Atmospheric pressure (kPa (mmHg, inHg))** | **70 (525.1, 20.7)** | **80 (600.2, 23.6)** | **90 (675.2, 26.6)** | **100 (750.2, 29.5)** | **110 (825.2, 32.5)** |
|---|---|---|---|---|---|
| Purge pulsation pressure (kPa (mmHg, inHg)) | 5.31 (39.8, 1.6) | 6.38 (47.9, 1.9) | 7.44 (55.8, 2.2) | 8.5 (63.8, 2.5) | 8.5 (63.8, 2.5) |

**Map2**

| **Atmospheric pressure (kPa (mmHg, inHg))** | **70 (525.1, 20.7)** | **80 (600.2, 23.6)** | **90 (675.2, 26.6)** | **100 (750.2, 29.5)** | **110 (825.2, 32.5)** |
|---|---|---|---|---|---|
| Purge pulsation pressure (kPa (mmHg, inHg)) | 25.05 (187.9, 7.4) | 26.7 (200.3, 7.9) | 28.35 (212.7, 8.4) | 30 (225.1, 8.9) | 30 (225.1, 8.9) |

**Time needed for diagnosis:** 1620 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



## DTC P04F1 EVAP SYSTEM LOW PRESSURE PURGE LINE PERFORMANCE

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

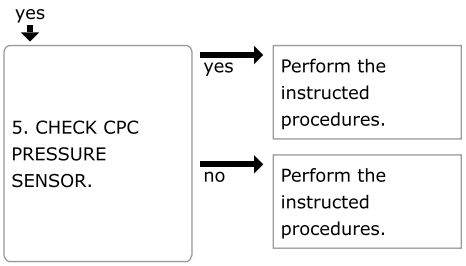
**Trouble symptom:**

Fuel odor

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK PIPES.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK PURGE CONTROL SOLENOID VALVE.
   - no → Perform the instructed procedures.
   - yes ↓
4. CHECK CHECK VALVE.
   - no → Perform the instructed procedures.




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P04F1 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK PIPES.

1. Turn the ignition switch to OFF.
2. Check for disconnection or damage in the following pipes. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT.
   - Between leak check valve assembly and purge control solenoid valve
   - Between purge control solenoid valve and check valve No. 1
   - Between check valve No. 2 and intake manifold

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair or replace faulty parts.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.<br>Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

### 3. CHECK PURGE CONTROL SOLENOID VALVE.

Check that the purge control solenoid valve has no open or close stuck. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 4. CHECK CHECK VALVE.

Check the check valve No. 1 for close stuck. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the check valve No. 1. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Check Valve. |

### 5. CHECK CPC PRESSURE SENSOR.

Check the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | End. |
| No | Replace the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P04F0. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04F0 EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P0500 VEHICLE SPEED SENSOR "A" CIRCUIT

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC OF Brake Control. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC OF Brake Control.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Brake Control]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Brake Control] displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to BRAKE CONTROL (DIAGNOSTICS)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG when outside of the judgment value.

Judge NG when the received data from VDC control module and hydraulic control unit is abnormal vehicle speed, and the vehicle speed data is impossible.

**COMPONENT DESCRIPTION**

Vehicle speed signals are taken in to the VDC control module and hydraulic control unit, and normal/erroneous data of the ABS wheel speed sensor is received by CAN communication from the VDC control module and hydraulic control unit.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Speed of front wheels received from VDC control module & hydraulic control unit | 300 km/h (186.4 MPH) or more |

**Time needed for diagnosis:** 2560 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0506 IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED

## 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**

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

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK AIR CLEANER ELEMENT. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK ELECTRONIC THROTTLE CONTROL. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0506 displayed? (Current malfunction)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK AIR CLEANER ELEMENT.

1. Turn the ignition switch to OFF.
2. Check the air cleaner element.

Is there excessive clogging on air cleaner element?

| | |
|---|---|
| Yes | Replace the air cleaner element. Ref. to INTAKE (INDUCTION)(H4DOTC)>Air Cleaner Element. |
| No | Go to 3. |

### 3. CHECK ELECTRONIC THROTTLE CONTROL.

1. Remove the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.
2. Check the electronic throttle control.

Are foreign matter found inside electronic throttle control?

| | |
|---|---|
| Yes | Remove foreign matter from electronic throttle control. |
| No | Perform the diagnosis of DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0507. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0507 IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED.**

## DTC P0507 IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Engine keeps running at higher speed than specified idle speed.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK AIR INTAKE SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK ELECTRONIC THROTTLE CONTROL. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0507 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK AIR INTAKE SYSTEM.

1. Start and idle the engine.
2. Check the following items. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT.
   - Loose installation of intake manifold and electronic throttle control
   - Cracks of intake manifold gasket and electronic throttle control gasket
   - Disconnection of vacuum hoses

Is there any fault in air intake system?

Yes — Repair air suction and leaks.

No — Go to 3.

### 3. CHECK ELECTRONIC THROTTLE CONTROL.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.
3. Check the electronic throttle control.

Are foreign matter found inside electronic throttle control?

| | |
|---|---|
| Yes | Remove foreign matter from electronic throttle control. |
| No | Perform the diagnosis of DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Lambda value (left and right) | 0.85 or more<br>and<br>Less than 1.15 |
| Vehicle speed | 0 km/h (0 MPH) |
| Elapsed time after gear position change (P ←→ D or N ←→ D) | 5000 ms or more |
| Cold start diagnosis | Not in operation |
| Main feedback | In operation |
| Idle speed control feedback | In operation |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously at idling after warming up engine.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Actual engine speed − Target engine speed | Less than −100 rpm | P0506 |
| Actual engine speed − Target engine speed | More than 200 rpm | P0507 |

**Time needed for diagnosis:** 15 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE

### 1. —

**DTC detecting condition:**

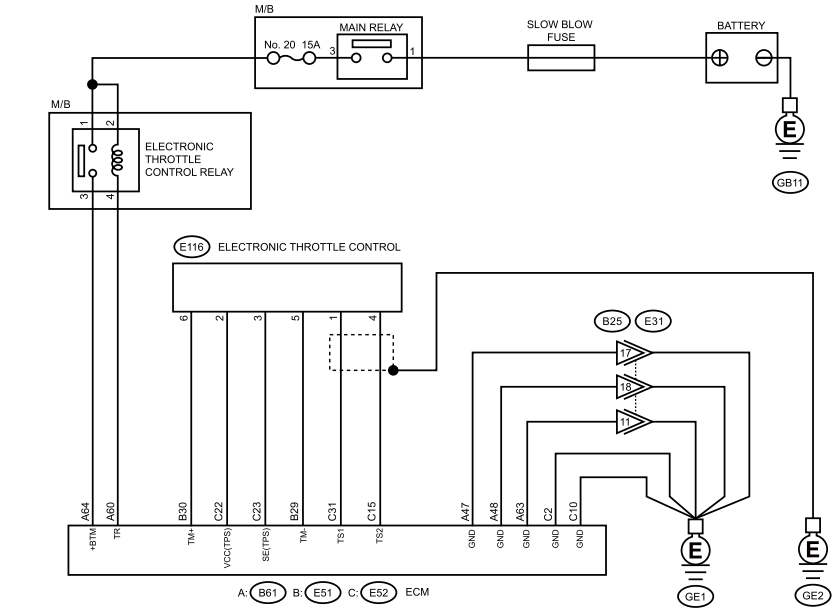
Detected when two consecutive driving cycles with fault occur.

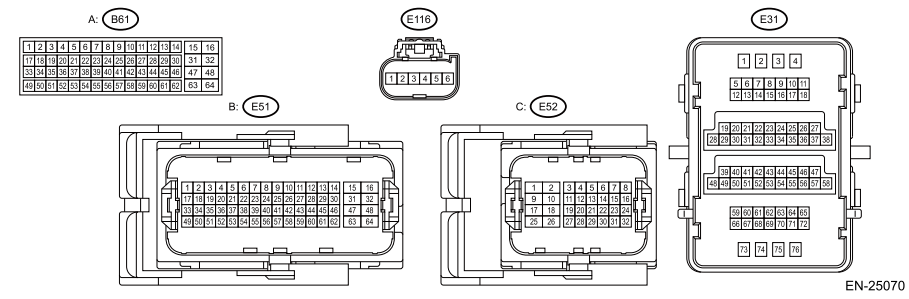
**Trouble symptom:**

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

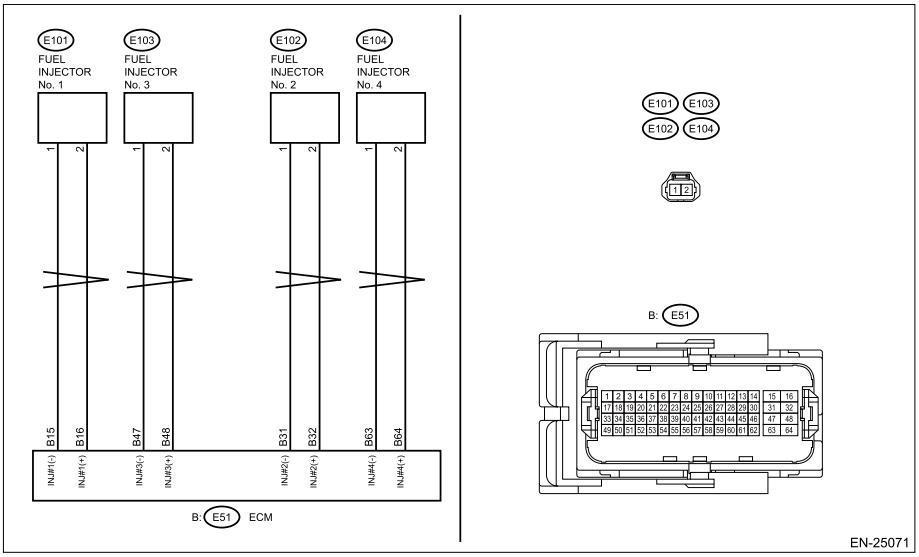
**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




EN-25070




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK ENGINE OIL.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK EXHAUST SYSTEM.
   - yes → Perform the instructed procedures.
   - no → Go to 4.
4. CHECK AIR INTAKE SYSTEM.
   - yes → Perform the instructed procedures.
   - no → Go to 5.
5. CHECK FUEL PRESSURE.
   - no → Perform the instructed procedures.
   - yes ↓
6. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
   - no → Perform the instructed procedures.
   - yes ↓

7. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no → Perform the instructed procedures.
yes ↓

8. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no → Perform the instructed procedures.
yes ↓

9. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

10. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

11. CHECK FUEL INJECTOR.
no → Perform the instructed procedures.
yes ↓

12. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.
yes → Perform the instructed procedures.
no ↓ Go to 13.

13. CHECK CRANKSHAFT POSITION SENSOR PLATE.
yes → Perform the instructed procedures.
no ↓ Go to 14.

14. CHECK INSTALLATION CONDITION OF TIMING CHAIN.
yes → Perform the instructed procedures.
no ↓ Go to 15.

15. CHECK ELECTRONIC THROTTLE CONTROL RELAY.
no → Perform the instructed procedures.

yes

16. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

no → Perform the instructed procedures.

yes

17. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY).

yes → Perform the instructed procedures.

no → Go to 18.

18. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

19. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (OPEN).

no → Perform the instructed procedures.

yes

20. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

21. CHECK SHORT CIRCUIT INSIDE ECM.

no → Perform the instructed procedures.

yes

22. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

no → Perform the instructed procedures.

yes

23. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

24. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).
- yes → Perform the instructed procedures.
- no → Go to 25.

25. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).
- no → Perform the instructed procedures.
- yes ↓

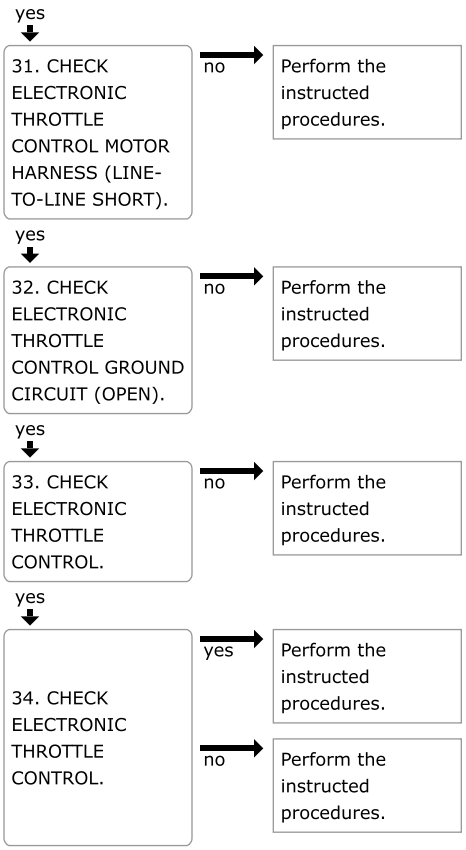
26. CHECK SENSOR OUTPUT.
- no → Perform the instructed procedures.
- yes ↓

27. CHECK SENSOR OUTPUT.
- no → Perform the instructed procedures.
- yes ↓

28. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

29. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (SHORT TO POWER SUPPLY).
- yes → Perform the instructed procedures.
- no → Go to 30.

30. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P050A displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

**2. CHECK ENGINE OIL.**

1. Turn the ignition switch to OFF.
2. Check the engine oil. Ref. to LUBRICATION(H4DOTC)>Engine Oil>INSPECTION.

Is there a proper amount of engine oil?

| | |
|---|---|
| Yes | Go to 3. |
| No | Replace engine oil. Ref. to LUBRICATION(H4DOTC)>Engine Oil. |

### 3. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

| | |
|---|---|
| Yes | Repair the exhaust system. |
| No | Go to 4. |

### 4. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 5. |

### 5. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 6. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 6. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 75[°C] (167°F) or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

### 7. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Warm up the engine until coolant temperature is higher than 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 2 — 5 [g/s] (0.26 — 0.66 lb/min)?

Yes — Go to 8.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 8. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Subtract ambient temperature from [IAT Sensor #11]. Is the obtained value −10 — 50 [°C] (−18 — 90 °F)?

Yes — Go to 9.

No — Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

### 9. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector on faulty cylinders.
4. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.

**Connector & terminal**

#1 (E101) No. 1 — Engine ground:
#1 (E101) No. 2 — Engine ground:
#2 (E102) No. 1 — Engine ground:
#2 (E102) No. 2 — Engine ground:
#3 (E103) No. 1 — Engine ground:
#3 (E103) No. 2 — Engine ground:
#4 (E104) No. 1 — Engine ground:
#4 (E104) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 10.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 10. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 11.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 11. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes — Go to 12.

No — Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

### 12. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.

Check the installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes — Tighten the camshaft position sensor or crankshaft position sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.

No — Go to 13.

### 13. CHECK CRANKSHAFT POSITION SENSOR PLATE.

Check the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate>INSPECTION.

Is the crankshaft position sensor plate rusted or does it have broken teeth?

Yes — Replace the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate.

No — Go to 14.

### 14. CHECK INSTALLATION CONDITION OF TIMING CHAIN.

Turn the crankshaft using the Subaru ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Is the timing chain dislocated from its proper position?

| | |
|---|---|
| Yes | Correct the installation condition of timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly. |
| No | Go to 15. |

### 15. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Remove the electronic throttle control relay.
2. Connect the battery to terminals No. 2 and No. 4 of electronic throttle control relay.
3. Measure the resistance between electronic throttle control relay terminals.

**Terminals**

No. 1 — No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 16. |
| No | Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Electronic Throttle Control Relay. |

### 16. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 17. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B (fuse) and M/B (electronic throttle control relay)<br>• Blown out of fuse |

### 17. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 4 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and M/B (electronic throttle control relay). |
| No | Go to 18. |

### 18. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Measure the resistance between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 3 — Engine ground:
No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 19.

No — Repair the short circuit to ground in the harness between ECM connector and M/B (electronic throttle control relay).

### 19. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (OPEN).

Measure the resistance between ECM connector and M/B (electronic throttle control relay) terminal.

**Connector & terminal**

(B61) No. 64 — No. 3:
(B61) No. 60 — No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 20.

No — Repair the open circuit in harness between ECM connector and M/B (electronic throttle control relay).

### 20. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

1. Disconnect the connectors from electronic throttle control.
2. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 15 — Engine ground:
(E52) No. 22 — Engine ground:
(E52) No. 31 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 21.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 21. CHECK SHORT CIRCUIT INSIDE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 1 — Engine ground:
(E116) No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 22.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. When there is no defect in the harness, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 22. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 31 — (E116) No. 1:
   (E52) No. 23 — (E116) No. 3:
   (E52) No. 15 — (E116) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 23.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

### 23. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 24.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of ECM connector

### 24. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 1 (+) — Engine ground (−):
   (E116) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 25.

### 25. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (E52) No. 22 — (E52) No. 15:
   (E52) No. 22 — (E52) No. 31:

Is the resistance 1 MΩ or more?

Yes — Go to 26.

No — Repair the line-to-line short circuit between ECM connector and electronic throttle control connector.

## 26. CHECK SENSOR OUTPUT.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Using the Subaru Select Monitor, read the value in [Main-Throttle Sensor].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Main-Throttle Sensor] 0.6 — 0.65 [V]?

| | |
|---|---|
| Yes | Go to 27. |
| No | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

## 27. CHECK SENSOR OUTPUT.

Using the Subaru Select Monitor, read the value in [Sub-Throttle Sensor].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Sub-Throttle Sensor] 0.6 — 0.65 [V]?

| | |
|---|---|
| Yes | Go to 28. |
| No | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

## 28. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E51) No. 29 — (E116) No. 5:
   (E51) No. 30 — (E116) No. 6:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 29. |
| No | Repair the open circuit of harness between ECM connector and electronic throttle control connector. |

## 29. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 5 (+) — Engine ground (−):
   (E116) No. 6 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector. |
| No | Go to 30. |

### 30. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**
(E116) No. 5 — Engine ground:
(E116) No. 6 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 31.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 31. CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS (LINE-TO-LINE SHORT).

Measure the resistance between electronic throttle control connectors.
**Connector & terminal**
(E116) No. 5 — (E116) No. 6:

Is the resistance 1 MΩ or more?

Yes — Go to 32.

No — Repair the short circuit in harness between ECM connector and electronic throttle control connector.

### 32. CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT (OPEN).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 33.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of coupling connector

### 33. CHECK ELECTRONIC THROTTLE CONTROL.

Measure the resistance between electronic throttle control terminals.
**Terminals**
No. 5 — No. 6:

Is the resistance 50 Ω or less?

Yes — Go to 34.

No — Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.

### 34. CHECK ELECTRONIC THROTTLE CONTROL.

1. Move the throttle valve to the fully opened and fully closed positions with fingers.
2. Check that the valve returns to the specified position when releasing fingers.

Does the valve return to the specified position?
Specification:
3 mm (0.12 in) from fully closed position

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
**When cold, the abnormality in the control of target engine speed increase is detected. (DTC P050A)**
Judge as NG if the idle speed diagnosis is NG.
<Idle speed diagnosis>
Judge as NG when actual engine speed is not close to target engine speed at cold start.
**Detect malfunctions of the catalyst advanced idling retard angle control. (DTC P050B)**
Judge as NG when ECM is not controlling the angle properly during catalyst advanced idling retard angle control.
<Final ignition timing diagnosis>
Judge as NG when actual retard amount is under the specified value at cold start.

**EXECUTION CONDITION**
**<Idle speed diagnosis>**

| Secondary parameters | Execution condition | DTC |
|---|---|---|
| Battery voltage | 10.9 V or more | P050A |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more | |
| Vehicle speed | 1.9 km/h (1.2 MPH) or less | |
| Throttle position | Less than 0.21% | |
| Integrated value of intake air amount | Less than value of Map1 | |
| Time when the parking/neutral position switch does not change | 3000 ms or more | |
| Elapsed time after starting the engine | 2000 ms or more | |

**<Final ignition timing diagnosis: Idle>**

| Secondary parameters | Execution condition | DTC |
|---|---|---|
| Battery voltage | 10.9 V or more | P050B |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more | |
| Throttle position | Less than 0.21% | |
| Integrated value of intake air amount | Less than value of Map1 | |
| Time when the parking/neutral position switch does not change | 3000 ms or more | |
| Target retard amount (N range) | 8.5 °CA or more | |
| Target retard amount (D range) | 8.5 °CA or more | |

**<Final ignition timing diagnosis: Non-idle>**

| Secondary parameters | Execution condition | DTC |
|---|---|---|
| Battery voltage | 10.9 V or more | P050B |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more | |
| Integrated value of intake air amount | Less than value of Map2 | |
| Target retard amount | 8.5 °CA or more | |

**Map1**

| Engine coolant temperature at first engine start (°C (°F)) | −40 (−40) | −30 (−22) | −20 (−4) | −10 (−14) | 0 (32) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) |

| Engine coolant temperature at first engine start (°C (°F)) | 10 (50) | 20 (68) | 30 (86) | 40 (104) | 50 (122) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) |

| Engine coolant temperature at first engine start (°C (°F)) | 60 (140) | 70 (158) | 75 (167) | 100 (212) | 110 (230) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 500 (17.64) | 250 (8.82) | 0 (0) | 0 (0) |

**Map2**

| Engine coolant temperature at first engine start (°C (°F)) | −40 (−40) | −30 (−22) | −20 (−4) | −10 (−14) | 0 (32) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) |

| Engine coolant temperature at first engine start (°C (°F)) | 10 (50) | 20 (68) | 30 (86) | 40 (104) | 50 (122) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) | 843 (29.7) |

| Engine coolant temperature at first engine start (°C (°F)) | 60 (140) | 70 (158) | 75 (167) | 100 (212) | 110 (230) |
|---|---|---|---|---|---|
| Integrated value of intake air amount (g (oz)) | 843 (29.7) | 500 (17.64) | 250 (8.82) | 0 (0) | 0 (0) |

**GENERAL DRIVING CYCLE**

Perform the diagnosis at cold start.

**DIAGNOSTIC METHOD**

**<Idle speed diagnosis>**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Actual engine speed − Target engine speed | Less than −300 rpm | P050A |

**<Final ignition timing diagnosis: Idle>**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| <N range><br>Final ignition timing − Ignition timing during CSERS*<br><D range><br>Final ignition timing − Ignition timing during CSERS* | More than 8.5 °CA<br><br>More than 8.5 °CA | P050B |

*: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing − Retard amount

**<Final ignition timing diagnosis: Non-idle>**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value | DTC |
|---|---|---|
| Final ignition timing − Ignition timing during CSERS* | More than 8.5 °CA | P050B |

*: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing − Retard amount
**Time needed for diagnosis:** 7000 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



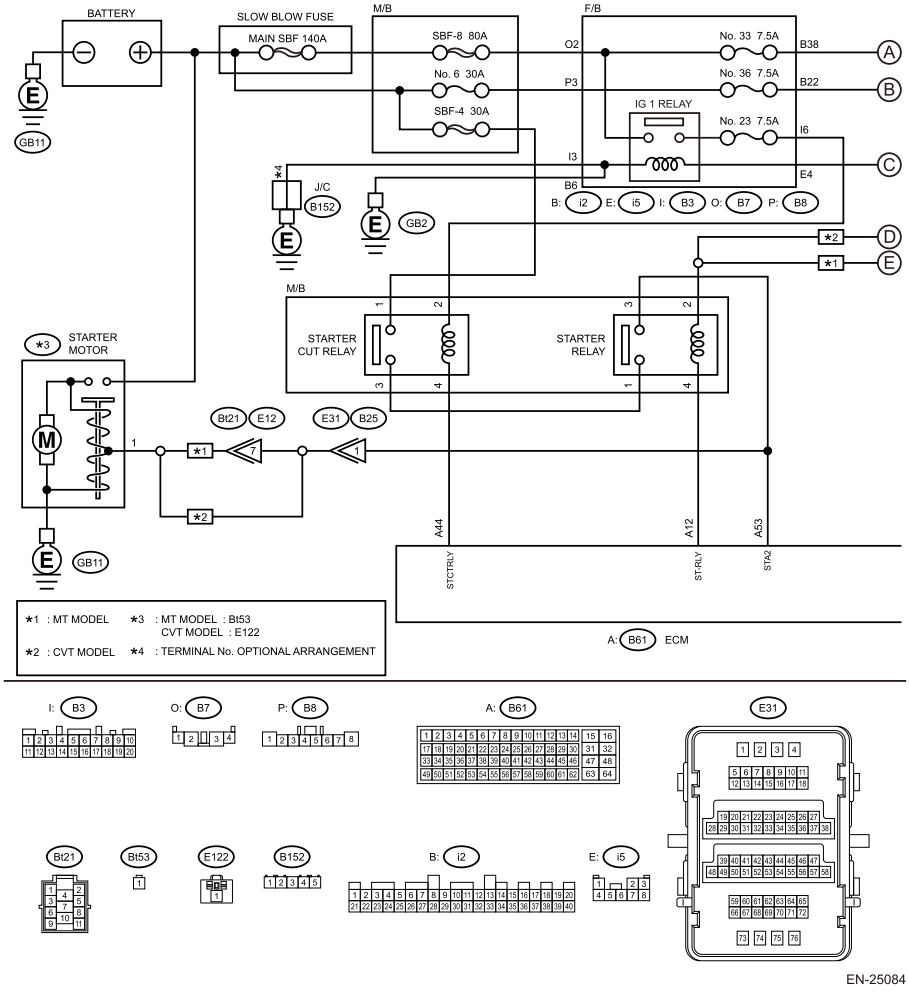
## DTC P050B COLD START IGNITION TIMING PERFORMANCE

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P050A. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE.**

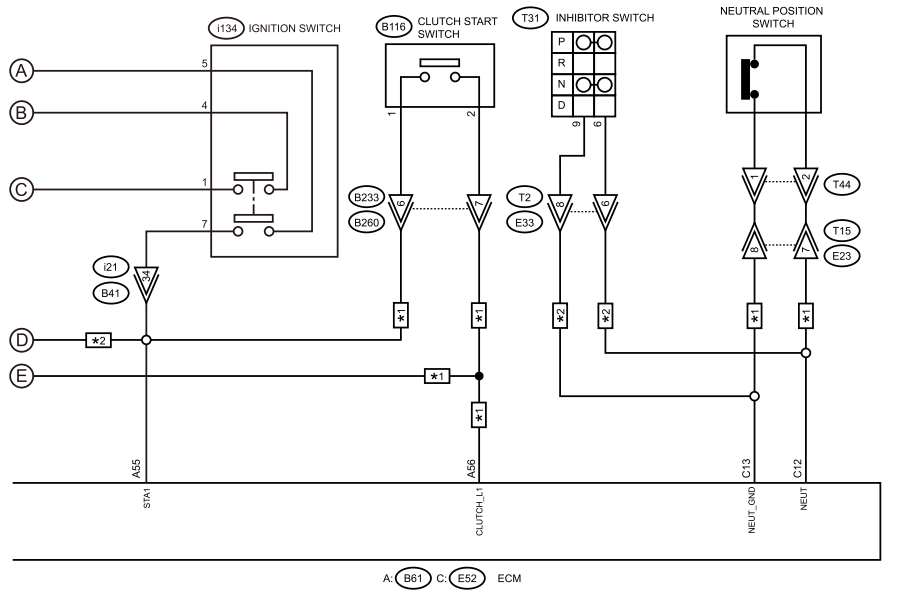
## DTC P0512 STARTER (SWITCH) REQUEST CIRCUIT

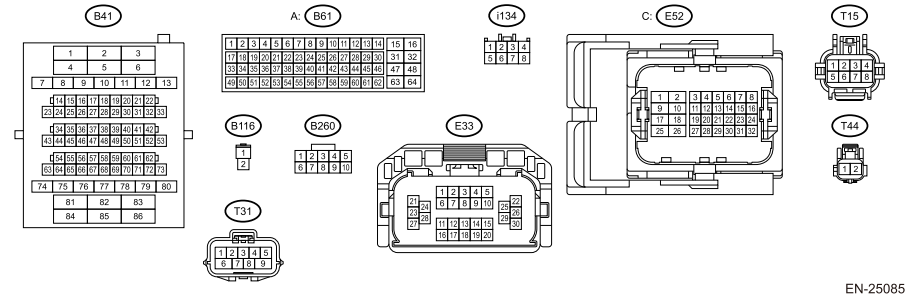
### 1. MODEL WITHOUT PUSH BUTTON START

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Failure of engine to start
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




EN-25084




EN-25085

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND IGNITION SWITCH (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Start and idle the engine for three minutes or more.
3. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0512 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 2. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. In this case, a malfunction may be detected by continuously holding the ignition key at START position. |

### 2. CHECK HARNESS BETWEEN ECM AND IGNITION SWITCH (SHORT TO POWER SUPPLY).

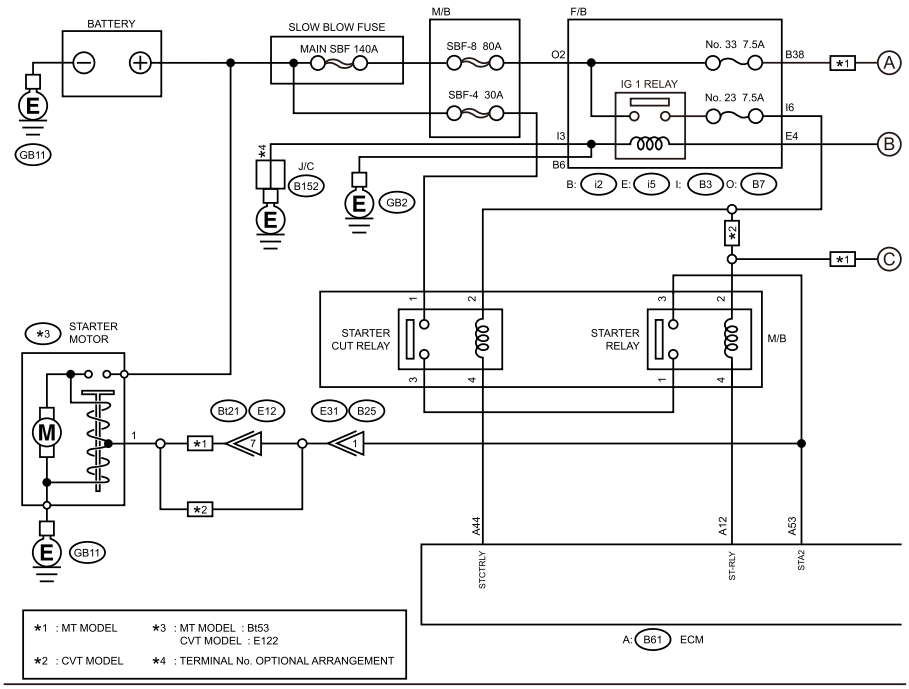
1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 55 (+) — Engine ground (−):

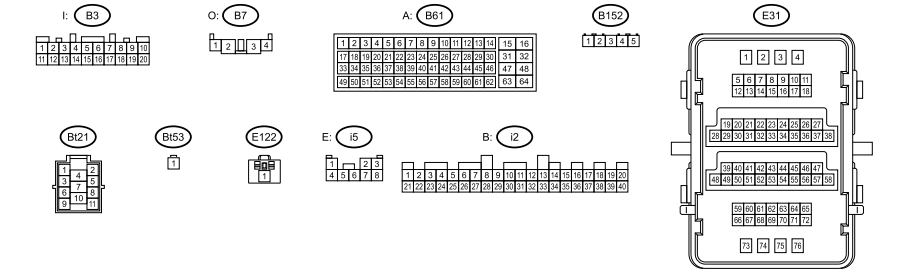
Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and ignition switch connector. |
| No | Repair the poor contact of ECM connector. |

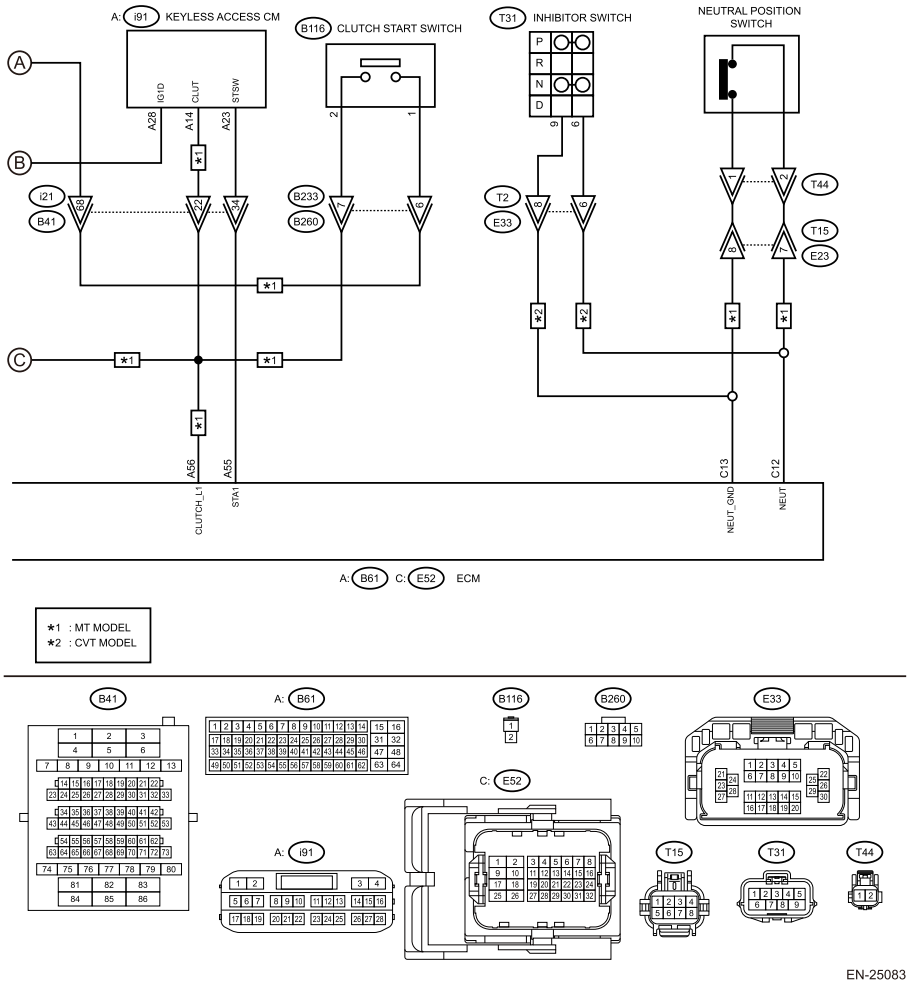
## 2. MODEL WITH PUSH BUTTON START

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Failure of engine to start
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.


BATTERY
SLOW BLOW FUSE
MAIN SBF 140A
M/B
SBF-8 80A
SBF-4 30A
F/B
O2
No. 33 7.5A
B38
IG 1 RELAY
No. 23 7.5A
I6
I3
E4
B6
B: i2 E: i5 I: B3 O: B7
GB11
J/C
B152
GB2
*1
*2
*3
*4
STARTER MOTOR
STARTER CUT RELAY
STARTER RELAY
M/B
Bt21 E12
E31 B25
A44
A12
A53
STCTRLY
ST-RLY
STA2
A: B61 ECM
*1 : MT MODEL
*2 : CVT MODEL
*3 : MT MODEL : Bt53
CVT MODEL : E122
*4 : TERMINAL No. OPTIONAL ARRANGEMENT


I: B3
O: B7
A: B61
B152
E31
Bt21
Bt53
E122
E: i5
B: i2

EN-25082




EN-25083

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK PUSH BUTTON IGNITION SWITCH.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK DTC.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM (SHORT TO POWER SUPPLY).
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

### 1. CHECK PUSH BUTTON IGNITION SWITCH.

Check the push button ignition switch. Ref. to SECURITY AND LOCKS>Push Button Ignition Switch>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the push button ignition switch. Ref. to SECURITY AND LOCKS>Push Button Ignition Switch. |

### 2. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Start and idle the engine for three minutes or more.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0512 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 3. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

### 3. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 55 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and keyless access CM connector. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect abnormal continuity in the starter SW.
Judge as ON NG when the starter SW signal remains ON.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Engine speed | 475 rpm or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as ON NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Starter SW voltage | More than 6 V |

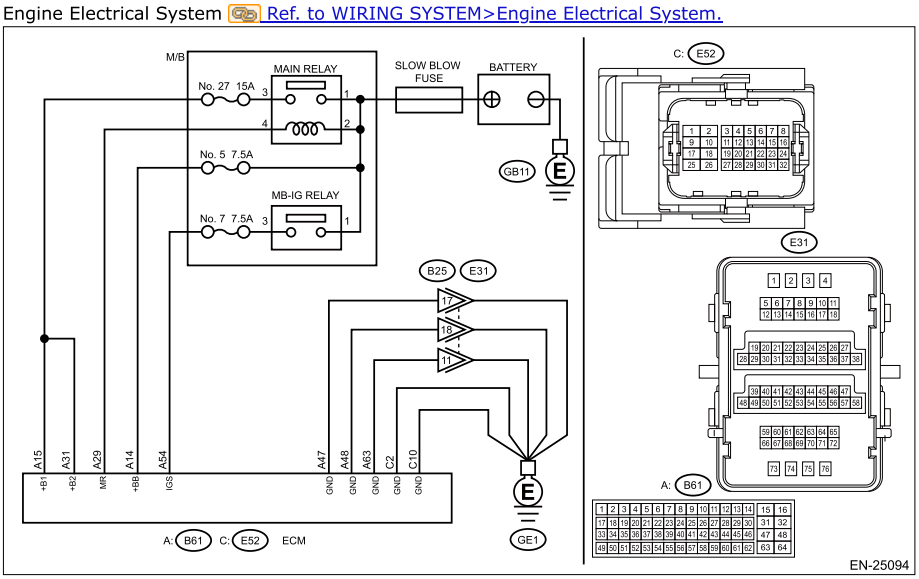
**Time needed for diagnosis:** 30 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0560 SYSTEM VOLTAGE

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INPUT SIGNAL OF ECM. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| 2. CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX (SHORT TO GROUND). | yes ↓ | |
| 3. CHECK FUSE (MAIN FUSE BOX). | yes → | Perform the instructed procedures. |
| 3. CHECK FUSE (MAIN FUSE BOX). | no → | Perform the instructed procedures. |

### 1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 14 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX (SHORT TO GROUND).

1. Remove the fuse No. 5.
2. Disconnect the connector from ECM.
3. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 14 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the short circuit to ground in harness between ECM connector and main fuse box. |

### 3. CHECK FUSE (MAIN FUSE BOX).

Check the fuse No. 5. Ref. to WIRING SYSTEM>Engine Electrical System.

Is the fuse blown out?

| | |
|---|---|
| Yes | Replace the fuse. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and battery<br>• Poor contact of ECM connector<br>• Poor contact of battery terminal |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open/short circuit of back-up power supply circuit.
Judge as NG when the backup power voltage is low.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**
Perform the diagnosis after starting the engine.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

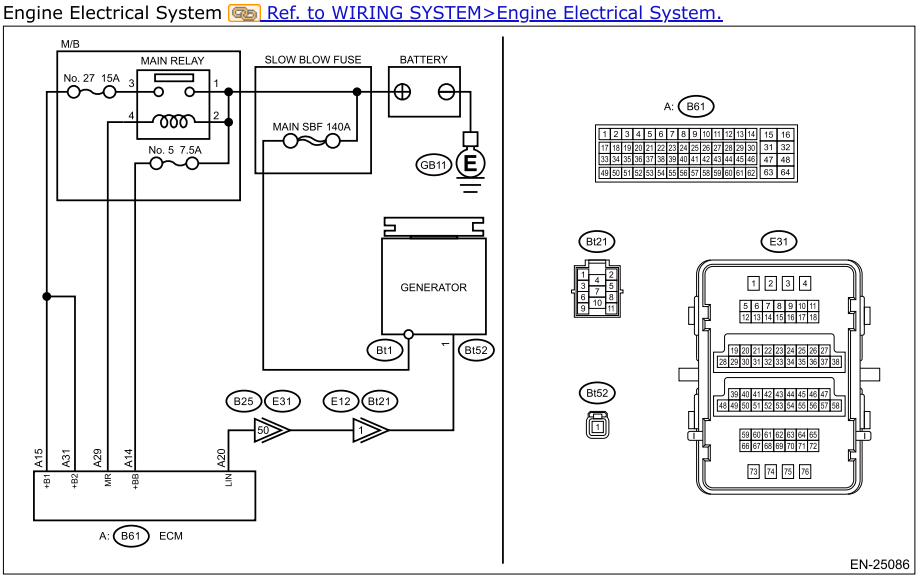
| Malfunction Criteria | Threshold Value |
|---|---|
| Voltage of back-up power supply | Less than 6 V |

**Time needed for diagnosis:** 2560 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P0562 SYSTEM VOLTAGE LOW

### 1. —

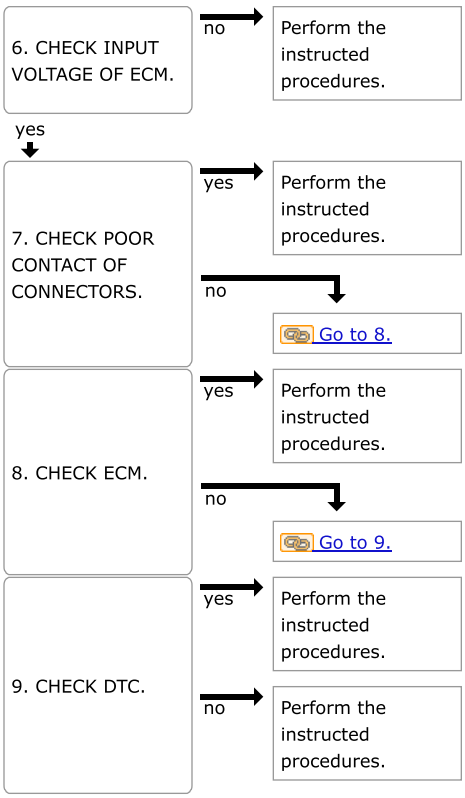
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Charge warning light illuminates.
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK GENERATOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK GENERATOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK GENERATOR TERMINAL B. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK CONTINUITY BETWEEN GENERATOR AND ENGINE GROUND. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 5. CHECK BATTERY TERMINAL. | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK GENERATOR.

1. Start the engine.
2. Run the engine at idle after warming up.
3. Measure the voltage between generator terminal B and engine ground.
   **Terminals**
   Generator terminal B (+) — Engine ground (−):

Is the voltage 10.8 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |

### 2. CHECK GENERATOR.

1. Run the engine at 3,000 rpm.
2. Measure the voltage between generator terminal B and engine ground.
   **Terminals**
   Generator terminal B (+) — Engine ground (−):

Is the voltage 10.8 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |

### 3. CHECK GENERATOR TERMINAL B.

1. Turn the ignition switch to OFF.
2. Measure the battery voltage.
3. Measure the voltage of the generator terminal B.

Are the battery voltage and generator terminal B voltage the same?

| | |
|---|---|
| Yes | Go to 4. |
| No | Check the generator terminal B harness and fuse. |

### 4. CHECK CONTINUITY BETWEEN GENERATOR AND ENGINE GROUND.

Check continuity between generator main body and engine ground.

Is there continuity?

| | |
|---|---|
| Yes | Go to 5. |
| No | Check and repair the installation condition of the generator and engine ground. |

### 5. CHECK BATTERY TERMINAL.

Check the battery terminals.

Are the positive and negative battery terminals installed tightly?

| | |
|---|---|
| Yes | Go to 6. |
| No | Tighten the clamp of terminal. |

### 6. CHECK INPUT VOLTAGE OF ECM.

1. Run the engine at idle.
2. Measure the voltage between ECM and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 10.8 V or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the harness connector between the ECM, battery and main relay. |

### 7. CHECK POOR CONTACT OF CONNECTORS.

Check the following connectors.
- ECM to Battery
- Generator to ECM
- Battery to Generator

Is there poor contact of connectors between ECM, generator or battery?

| | |
|---|---|
| Yes | Repair the connector. |
| No | Go to 8. |

### 8. CHECK ECM.

1. Connect all connectors.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0562 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |
| No | Go to 9. |

### 9. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0562 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of the charging system (generator, battery, pulleys, harnesses, V-belt, etc).
Judge as NG when the battery voltage is below the predetermined value in a possible driving condition under which the generator should generate electricity.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | 1500 rpm or more |
| Final output duty of generator power generation control | 50% or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

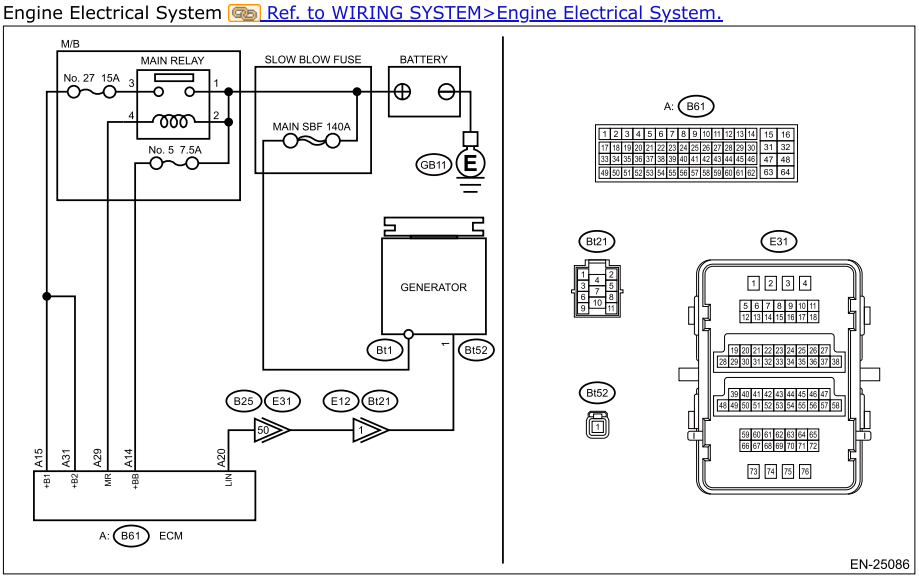
| Malfunction Criteria | Threshold Value |
|---|---|
| Battery voltage | Less than 10.8 V |

**Time needed for diagnosis:** 30 s
**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs. (Charge warning light illuminates.)

## DTC P0563 SYSTEM VOLTAGE HIGH

### 1. —

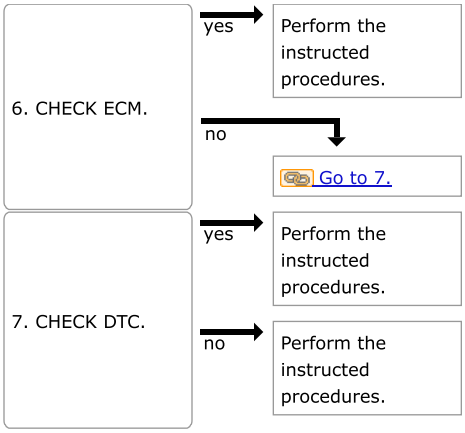
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Charge warning light illuminates.
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK GENERATOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK GENERATOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK BATTERY TERMINAL. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK INPUT VOLTAGE OF ECM. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 5. CHECK POOR CONTACT OF CONNECTORS. | yes → | Perform the instructed procedures. |
| | no ↓ | Go to 6. |




### 1. CHECK GENERATOR.

1. Start the engine.
2. Run the engine at idle after warming up.
3. Measure the voltage between generator terminal B and engine ground.
   **Terminals**
   Generator terminal B (+) — Engine ground (−):

Is the voltage less than 16.2 V?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |

### 2. CHECK GENERATOR.

1. Run the engine at 3,000 rpm.
2. Measure the voltage between generator terminal B and engine ground.
   **Terminals**
   Generator terminal B (+) — Engine ground (−):

Is the voltage less than 16.2 V?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |

### 3. CHECK BATTERY TERMINAL.

1. Turn the ignition switch to OFF.
2. Check the battery terminals.

Are the positive and negative battery terminals installed tightly?

| | |
|---|---|
| Yes | Go to 4. |
| No | Tighten the clamp of terminal. |

### 4. CHECK INPUT VOLTAGE OF ECM.

1. Run the engine at idle.
2. Measure the voltage between ECM and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage less than 16.2 V?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the harness connector between the ECM, battery and main relay. |

### 5. CHECK POOR CONTACT OF CONNECTORS.

1. Turn the ignition switch to OFF.
2. Check the following connectors.
   - ECM to Battery
   - Generator to ECM
   - Battery to Generator

Is there poor contact of connectors between ECM, generator or battery?

| | |
|---|---|
| Yes | Repair the connector. |
| No | Go to 6. |

### 6. CHECK ECM.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P0563 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |
| No | Go to 7. |

### 7. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0563 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of the charging system (generator, battery, pulleys, harnesses, V-belt, etc).

Judge as NG when the battery voltage is the predetermined value or more in a possible driving condition under which the generator should generate electricity.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Engine speed | 1500 rpm or more |
| Final output duty of generator power generation control | 50% or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Battery voltage | 16.2 V or more |

**Time needed for diagnosis:** 30 s

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs. (Charge warning light illuminates.)

## DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine does not start
- Engine stall

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0604 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of microcomputer RAM.
When there is a problem in the CPU normal RAM, judge as NG.
If it is possible to write data to the whole area of RAM in the initial routine, and is possible to read the same data, it is judged as OK, and if not, NG.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Perform the diagnosis immediately after ignition switch ON.

**DIAGNOSTIC METHOD**
Judge as NG when the following conditions are established.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Write the specified value into the RAM. | Different from written value |

**Time needed for diagnosis:** 2 times
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

**Note:**
**For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.**

## 1. OUTLINE OF DIAGNOSIS

Judge as NG when SUM value of ROM is outside the standard value.

## 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

## 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 4. DIAGNOSTIC METHOD

Judge as NG if the criteria below are met.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| SUM value of ROM | Malfunction |

**Time needed for diagnosis:** 2 times

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

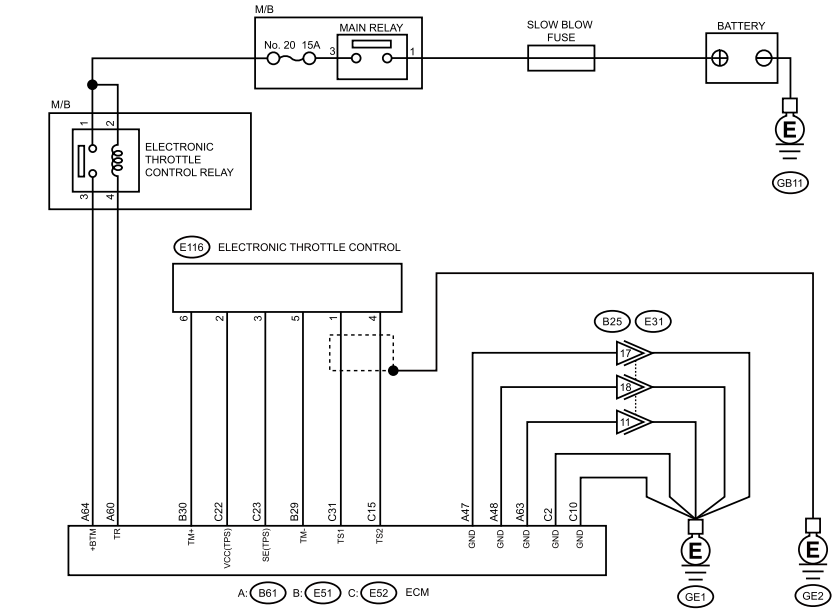
## DTC P0606 CONTROL MODULE PROCESSOR

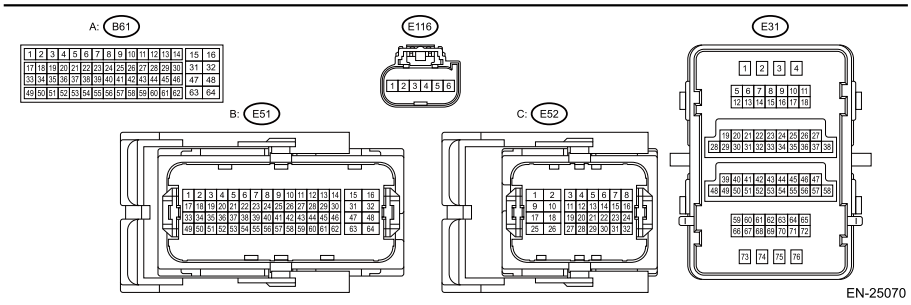
### 1. —

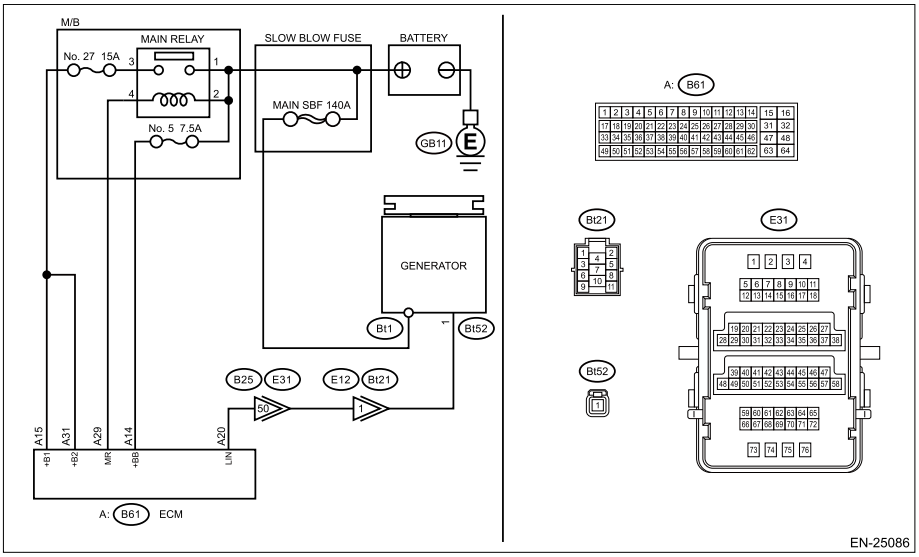
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.






**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK INPUT VOLTAGE OF ECM.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK INPUT VOLTAGE OF ECM.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
4. CHECK ECM GROUND HARNESS.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

### 1. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 10 — 13 V?

Yes — Go to 2.

No — Repair the open or short to ground in the power supply circuit.

### 2. CHECK INPUT VOLTAGE OF ECM.

1. Start the engine.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 13 — 15 V?

Yes — Go to 3.

No — Repair the open or short to ground in the power supply circuit.

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 22 — (E116) No. 2:
   (E52) No. 23 — (E116) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

### 4. CHECK ECM GROUND HARNESS.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the voltage less than 1 V?

Yes — Check the connector for poor contact and check the harness. Replace the ECM if no fault is found. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Repair the following item.
- Open circuit in ground circuit
- Loose engine ground terminal
- Poor contact of coupling connector

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when any one of the followings is established.
- Judgment 1: When the input amplifier circuit operation of throttle position sensor 1 is abnormal.
- Judgment 2: When the learning value of backup RAM is incorrect.
- Judgment 3: When SUM value of backup RAM is outside the standard value.
- Judgment 4: When the communication between main CPU and sub CPU is abnormal.
- Judgment 5: If the CPU operation is abnormal
- Judgment 6: If the CPU operation is abnormal (FPU check)
- Judgment 7: If the CPU operation is abnormal (torque monitor)

**EXECUTION CONDITION**

**Judgment 1, 3**

| Secondary parameters | Execution condition |
|---|---|
| ECM initialization | Execution |

**Judgment 2**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**Judgment 4, 5, 6**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**Judgment 7**

| Secondary parameters | Execution condition |
|---|---|
| Time elapsed after engine start | 500 ms or more |
| (Actual engine output change amount − Target engine output change amount) | Value of Map or more |

**Map**

| Vehicle speed (km/h (MPH)) | 0 (0) | 8 (5) | 16 (10) | 24 (15) | 32 (20) | 48 (30) |
|---|---|---|---|---|---|---|
| Engine output (kw (PS)) | 10 (14) | 15 (20) | 15 (20) | 20 (27) | 20 (27) | 35 (48) |

| Vehicle speed (km/h (MPH)) | 64 (40) | 80 (50) | 97 (60) | 113 (70) | 129 (80) |
|---|---|---|---|---|---|
| Engine output (kw (PS)) | 40 (54) | 60 (82) | 70 (95) | 80 (109) | 100 (136) |

**GENERAL DRIVING CYCLE**
- Judgment 1, 3:
  Perform the diagnosis only once.
- Judgment 2, 4, 5, 6, 7:

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG if the criteria below are met.

Judgment value

**Judgment 1**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle minimum stop position | 2.2 V or more |

**Judgment 2**

| Malfunction Criteria | Threshold Value |
|---|---|
| Accelerator pedal position learning value in backup RAM area 1 | Not equal to accelerator pedal position learning value in backup RAM area 2 |

**Judgment 3**

| Malfunction Criteria | Threshold Value |
|---|---|
| Total of backup RAM (ECM shutdown) | Not equal to total of backup RAM (ECM startup) |

**Judgment 4**

| Malfunction Criteria | Threshold Value |
|---|---|
| Communication status between main CPU and sub CPU | Malfunction |

**Judgment 5**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle control calculation data by main CPU | Not equal to throttle control calculation data by sub CPU |

**Judgment 6**

| Malfunction Criteria | Threshold Value |
|---|---|
| Calculation data by main CPU | Not equal to calculation data by FPU |

**Judgment 7**

| Malfunction Criteria | Threshold Value |
|---|---|
| Actual engine output − Target engine output | More than 20 kw (27 PS) |

**Time needed for diagnosis**

- Judgment 1, 2, 3, 4, 5: Less than 1 s
- Judgment 6: 200 ms
- Judgment 7: 500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE

**Note:**
**For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the monitoring IC operation is abnormal.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Communication status between main CPU and sub CPU | Malfunction |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE

**Note:**
**For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the AD converter operation is abnormal.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.
**Judgment value**

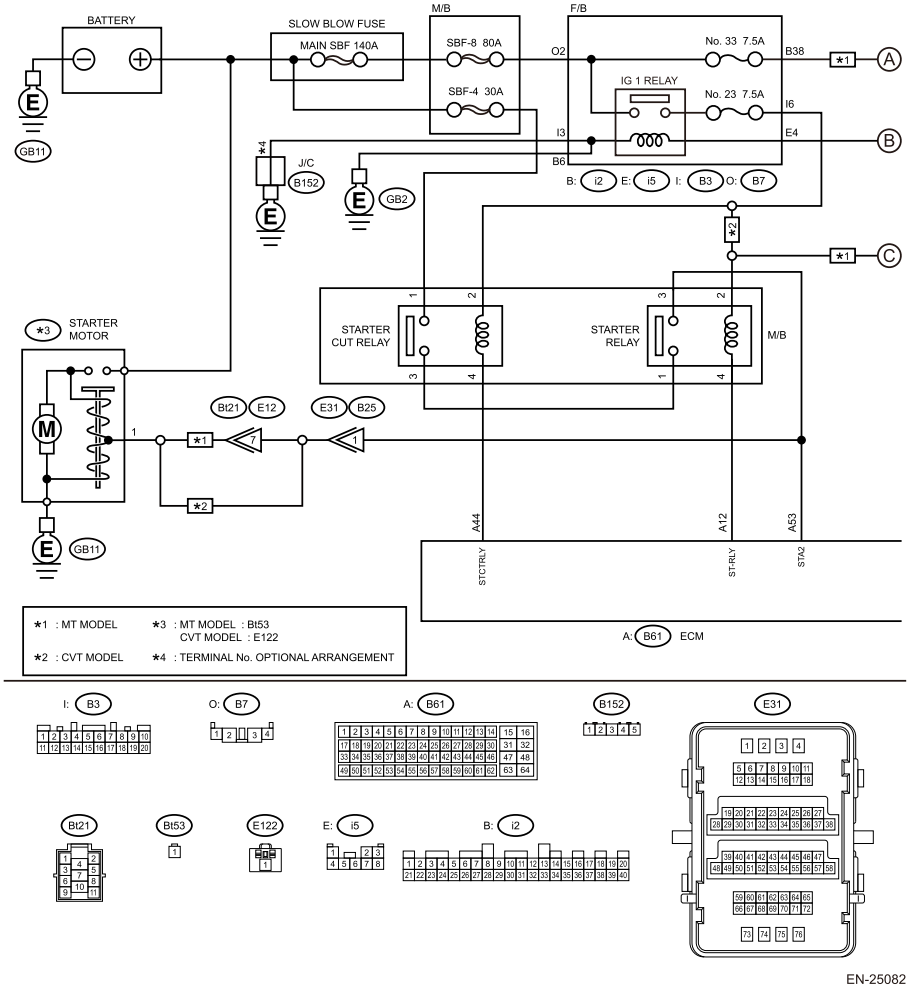
| Malfunction Criteria | Threshold Value |
|---|---|
| AD conversion results | Malfunction |

**Time needed for diagnosis:** 200 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

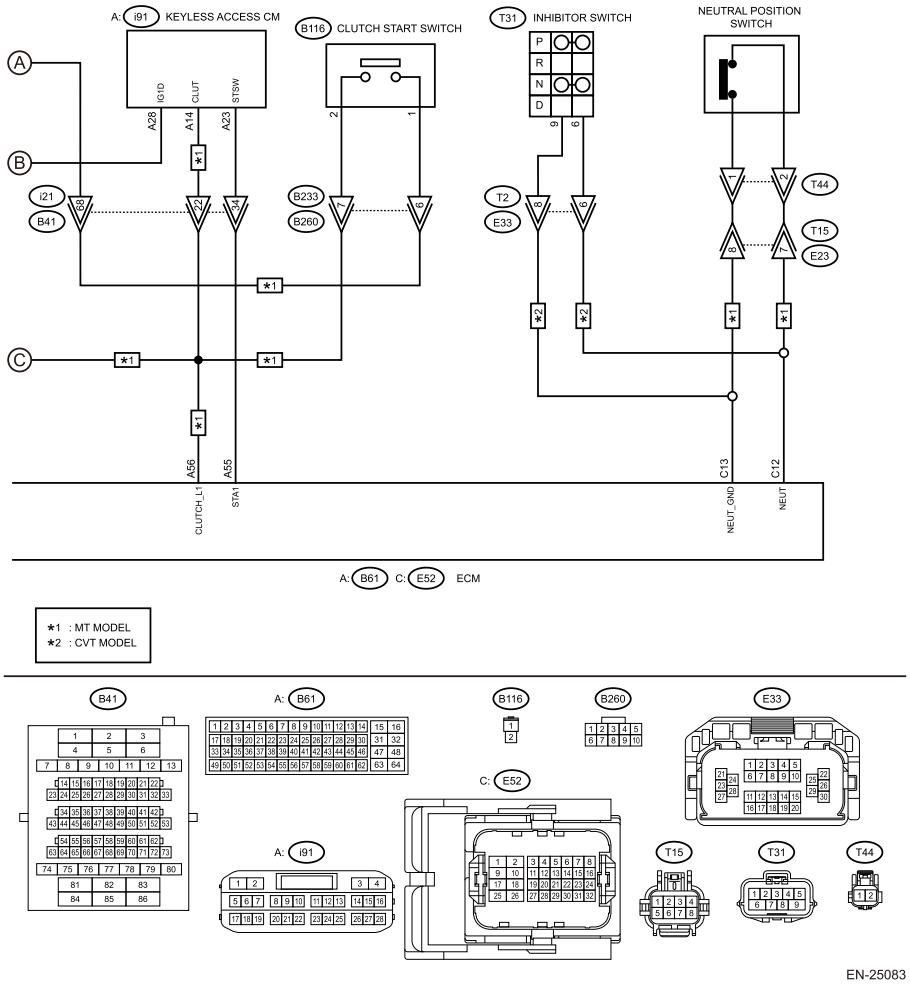
## DTC P0616 STARTER RELAY "A" CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Failure of engine to start
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




EN-25082







EN-25083

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND STARTER RELAY (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND STARTER RELAY (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND STARTER RELAY (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the starter relay.
4. Measure the resistance of harness between ECM connector and M/B (starter relay) terminal.
   **Connector & terminal**
   (B61) No. 53 — No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the open circuit of harness between ECM connector and M/B (starter relay). |

### 2. CHECK HARNESS BETWEEN ECM AND STARTER RELAY (SHORT TO GROUND).

1. Disconnect the connector from starter motor.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the short circuit to ground in harness between ECM connector and M/B (starter relay). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect abnormal continuity in the starter SW 2.
Judge as OFF NG when the starter SW 2 signal remains OFF.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Engine speed | More than 0 rpm to 500 rpm |
| Vehicle speed | Less than 1 km/h (0.6 MPH) |
| Starter relay command | ON |

**GENERAL DRIVING CYCLE**
Perform the diagnosis continuously after starting the engine.

**DIAGNOSTIC METHOD**
Judge as OFF NG when the following conditions are established.
**Judgment value**

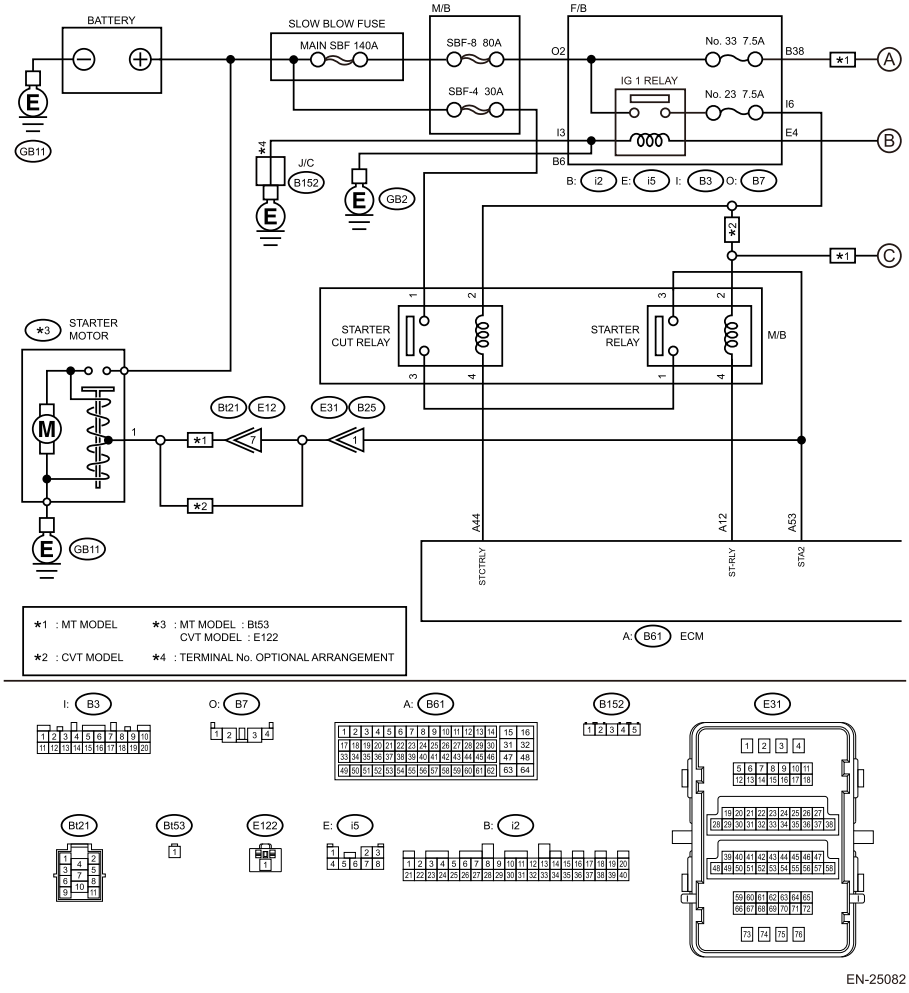
| Malfunction Criteria | Threshold Value |
|---|---|
| Starter SW2 signal of more than 6 V | Not detected |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

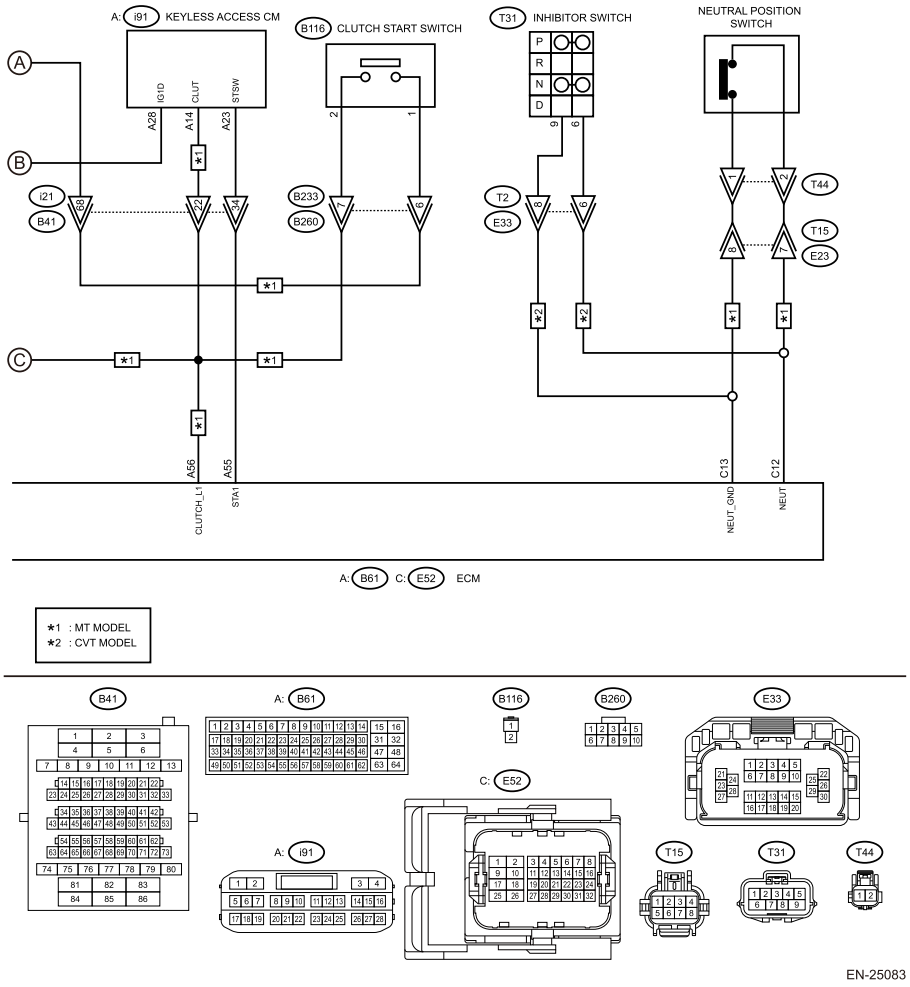
## DTC P0617 STARTER RELAY "A" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Failure of engine to start
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




EN-25082




EN-25083

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM, STARTER RELAY AND STARTER MOTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0617 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK HARNESS BETWEEN ECM, STARTER RELAY AND STARTER MOTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 53 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the following item.
- Short circuit to power supply in harness between ECM connector and M/B (starter relay)
- Short circuit to power supply in harness between ECM connector and starter motor

No — Repair the poor contact of ECM connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect abnormal continuity in the starter SW 2.
Judge as ON NG when the starter SW2 signal remains ON.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Engine speed | 475 rpm or more |
| Starter relay command | OFF |

**GENERAL DRIVING CYCLE**
Perform the diagnosis continuously after starting the engine.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Starter SW2 signal | More than 6 V |

**Time needed for diagnosis:** 2000 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P062D FUEL INJECTOR DRIVER CIRCUIT PERFORMANCE BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Engine does not start
- Engine stall

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P062D displayed? (Current code)

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of fuel injector circuit function.
Judge as NG when the fuel injector current is low.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses: | |
| FET1 | ON |
| FET2 | ON |
| FET3 | ON |
| SW1 | OFF |
| SW2 | OFF |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fuel injector current 250 μs after the injection command | 4 A or less |

**Time needed for diagnosis:** 50 times
**Map**

| Engine speed (rpm) | Time needed for 50 times of diagnosis (sec) |
|---|---|
| 500 | 3 |

| Engine speed (rpm) | Time needed for 50 times of diagnosis (sec) |
|---|---|
| 2000 | 0.75 |
| 4000 | 0.375 |
| 6000 | 0.25 |

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR

**Note:**
**For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.**

### 1. OUTLINE OF DIAGNOSIS

Diagnosis 1: Judge as NG when the EEPROM operation is abnormal.
Diagnosis 2: Judge as NG when the EEPROM value is abnormal during CRC check.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis during self shut.

### 4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Writing result to EEPROM | Malfunction |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| CRC check error | Detected |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P065A GENERATOR/ALTERNATOR SYSTEM PERFORMANCE

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Charge warning light illuminates.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK V-BELT.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

#### 1. CHECK V-BELT.

Check the V-belt. Ref. to MECHANICAL(H4DOTC)>V-belt>INSPECTION.

Is the V-belt broken?

- Yes: Replace the V-belt. Ref. to MECHANICAL(H4DOTC)>V-belt.
- No: Replace the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG when detecting no rotation of the generator (mechanical malfunction such as belt breakage), or internal electrical malfunction.

**COMPONENT DESCRIPTION**
To secure the vehicle power supply, the generator varies the generation amount according to EGI command.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| LIN communication schedule | Normal schedule |

**GENERAL DRIVING CYCLE**
Perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| <Mechanical malfunction warning> | |
| Internal malfunction flag of generator (mechanical malfunction warning)<br>Generator revolution speed | ON<br>More than 1300 rpm |
| <Electrical malfunction warning> | |
| Internal malfunction flag of generator (electrical malfunction warning) | ON |

**Time needed for diagnosis:**
Mechanical malfunction warning: 10 sec. or more
Electrical malfunction warning: 0 sec. or more
**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs. (Charge warning light illuminates.)

## DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P0685 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). **Note: The soak timer IC is built into the ECM.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the main relay stuck to ON.
Judge as NG when ECM keeps operating for more than predetermined time although the main relay does not turn to OFF after ignition switch is turned to OFF.

**COMPONENT DESCRIPTION**
The main relay controls current of coils by receiving instructions from the ignition switch and leak check valve assembly to switch ECM to ON/OFF.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Main relay command | OFF |

**GENERAL DRIVING CYCLE**
Perform the diagnosis if execution conditions are met when the ignition switch is turned from OFF to ON.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| ECM status | In operation |

**Time needed for diagnosis:** 2500 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



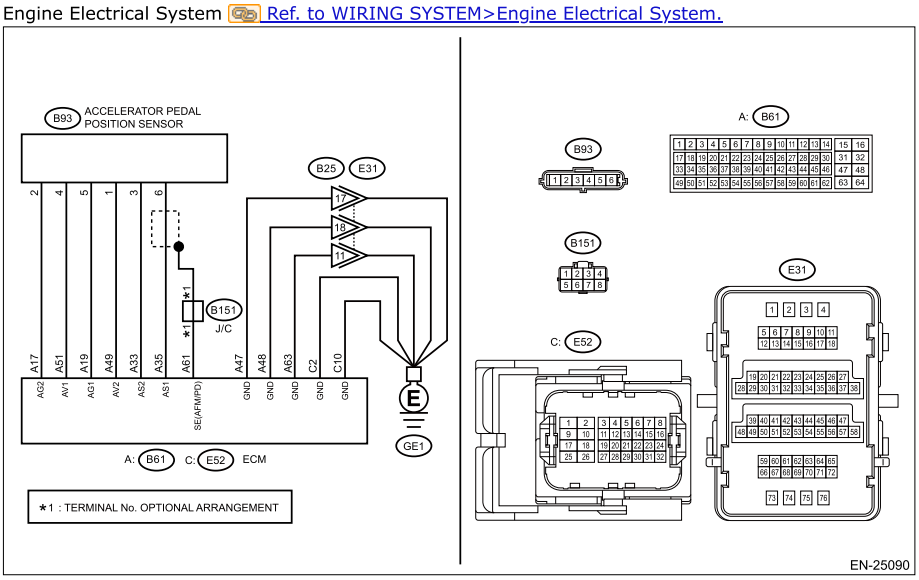
## DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW

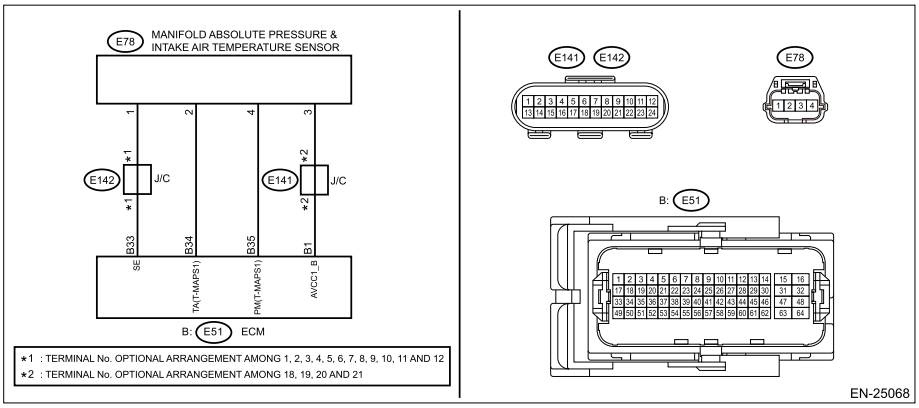
### 1. —

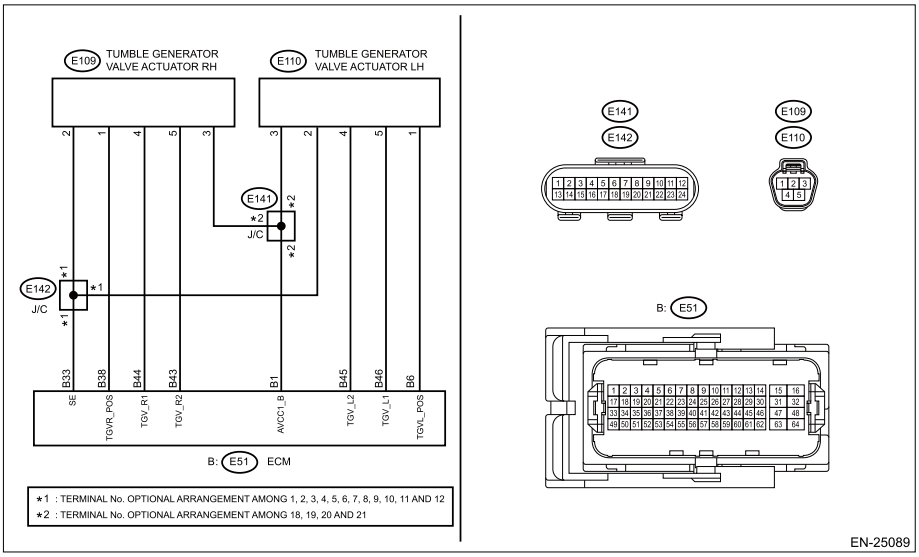
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



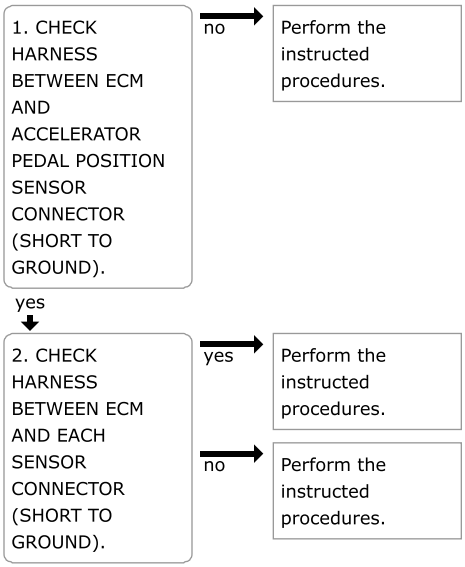




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 51 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. |

### 2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
2. Disconnect the connector from tumble generator valve actuator RH.
3. Disconnect the connector from tumble generator valve actuator LH.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Repair the short circuit to ground in harness between the ECM connector and the following sensor connector.<br>• Manifold absolute pressure and intake air temperature sensor<br>• Tumble generator valve actuator RH<br>• Tumble generator valve actuator LH |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the power supply voltage of the sensor is abnormal.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor power supply | Less than 4.48 V |

**Time needed for diagnosis:** 1 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**

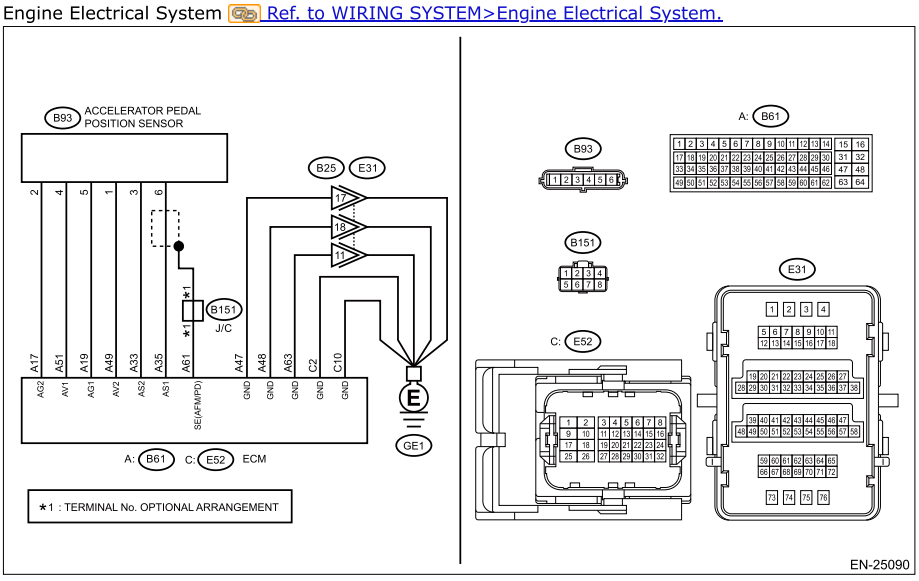
Immediately at fault recognition

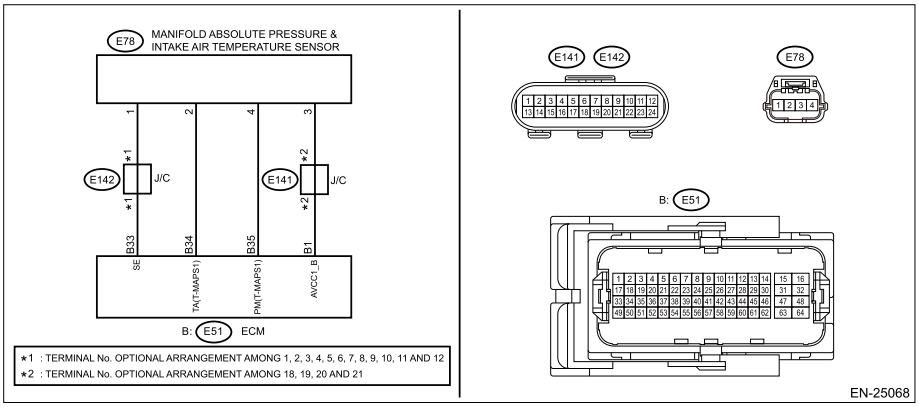
**Trouble symptom:**

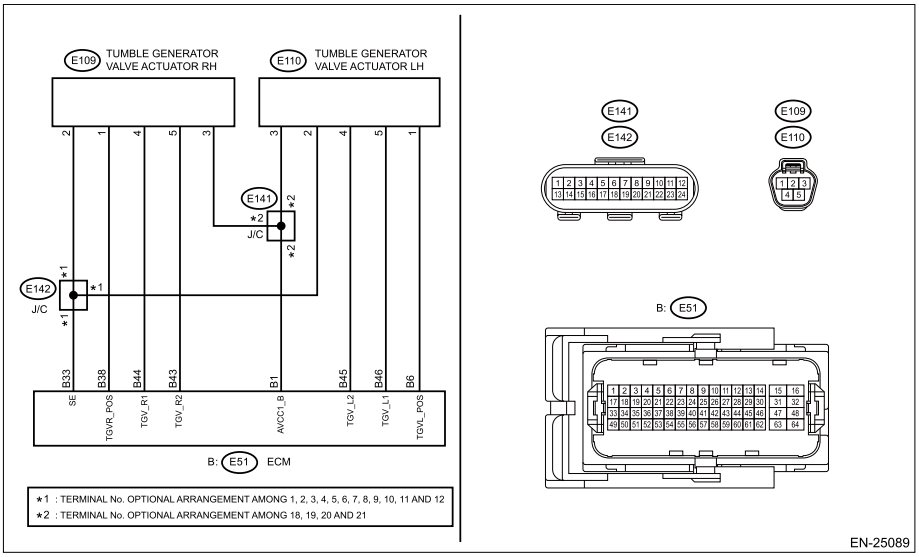
Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.






**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 51 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in harness between the ECM connector and the following sensor connector.<br>• Manifold absolute pressure and intake air temperature sensor<br>• Tumble generator valve actuator RH<br>• Tumble generator valve actuator LH |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the power supply voltage of the sensor is abnormal.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor power supply | More than 5.55 V |

**Time needed for diagnosis:** 1 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW

### 1. —

**DTC detecting condition:**

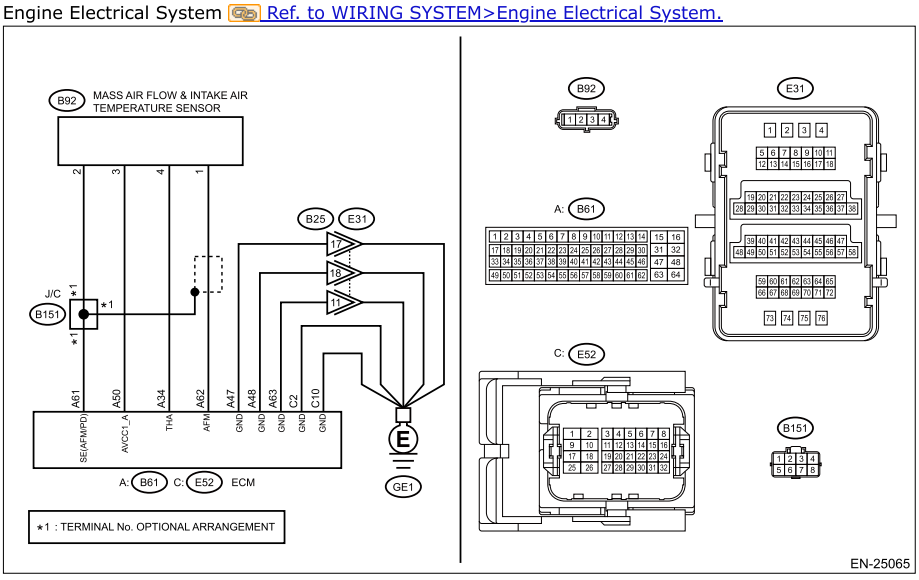
Immediately at fault recognition

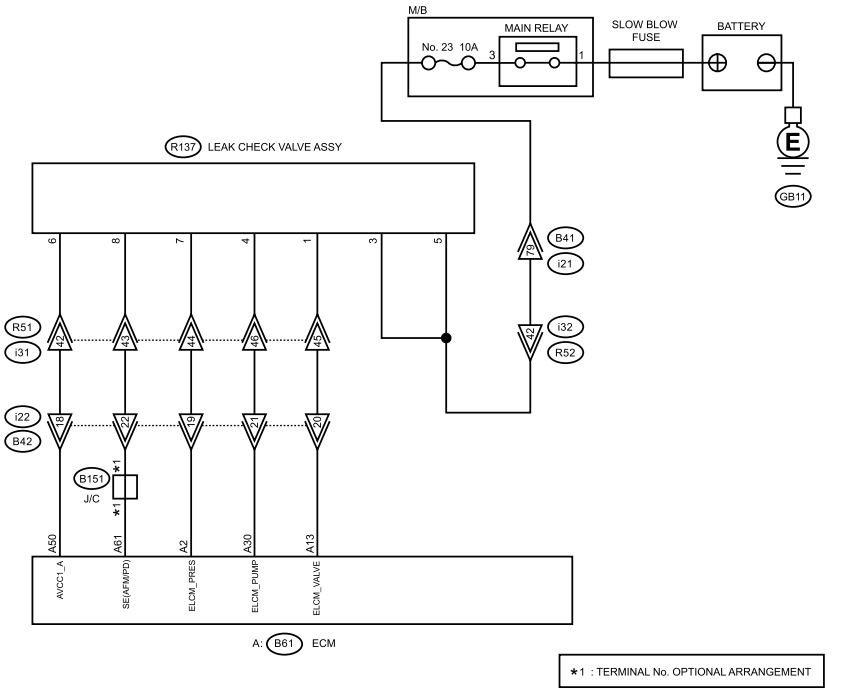
**Trouble symptom:**

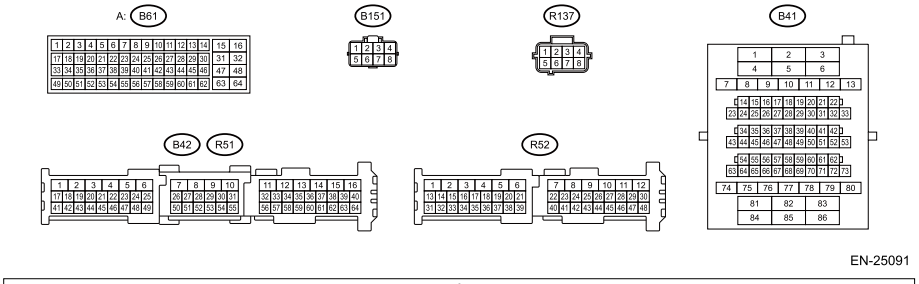
Improper idling

**Wiring diagram:**

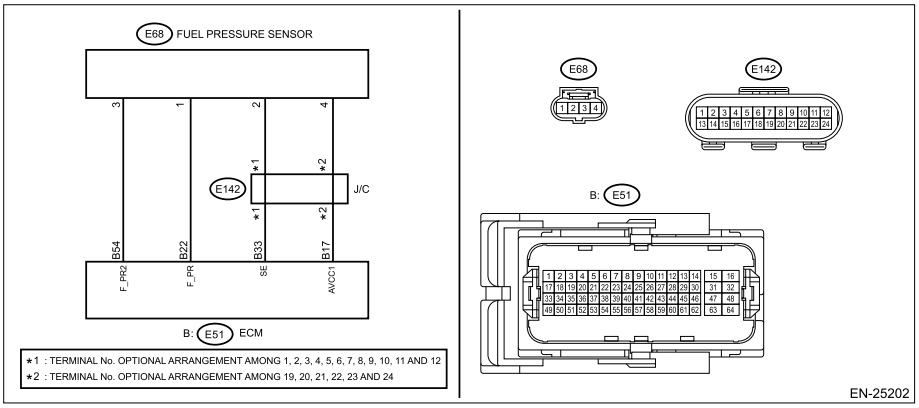
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



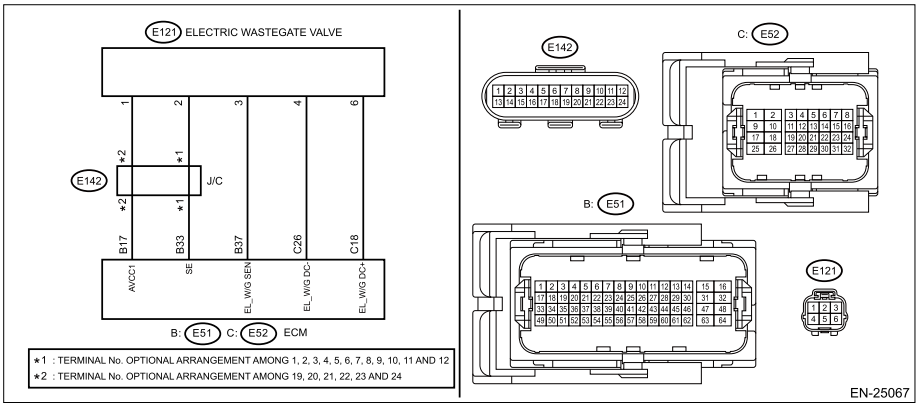


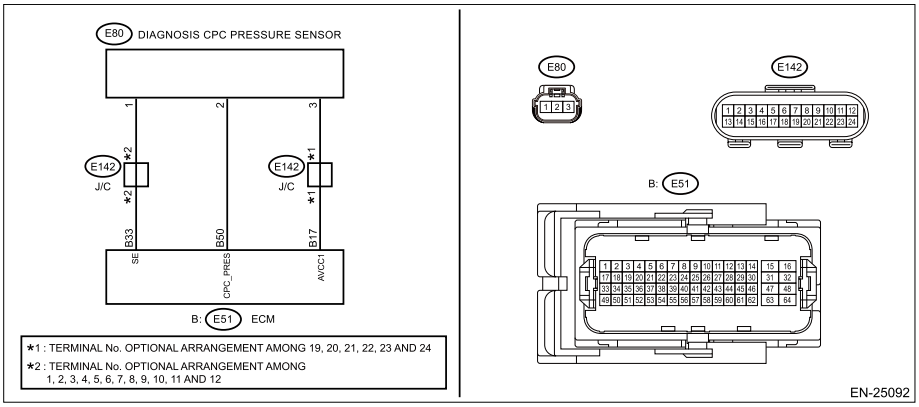

EN-25091



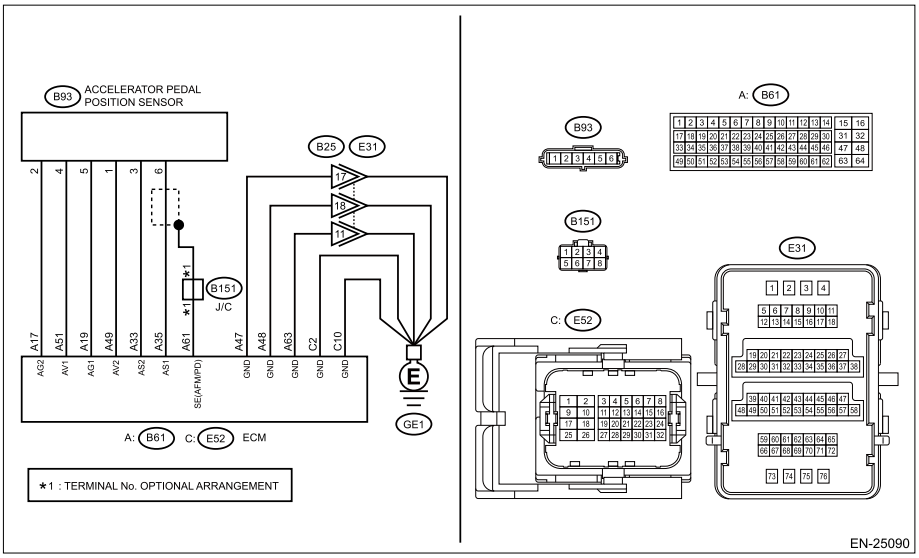

EN-25202



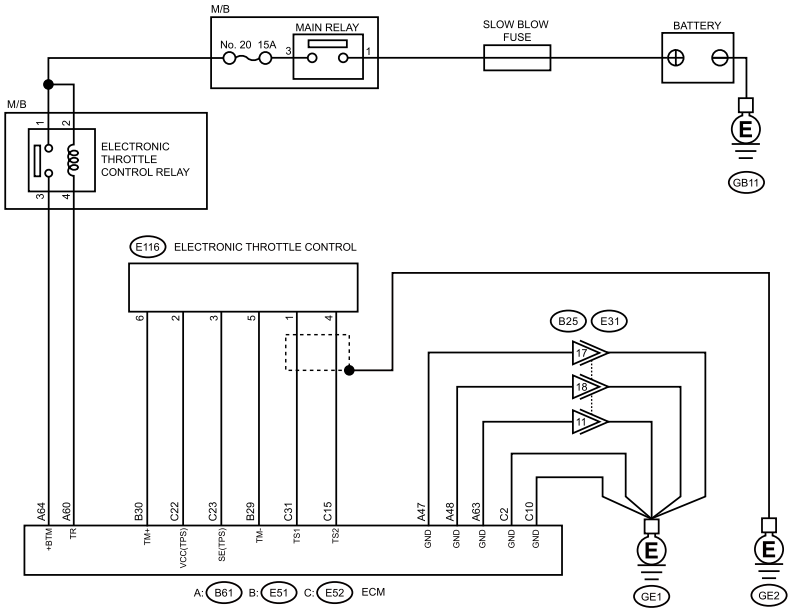

EN-25067

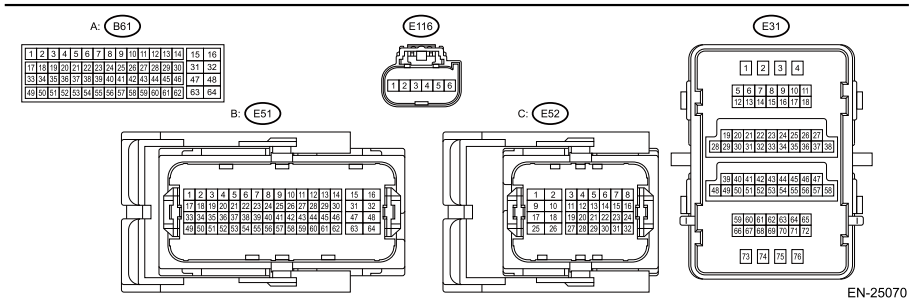


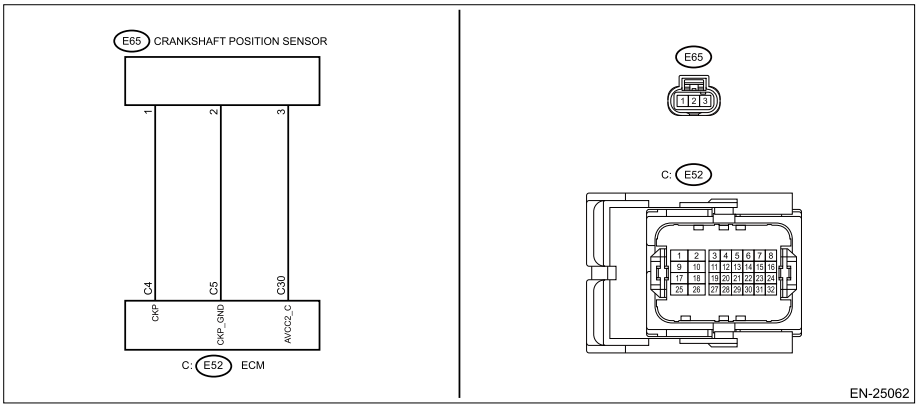

EN-25092




EN-25090




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |

yes ↓

2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO GROUND).
→ no: Perform the instructed procedures.
↓ yes

3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO GROUND).
→ no: Perform the instructed procedures.
↓ yes

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).
→ no: Perform the instructed procedures.
↓ yes

5. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
→ yes: Perform the instructed procedures.
→ no: Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Disconnect the connector from the leak check valve assembly.
5. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(B61) No. 50 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 2.

No — Repair the short circuit to ground in harness between the ECM connector and the following sensor connector.

- Mass air flow and intake air temperature sensor
- Leak check valve assembly

### 2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from the fuel pressure sensor.
2. Disconnect the connector from electronic wastegate valve.
3. Disconnect the connector from CPC pressure sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 17 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the short circuit to ground in harness between the ECM connector and the following sensor connector.
- Fuel pressure sensor
- Electronic wastegate valve
- CPC pressure sensor

### 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from the accelerator pedal position sensor.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

1. Disconnect the connectors from electronic throttle control.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 22 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 5.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 5. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from the crankshaft position sensor.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 30 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

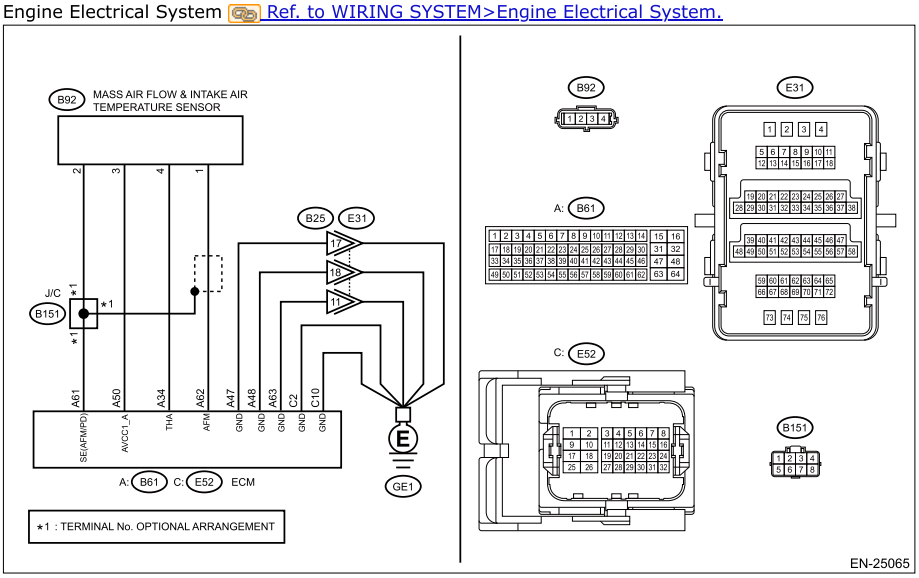
**Note:**
**For the detection standard, refer to DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW.**

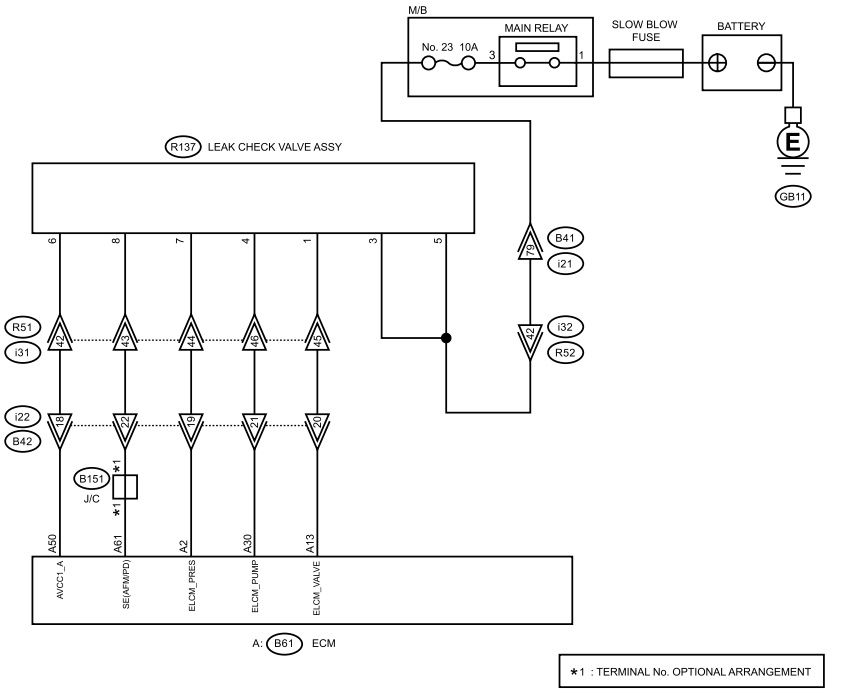


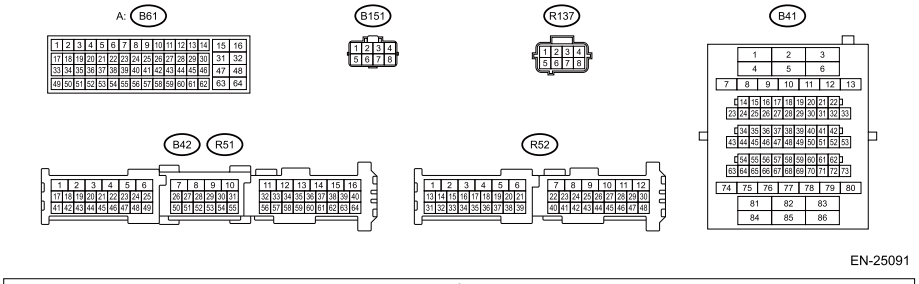
## DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH

### 1. —

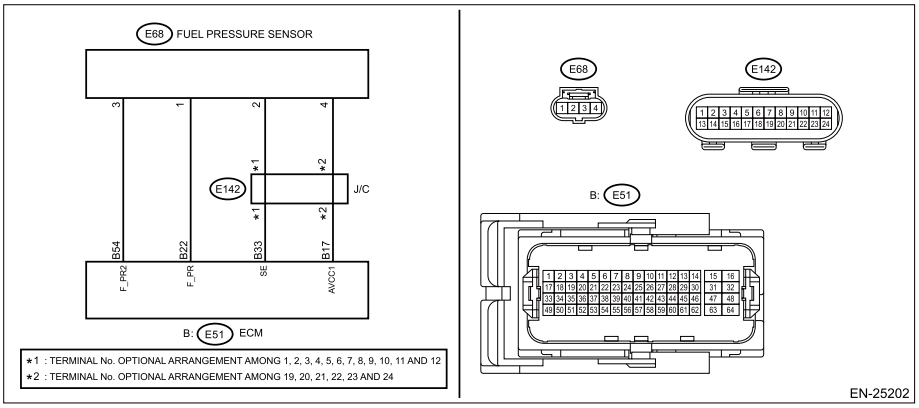
**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



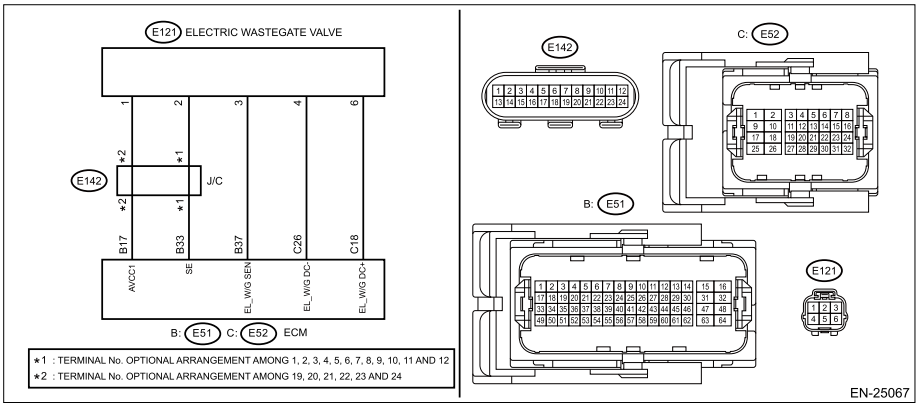


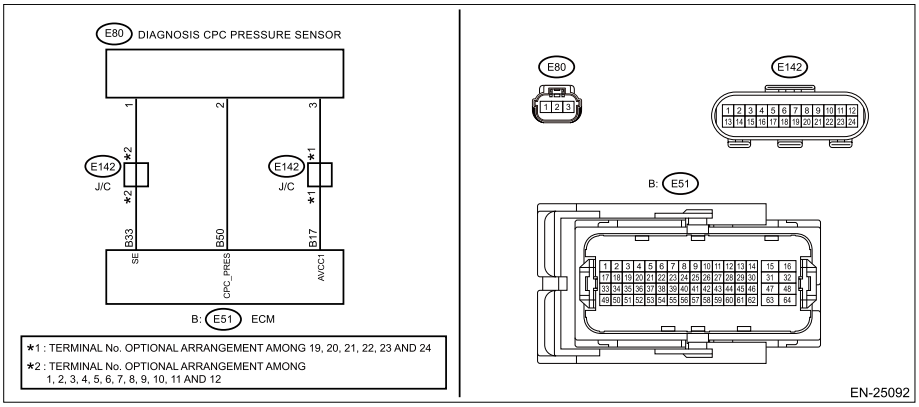

EN-25091



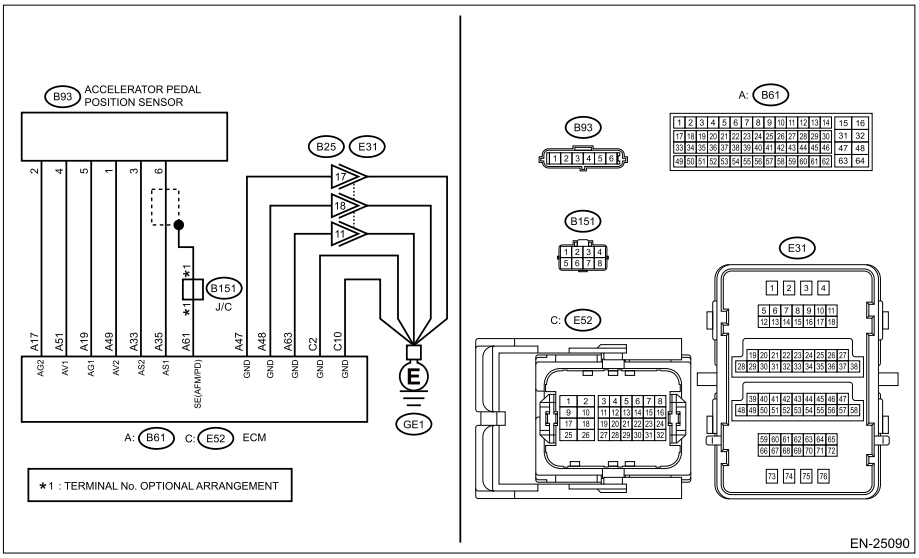

EN-25202



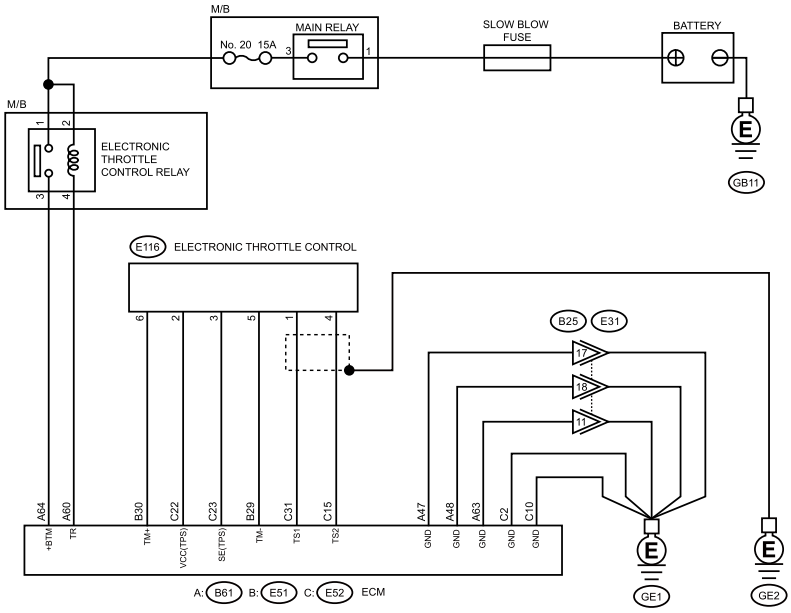

EN-25067

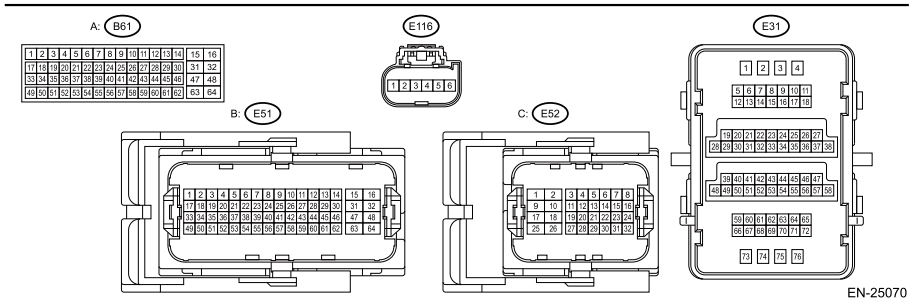


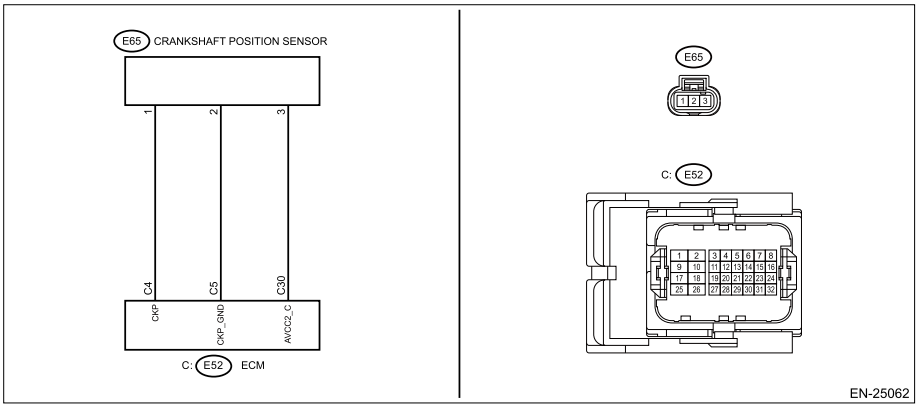

EN-25092




EN-25090




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |

| | | |
|---|---|---|
| 2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 4. |
| 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 5. |
| 5. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 50 — Engine ground:

Is the voltage 10 V or more?

Yes — Repair the short circuit to power in harness between the ECM connector and the following sensor connector.
- Mass air flow and intake air temperature sensor
- Leak check valve assembly

No — Go to 2.

**2. CHECK HARNESS BETWEEN ECM AND EACH SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

Measure the voltage between ECM connector and engine ground.
**Connector & terminal**
(E51) No. 17 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power in harness between the ECM connector and the following sensor connector.
- Fuel pressure sensor
- Electronic wastegate valve
- CPC pressure sensor

No — Go to 3.

**3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

Measure the voltage between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 49 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

No — Go to 4.

**4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).**

Measure the voltage between ECM connector and engine ground.
**Connector & terminal**
(E52) No. 22 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 5.

**5. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).**

Measure the voltage between ECM connector and engine ground.
**Connector & terminal**
(E52) No. 30 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power in the harness between ECM connector and crankshaft position sensor connector.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**Note:**
**For the detection standard, refer to DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH.**

## DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

**Note:**
**For the diagnostic procedure, refer to "TRANSMISSION (DIAGNOSTICS)". Ref. to TRANSMISSION (DIAGNOSTICS)>Basic Diagnostic Procedure.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when there is CAN communication with the TCM and there is a MIL lighting request.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| MIL lighting request from TCM | ON |

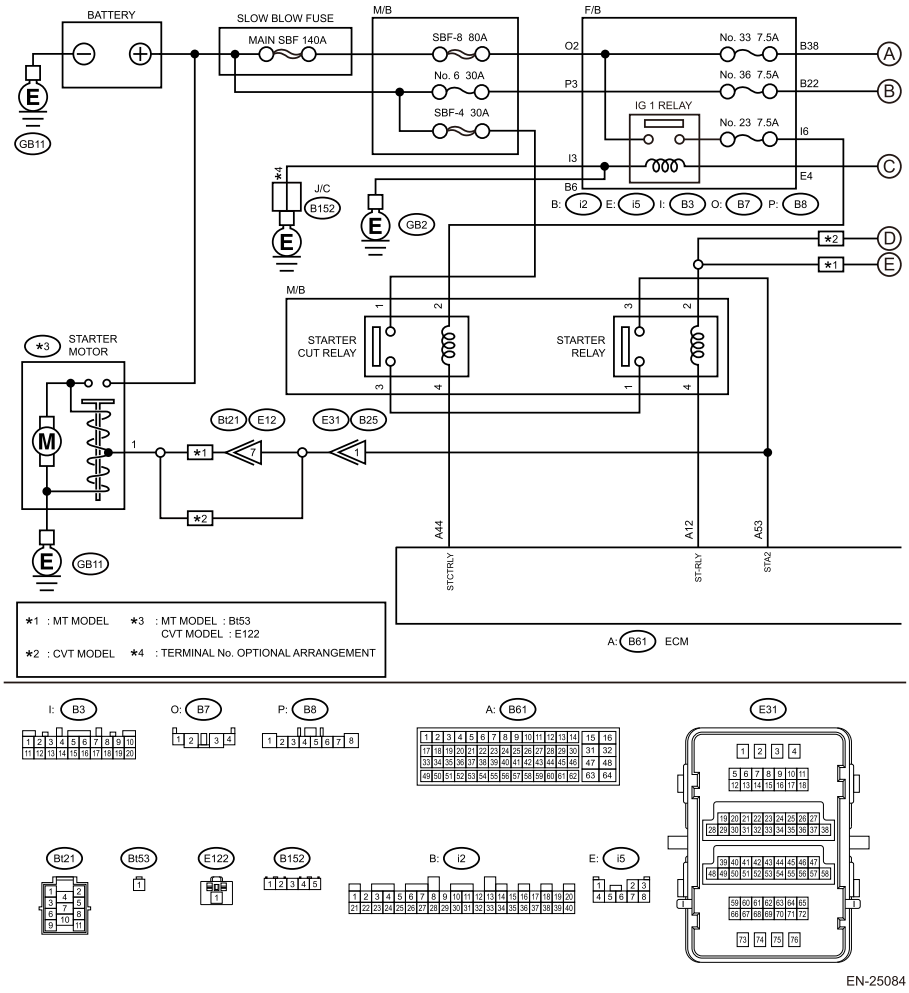
**Time needed for diagnosis:** 2560 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

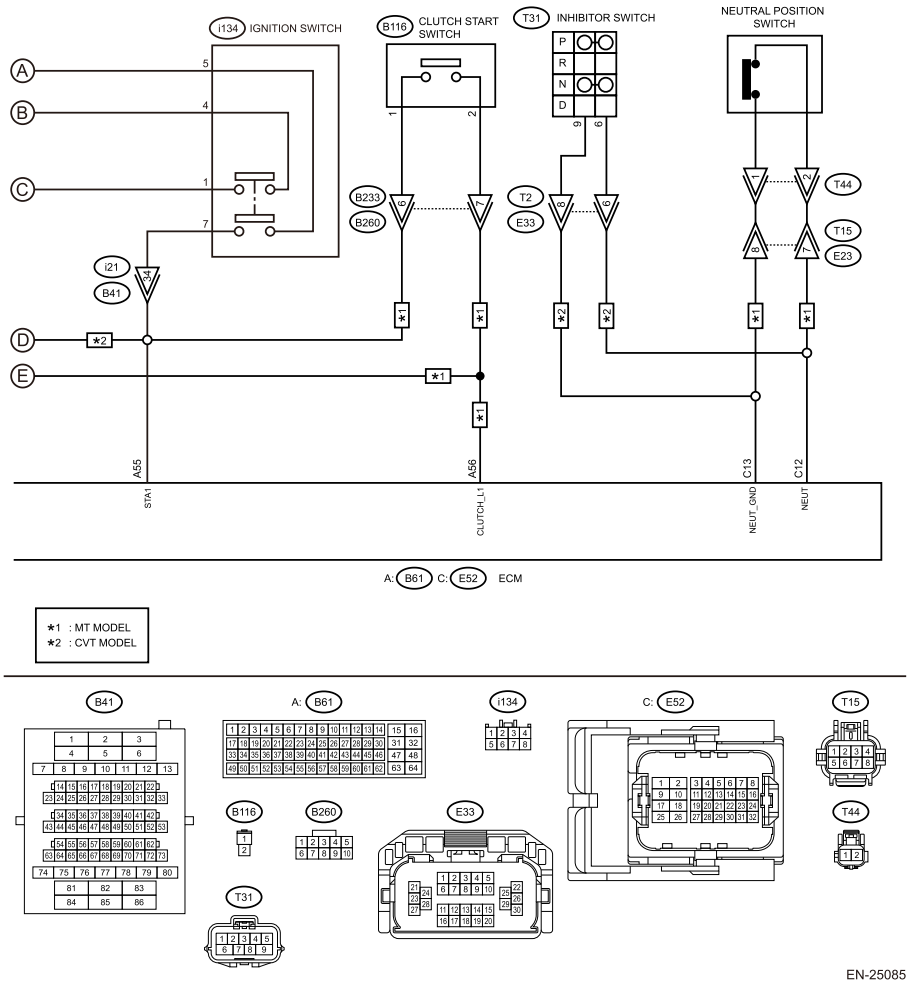
## DTC P081A STARTER DISABLE CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Failure of engine to start
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

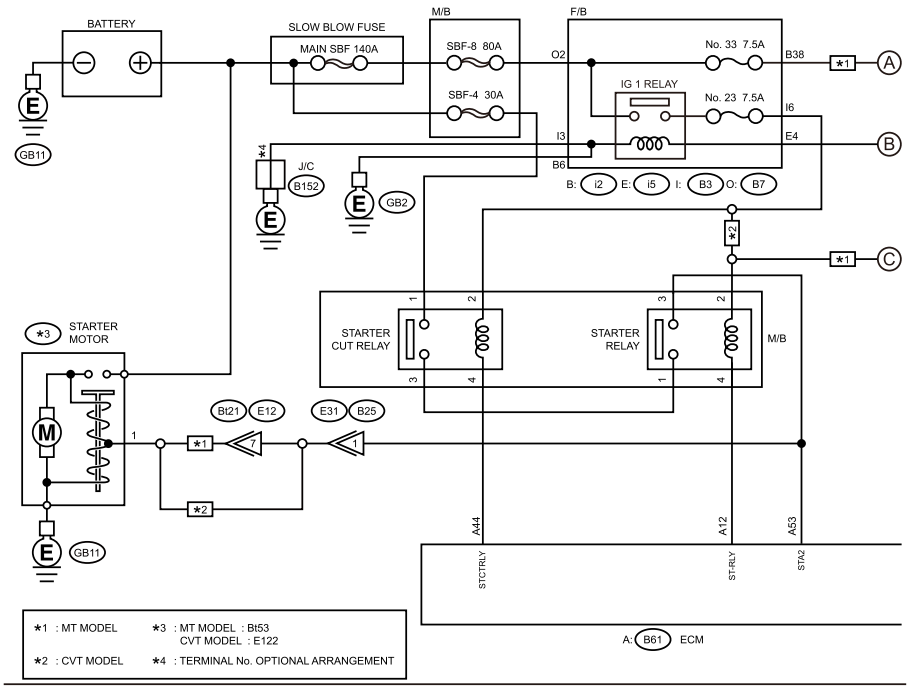
- Model without push button start

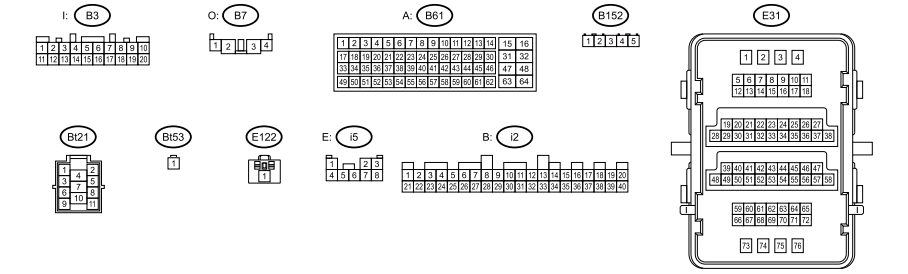




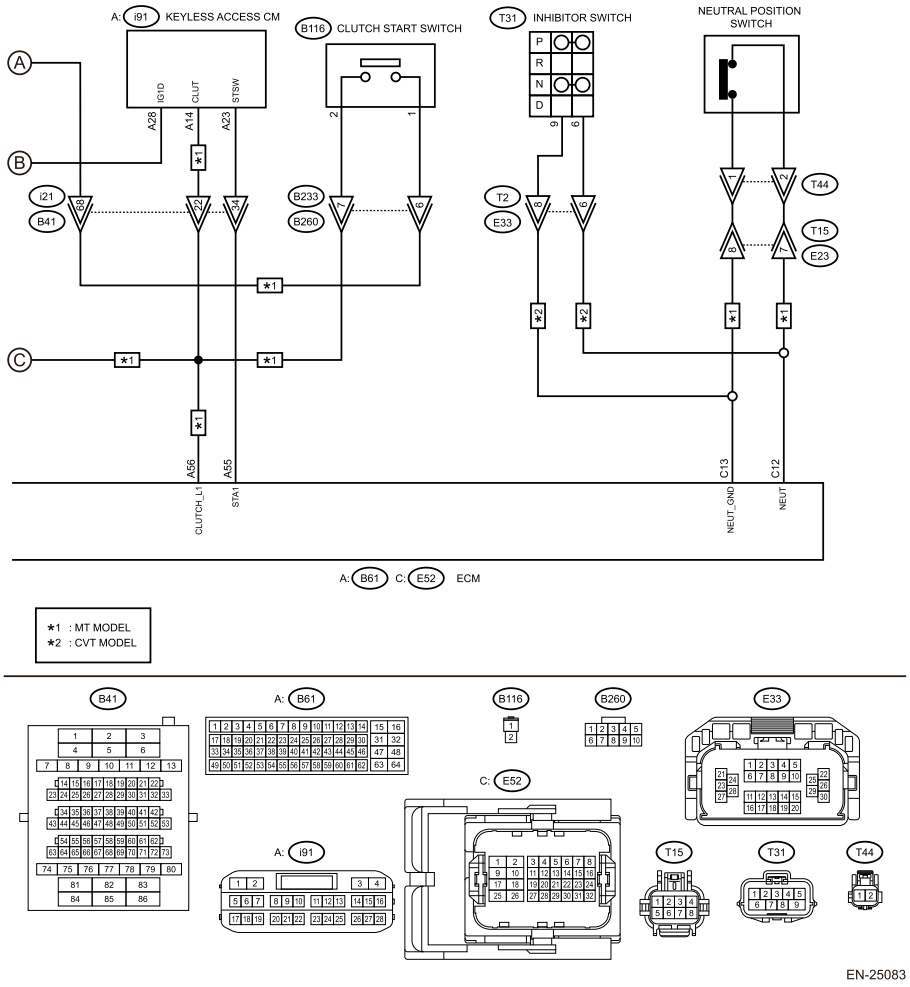

EN-25085

- Model with push button start


BATTERY
SLOW BLOW FUSE
MAIN SBF 140A
M/B
SBF-8 80A
SBF-4 30A
F/B
O2
No. 33 7.5A
B38
IG 1 RELAY
No. 23 7.5A
I6
I3
E4
B6
B: i2 E: i5 I: B3 O: B7
GB11
J/C
B152
GB2
*1
*2
*3
*4
STARTER MOTOR
STARTER CUT RELAY
STARTER RELAY
M/B
Bt21 E12
E31 B25
A44
A12
A53
STCTRLY
ST-RLY
STA2
A: B61 ECM
*1 : MT MODEL
*2 : CVT MODEL
*3 : MT MODEL : Bt53
CVT MODEL : E122
*4 : TERMINAL No. OPTIONAL ARRANGEMENT


I: B3
O: B7
A: B61
B152
E31
Bt21
Bt53
E122
E: i5
B: i2

EN-25082







EN-25083

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM CONNECTOR AND M/B (STARTER CUT RELAY) (SHORT TO GROUND). | no → | Perform the instructed procedures. |

yes ↓

| | | |
|---|---|---|
| 2. CHECK HARNESS BETWEEN ECM CONNECTOR AND M/B (STARTER CUT RELAY) (OPEN). | no → | Perform the instructed procedures. |

yes ↓

| | | |
|---|---|---|
| 3. CHECK STARTER CUT RELAY. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM CONNECTOR AND M/B (STARTER CUT RELAY) (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the starter cut relay.
4. Measure the resistance between the ECM connector and engine ground.
   **Terminals**
   (B61) No. 44 — Engine ground (−):

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the short circuit to ground in harness between ECM connector and M/B (starter cut relay). |

### 2. CHECK HARNESS BETWEEN ECM CONNECTOR AND M/B (STARTER CUT RELAY) (OPEN).

Measure the resistance of harness between ECM connector and M/B (starter cut relay) terminal.
**Connector & terminal**
(B61) No. 44 — No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and M/B (starter cut relay). |

### 3. CHECK STARTER CUT RELAY.

Check the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect abnormal continuity in the starter cut relay.
Judge as NG when the starter cut relay output line is open.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 8 V or more |
| Starter cut relay | OFF |

**GENERAL DRIVING CYCLE**
Perform the diagnosis when the engine condition is turned from before starting to after starting.

**DIAGNOSTIC METHOD**
Judge as NG when the following conditions are established.
**Judgment value**

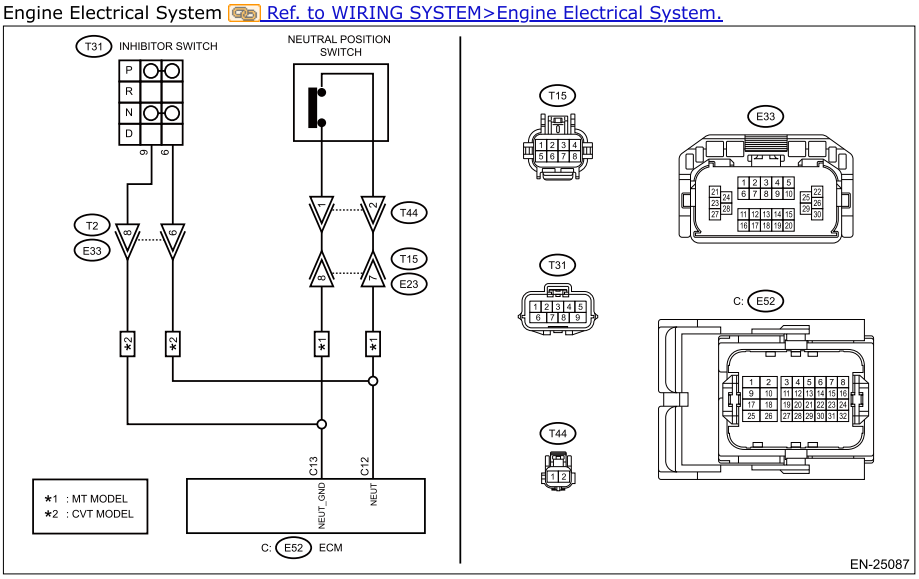
| Malfunction Criteria | Threshold Value |
| --- | --- |
| Starter cut relay control voltage | Less than 1 V |

**Time needed for diagnosis:** 640 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

## 1. CVT MODEL

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK SELECT CABLE. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK INPUT SIGNAL OF ECM. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH (SHORT TO GROUND). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK SELECT CABLE.

Check the select cable. Ref. to CONTROL SYSTEMS>Select Cable>INSPECTION.

Is there any fault in select cable?

| | |
|---|---|
| Yes | Repair or adjust the select cable. Ref. to CONTROL SYSTEMS>Select Cable. |
| No | Go to 2. |

### 2. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the select lever in other than "P" range and "N" range.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 12 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 3. |

### 3. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH (SHORT TO GROUND).

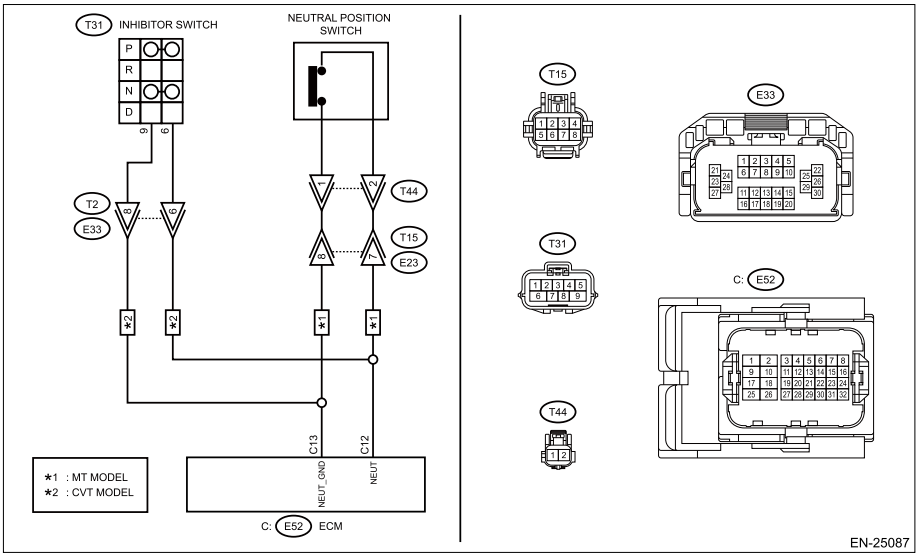
1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from inhibitor switch.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 12 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Replace the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch. |
| No | Repair the short circuit to ground in harness between ECM connector and inhibitor switch connector. |

## 2. MT MODEL

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INPUT SIGNAL OF ECM. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR (SHORT TO GROUND). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the shift lever in a position other than neutral.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 12 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the neutral position switch.
4. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 12 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Check the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(TY75)>Switches and Harness>INSPECTION > NEUTRAL POSITION SWITCH.

No — Repair the following item.

- Short circuit to ground in the harness between ECM connector and neutral position switch connector
- Poor contact of coupling connector

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS (CVT MODEL)**

Detect the short circuit of neutral SW.

Judge as NG when the ECM neutral terminal input differs from the reception data from TCM.

**EXECUTION CONDITION (CVT MODEL)**

| Secondary parameters | Execution condition |
|---|---|
| Starter relay feedback voltage | Less than 1.5 V |
| Battery voltage | 10.9 V or more |
| Data received from TCM | Not equal to “P” range/“N” range |

**GENERAL DRIVING CYCLE (CVT MODEL)**

Perform the diagnosis continuously in 2 seconds after starting the engine.

**DIAGNOSTIC METHOD (CVT MODEL)**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Voltage of the neutral position switch signal | 1 V or less |

**Time needed for diagnosis:** 6.4 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

**OUTLINE OF DIAGNOSIS (MT MODEL)**

Detect the open or short circuit of neutral position SW.

Judge as NG when there is no change in the neutral position SW even if the driving shift was applied. (There is neutral position SW ON/OFF inversion from the vehicle speed and engine speed.)

**EXECUTION CONDITION (MT MODEL)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| The number of changes from driving condition a) to b) | 1 time |
| a) | |
| Vehicle speed | 0 km/h (0 MPH) or less |
| and | |
| Engine speed | 600 rpm — 900 rpm |
| b) | |
| Vehicle speed | 64 km/h (39.8 MPH) or less |
| and | |
| Engine speed | 1350 rpm — 2120 rpm |

**GENERAL DRIVING CYCLE (MT MODEL)**

Perform the diagnosis continuously after the enable conditions have been established.

**METHOD OF DIAGNOSIS (MT MODEL)**

Judge NG when the malfunction criteria below are completed determined times or more after the neutral position SW change.

**Judgment value**

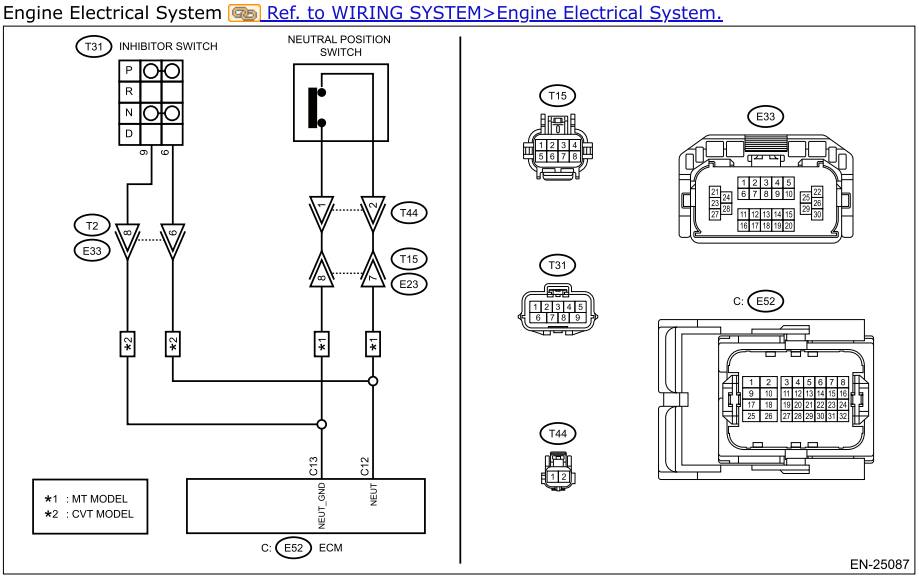
| Malfunction Criteria | Threshold Value |
| --- | --- |
| Voltage of the neutral position switch signal<br>**Note:**<br>**The condition above is established between the driving conditions a) and b).** | 1 V or less |

**Time needed for diagnosis:** 1 time
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

### 1. CVT MODEL

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK SELECT CABLE. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK INPUT SIGNAL OF ECM. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH (OPEN). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK SELECT CABLE.

Check the select cable. Ref. to CONTROL SYSTEMS>Select Cable>INSPECTION.

Is there any fault in select cable?

| | |
|---|---|
| Yes | Repair or adjust the select cable. Ref. to CONTROL SYSTEMS>Select Cable. |
| No | Go to 2. |

### 2. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the select lever in "P" range and "N" range.
3. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E52) No. 12 (+) — Engine ground (−):

Is the voltage less than 1 V?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 3. |

### 3. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from inhibitor switch.
4. Measure the resistance of harness between ECM connector and inhibitor switch connector.

**Connector & terminal**

(E52) No. 12 — (T31) No. 6:
(E52) No. 13 — (T31) No. 9:

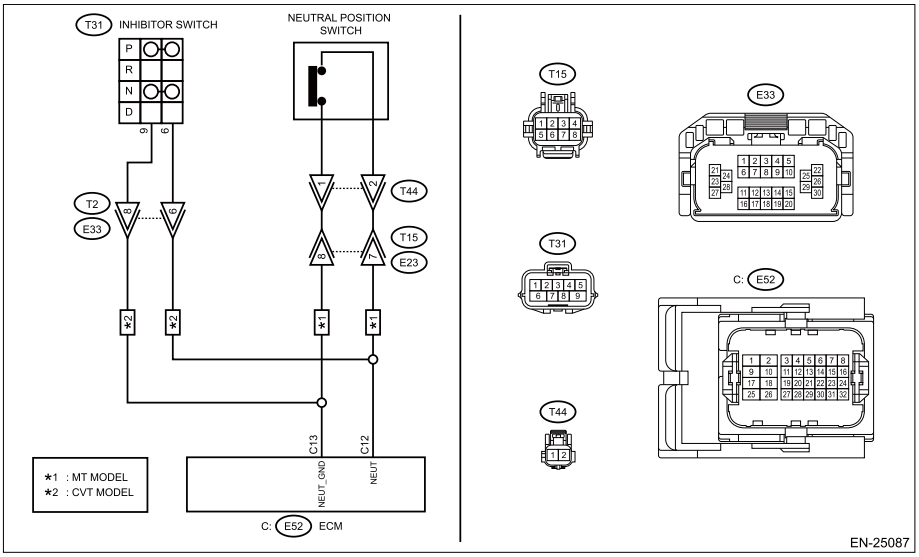
Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Replace the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and inhibitor switch connector<br>• Poor contact of coupling connector |

## 2. MT MODEL

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INPUT SIGNAL OF ECM. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR (OPEN). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the shift lever in neutral.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E52) No. 12 (+) — Engine ground (−):

Is the voltage less than 1 V?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the neutral position switch.
4. Measure the resistance of harness between ECM connector and neutral position switch connector.

**Connector & terminal**

(E52) No. 13 — (T44) No. 1:

(E52) No. 12 — (T44) No. 2:

Is the resistance less than 1 Ω?

Yes — Check the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(TY75)>Switches and Harness>INSPECTION > NEUTRAL POSITION SWITCH.

No — Repair the following item.

- Open circuit in harness between ECM connector and neutral position switch connector
- Poor contact of coupling connector

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS (CVT MODEL)**

Detect the open or short circuit of neutral SW.

Judge as NG when the ECM neutral terminal input differs from the reception data from TCM.

**EXECUTION CONDITION (CVT MODEL)**

| Secondary parameters | Execution condition |
|---|---|
| Starter relay feedback voltage | Less than 1.5 V |
| Battery voltage | 10.9 V or more |
| Data received from TCM | "P" range/"N" range |

**GENERAL DRIVING CYCLE (CVT MODEL)**

Perform the diagnosis continuously in 2 seconds after starting the engine.

**DIAGNOSTIC METHOD (CVT MODEL)**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Voltage of the neutral position switch signal | 6.6 V or more |

**Time needed for diagnosis:** 6.4 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

**OUTLINE OF DIAGNOSIS (MT MODEL)**

Detect the open or short circuit of neutral position SW.

Judge as NG when there is no change in the neutral position SW even if the driving shift was applied. (There is neutral position SW ON/OFF inversion from the vehicle speed and engine speed.)

**EXECUTION CONDITION (MT MODEL)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| The number of changes from driving condition a) to b) | 1 time |
| a) | |
| Vehicle speed | 0 km/h (0 MPH) or less |
| and | |
| Engine speed | 600 rpm — 900 rpm |
| b) | |
| Vehicle speed | 64 km/h (39.8 MPH) or less |
| and | |
| Engine speed | 1350 rpm — 2120 rpm |

**GENERAL DRIVING CYCLE (MT MODEL)**

Perform the diagnosis continuously after the enable conditions have been established.

**METHOD OF DIAGNOSIS (MT MODEL)**

Judge NG when the malfunction criteria below are completed determined times or more after the neutral position SW change.

**Judgment value**

| Malfunction Criteria | Threshold Value |
| --- | --- |
| Voltage of the neutral position switch signal<br>**Note:**<br>**The condition above is established between the driving conditions a) and b).** | 6.6 V or more |

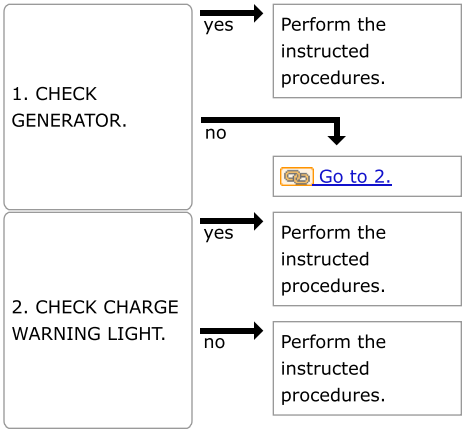
**Time needed for diagnosis:** 1 time
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P0A3B GENERATOR/ALTERNATOR OVER TEMPERATURE

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Charge warning light illuminates.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK GENERATOR.

Check the generator vent window. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator>INSPECTION.

Is there clogging with foreign objects?

| | |
|---|---|
| Yes | Eliminate the foreign objects and leave the generator main body intact approx. 20 minutes to cool down. |
| No | Go to 2. |

#### 2. CHECK CHARGE WARNING LIGHT.

1. Turn the ignition switch to OFF and wait for at least 20 minutes.
2. Start the engine and check the charge warning light.

Does the charge warning light remain on?

| | |
|---|---|
| Yes | Replace the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |
| No | This is a temporarily overheating of the generator. It is now back to normal state. Check for clogging with foreign objects in the proximate area such as the generator vent window. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
The overheating detection sensor is integrated as protection of the generator internal parts. If a malfunction is detected, DTCs will be output and charge warning light will be lit.

**COMPONENT DESCRIPTION**
To secure the vehicle power supply, the generator varies the generation amount according to EGI command.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| LIN communication schedule | Normal schedule |

**GENERAL DRIVING CYCLE**
Perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Internal malfunction flag of generator (high temperature malfunction warning) | ON |
| Monitor value of generator internal temperature | More than 168°C (334°F) |

**Time needed for diagnosis:** 1000 ms or more

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs. (Charge warning light illuminates.)



## DTC P100A AVCS SYSTEM STUCK

### 1. —

**DTC detecting condition:**

Immediately at fault recognition

**Trouble symptom:**

- Engine stall
- Improper idling
- Poor acceleration

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Go to 4. |
| | no | Go to 3. |
| 3. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 4. CHECK DATA MONITOR. | yes | Perform the instructed procedures. |
| | no | Go to 5. |
| 5. CHECK DATA MONITOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P000A, P000B, P000C, P000D, P0011, P0014, P0021 or P0024 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK DTC.

1. Start the engine and warm up fully until the engine oil temperature reaches 80°C (176°F) or more.
2. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

**Warning:**
**When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

3. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P100A displayed? (Current code)

| | |
|---|---|
| Yes | Go to 4. |
| No | Go to 3. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P000A, P000B, P000C, P000D, P0011, P0014, P0021 or P0024 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | End. |

### 4. CHECK DATA MONITOR.

1. Perform the inspection mode T. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

**Warning:**
**When performing inspection mode on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.**

2. Using the Subaru Select Monitor, read the value described below.
   - Intake side RH: [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount R]
   - Intake side LH: [VVT Advance Target Angle Amount L], [VVT Adv. Ang. Amount L]
   - Exhaust side RH: [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. R]
   - Exhaust side LH: [Ex VVT Retard Target Angle L], [Exh. VVT Retard Ang. L]

**Note:**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
- **Use of the data storage function of Subaru Select Monitor allows the data during driving to be stored. The stored data can be checked after the driving.**

Compare the VVT Advance Target Angle Amount (Ex VVT Retard Target Angle) value and the VVT Adv. Ang. Amount (Exh. VVT Retard Angle) value. Are there any banks that have a difference of 10 degrees or more for 3 seconds or more?

Yes

Perform the diagnosis for the bank that does not synchronize.
- Intake side RH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Intake side LH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.
- Exhaust side RH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Exhaust side LH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.

No

Go to 5.

### 5. CHECK DATA MONITOR.

Read the data saved in step 4.
- Intake side RH: [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount R]
- Intake side LH: [VVT Advance Target Angle Amount L], [VVT Adv. Ang. Amount L]
- Exhaust side RH: [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. R]
- Exhaust side LH: [Ex VVT Retard Target Angle L], [Exh. VVT Retard Ang. L]

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Are there any banks whose VVT Adv. Ang. Amount (Exh. VVT Retard Angle) value have a difference of 10 degrees or more against the VVT Advance Target Angle Amount (Ex VVT Retard Target Angle) value?

Yes

Perform the diagnosis for the banks that have a difference.
- Intake side RH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Intake side LH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.
- Exhaust side RH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Exhaust side LH: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.

No

End.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the AVCS system malfunction.
Judge as NG when the condition during which the difference between AVCS target timing advance amount (AVCS target retard angle amount) and AVCS actual timing advance amount (AVCS actual retard angle amount) is large continues.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

| Secondary parameters | Execution condition |
|---|---|
| AVCS control | In operation |
| \|Target timing advance change amount (per 80 ms)\| | Less than 4°CA |
| \|VVT target angle\| | 12.5 °CA or more |
| Ambient air temperature | Less than 7°C (45°F) |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously while AVCS is operating.

**DIAGNOSTIC METHOD**

For the diagnostic method and judgment value, refer to the following.

- Intake side target error: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Exhaust side target error: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
- Intake side slow response: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1.
- Exhaust side slow response: Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1.

**Time needed for diagnosis:**

Intake side: 25 sec.

Exhaust side: 25 sec.

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.



## DTC P1134 A/F / O2 SENSOR BANK1 SENSOR1 SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION

### 1. —

**DTC detecting condition:**

Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1134 displayed? (Current code)

- Yes: Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.
- No: Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the A/F sensor microcomputer operation is abnormal.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Communication data between CPU and front oxygen (A/F) sensor IC | Different from expected value |

**Time needed for diagnosis:** 80 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P1160 THROTTLE RETURN SPRING

**Note:**

**For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the throttle position is out of specified value with ignition switch OFF.

### 2. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Ignition switch | OFF |
| Continuous time when throttle motor control duty is 0% | 1250 ms |

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis when the ignition switch is turned from ON to OFF.

### 4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle position | More than 21.6 % |

**Time needed for diagnosis:** Less than 1 s

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

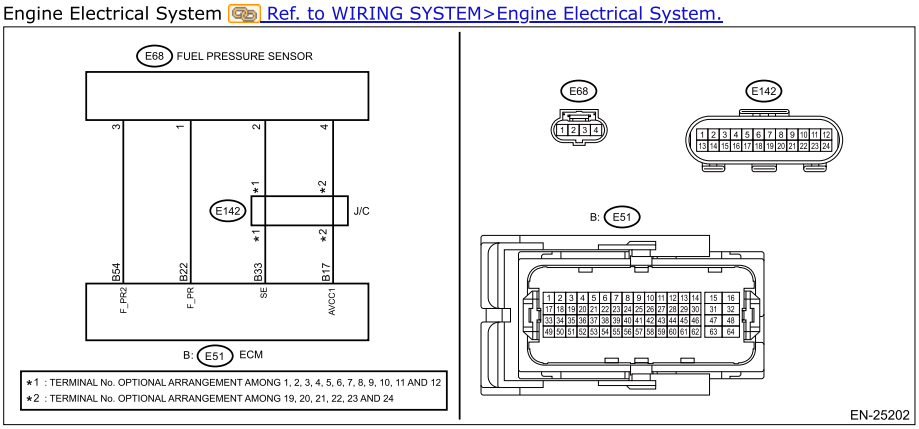
## DTC P1192 FUEL RAIL PRESSURE SENSOR "B" CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Turn the ignition switch to OFF.
4. Start the engine.
5. Using the Subaru Select Monitor, read the value in [Fuel Rail Pressure B].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Fuel Rail Pressure B] approx. 30000 [kPa] (4350 psi) or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Refer to "Check non-permanent occurrence malfunctions". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>INSPECTION > CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS. |

### 4. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the fuel pressure sensor.
4. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 54 — Engine ground:

Is the resistance 1 MΩ or more?

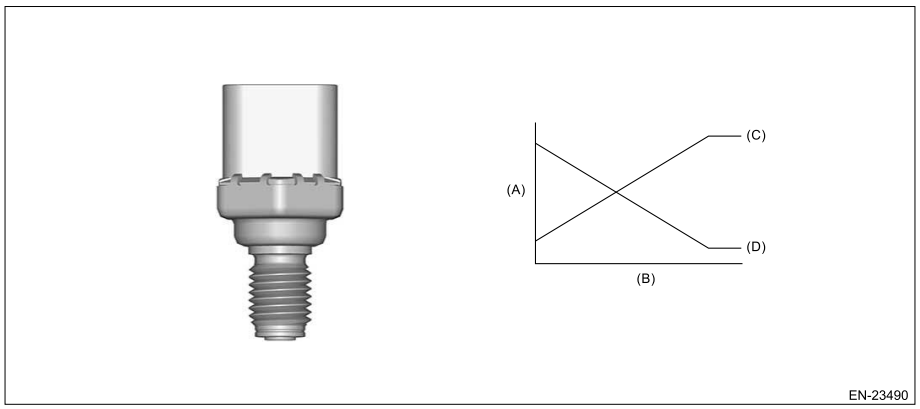
| | |
|---|---|
| Yes | Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor. |
| No | Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the short circuit in the fuel pressure sensor sub signal.

Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Output voltage
(B) Absolute pressure
(C) Main signal
(D) Sub signal

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.486 V |

**Time needed for diagnosis:** 2400 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

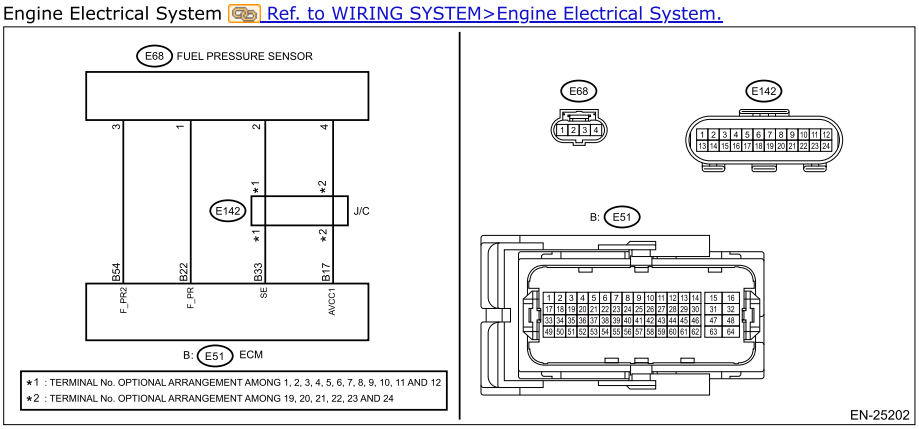
## DTC P1193 FUEL RAIL PRESSURE SENSOR "B" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK FUEL PRESSURE SENSOR POWER SUPPLY. | no → | Go to 7. |
| yes ↓ | | |

5. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).
→ no: Perform the instructed procedures.
yes ↓

6. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
→ yes: Perform the instructed procedures.
→ no: Perform the instructed procedures.

7. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).
→ no: Perform the instructed procedures.
yes ↓

8. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).
→ yes: Perform the instructed procedures.
→ no: Perform the instructed procedures.

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

Yes: Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW.

No: Go to 2.

**2. CHECK DTC.**

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes: Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No: Go to 3.

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Fuel Rail Pressure B].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Fuel Rail Pressure B] 0 [kPa] (0 psi)?

Yes — Go to 4.

No — Refer to "Check non-permanent occurrence malfunctions". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>INSPECTION > CHECK NON-PERMANENT OCCURRENCE MALFUNCTIONS.

### 4. CHECK FUEL PRESSURE SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the fuel pressure sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel pressure sensor connector and engine ground.
   **Connector & terminal**
   (E68) No. 4 (+) — Engine ground (−):

Is the voltage 4.5 — 5.5 V?

Yes — Go to 5.

No — Go to 7.

### 5. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 33 — (E68) No. 2:
   (E51) No. 54 — (E68) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pressure sensor connector
- Poor contact of J/C

### 6. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and fuel pressure sensor connector and engine ground.
   **Connector & terminal**
   (E51) No. 54 (+) — Engine ground (−):
   (E68) No. 3 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power in the harness between ECM connector and fuel pressure sensor connector.

No — Replace the fuel pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pressure Sensor.

### 7. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel pressure sensor connector.
   **Connector & terminal**
   (E51) No. 17 — (E68) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the following item.
- Open circuit in harness between ECM connector and fuel pressure sensor connector
- Poor contact of J/C

### 8. CHECK HARNESS BETWEEN ECM AND FUEL PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between ECM connector and fuel pressure sensor connector and engine ground.
**Connector & terminal**
(E51) No. 17 — Engine ground:
(E68) No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

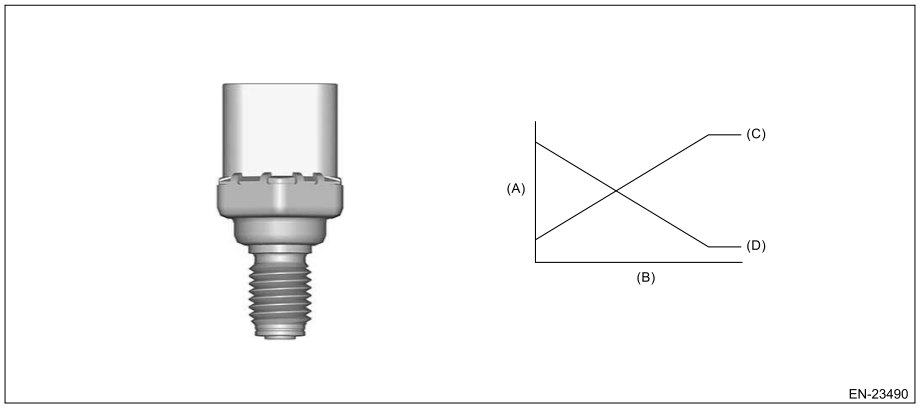
Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Repair the ground short circuit of harness between ECM connector and fuel pressure sensor connector.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit in sub signal of the fuel pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(A) Output voltage
(B) Absolute pressure
(C) Main signal
(D) Sub signal

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.775 V |

**Time needed for diagnosis:** 2400 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P1236 FUEL INJECTOR DRIVER SERIAL PERIPHERAL INTERFACE (SPI) COMMUNICATION

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1236 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG if communication between CPU and the injector driving IC is abnormal.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Communication data between CPU and the injector driving IC | Different from expected value |

**Time needed for diagnosis:** 65 times

**Map**

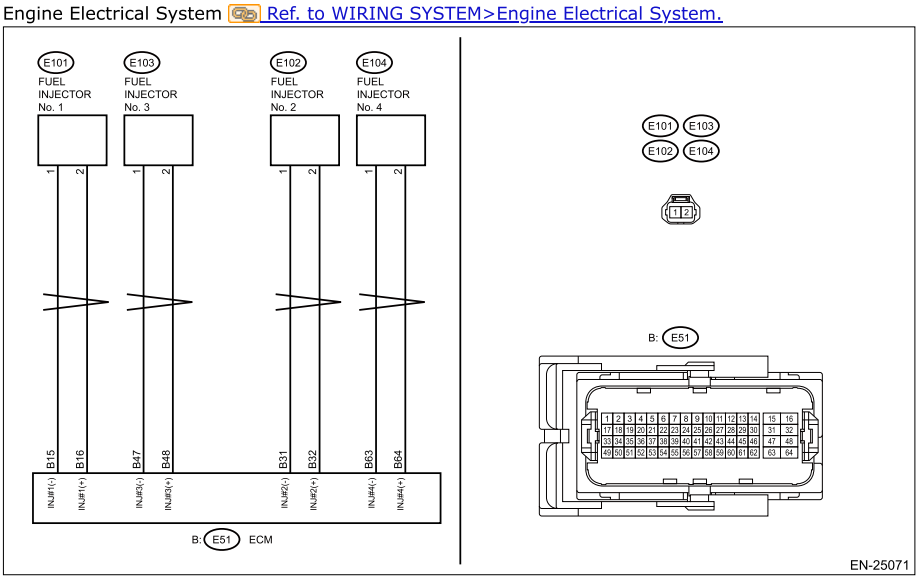
| Engine speed (rpm) | Time needed for 65 times of diagnosis (sec) |
|---|---|
| 500 | 3.9 |
| 2000 | 0.975 |
| 4000 | 0.4875 |
| 6000 | 0.325 |

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P1261 CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.
   - no → Go to 3.
   - yes ↓

2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
   - yes → Go to 4.
   - no → Perform the instructed procedures.

3. CHECK FUEL INJECTOR.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

| | | |
|---|---|---|
| 4. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM terminals on faulty fuel injectors.
   **Connector & terminal**
   #1 (E51) No. 15 — (E51) No. 16:
   #2 (E51) No. 31 — (E51) No. 32:
   #3 (E51) No. 47 — (E51) No. 48:
   #4 (E51) No. 63 — (E51) No. 64:

Is the resistance 1.5 Ω (at 23°C (73°F))?

Yes — Go to 2.

No — Go to 3.

### 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between ECM and engine ground on faulty injectors.
**Connector & terminal**
#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 3. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes — Repair the open circuit or short between lines in harness between ECM connector and fuel injector connector.

No — Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

### 4. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO POWER SUPPLY).

Measure the voltage between ECM and engine ground on defective fuel injectors.

**Connector & terminal**

#1 (E51) No. 15 (+) — Engine ground (−):
#1 (E51) No. 16 (+) — Engine ground (−):
#2 (E51) No. 31 (+) — Engine ground (−):
#2 (E51) No. 32 (+) — Engine ground (−):
#3 (E51) No. 47 (+) — Engine ground (−):
#3 (E51) No. 48 (+) — Engine ground (−):
#4 (E51) No. 63 (+) — Engine ground (−):
#4 (E51) No. 64 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Repair the short circuit to power in harness between ECM connector and fuel injector connectors.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of fuel injector circuit function.
Judge as NG when ECM detects any malfunction in the diagnostic items listed below.

| Diagnostic item | Malfunction Criteria |
|---|---|
| Power supply short | ECM low side terminal voltage of the fuel injector circuit is high. |
| Ground short | ECM low side terminal voltage of the fuel injector circuit is low. |
| Open circuit | Fuel injector current is low. |
| Overcurrent | Fuel injector current is high. |
| Short circuit | The time when the fuel injector current reaches the target current is short. |

**EXECUTION CONDITION**

**Diagnosis 1 (power supply short)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status A |

**Diagnosis 2 (ground short)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status B |

**Diagnosis 3 (open circuit)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status A (condition 1)<br>Status B (condition 2) |

**Diagnosis 4 (short circuit, overcurrent)**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |
| FET and SW statuses | Status C |

**FET and SW statuses**

| Condition | FET1 | FET2 | FET3 | SW1 | SW2 |
|---|---|---|---|---|---|
| Status A | OFF | OFF | OFF | OFF | ON |
| Status B | OFF | OFF | OFF | ON | OFF |
| Status C | ON | ON | ON | OFF | OFF |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Judgment value

**Diagnosis 1 (power supply short)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fuel injector supply voltage − Fuel injector terminal voltage (+) | 2 V or less |

**Diagnosis 2 (ground short)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fuel injector terminal voltage (−) − Ground | 2 V or less |

**Diagnosis 3 (open circuit)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Condition 1 and condition 2 are continuously detected | |
| Condition 1: | |
| Fuel injector supply voltage − Fuel injector terminal voltage (+) | 2 V or less |
| Condition 2: | |
| Fuel injector terminal voltage (−) − Ground | 2 V or less |

**Diagnosis 4 (short circuit, overcurrent)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Fuel injector current 3.5 μs after the injection command | 3 A or more |

**Time needed for diagnosis:**
Diagnosis 1, 2 and 3: 50 times
Diagnosis 4: 25 times

**Map**

| Engine speed (rpm) | Time needed for 50 times of diagnosis (sec) | Time needed for 25 times of diagnosis (sec) |
|---|---|---|
| 500 | 3 | 1.5 |
| 2000 | 0.75 | 0.375 |
| 4000 | 0.375 | 0.1875 |
| 6000 | 0.25 | 0.125 |

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1262 CYLINDER 2 DIRECT FUEL INJECTOR CIRCUIT/OPEN

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1261. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1261 CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1263 CYLINDER 3 DIRECT FUEL INJECTOR CIRCUIT/OPEN

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1261. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1261 CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

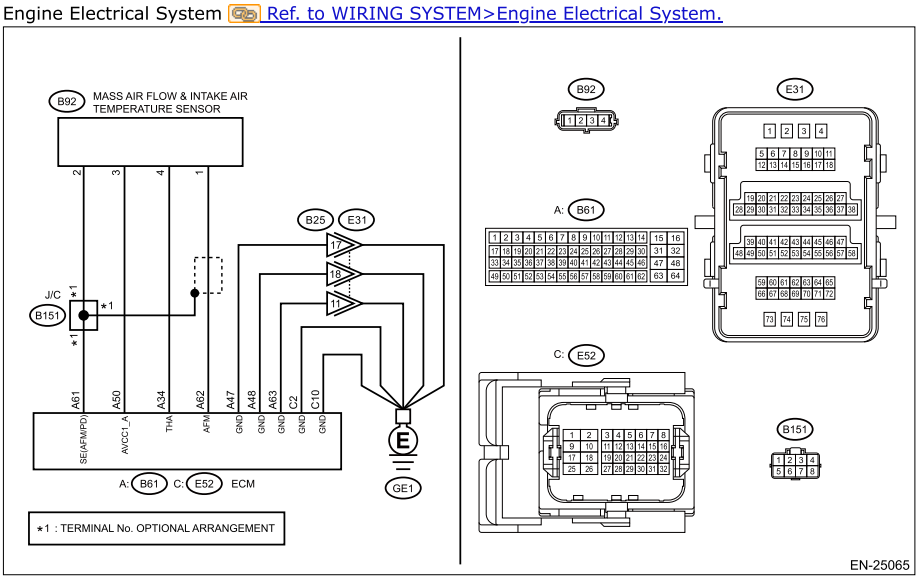
## DTC P1264 CYLINDER 4 DIRECT FUEL INJECTOR CIRCUIT/OPEN

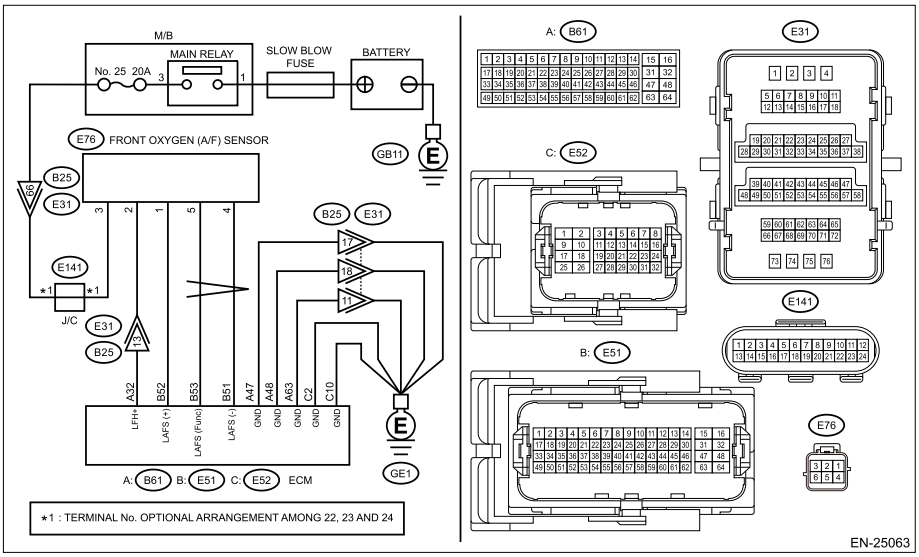
**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1261. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1261 CYLINDER 1 DIRECT FUEL INJECTOR CIRCUIT/OPEN.**

## DTC P1378 PRE-IGNITION DETECTED

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
- **This DTC may be detected even if fault does not occur in the vehicle. If the customer does not ask for inspection, clear memory instead of inspection and return the vehicle to the user. Ref. to COMMON (DIAGNOSTICS)>Clear memory.**
- **After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |

2. CHECK PHENOMENON.
- yes → Perform the instructed procedures.
- no → Go to 3.

3. CHECK DTC.
- no → Perform the instructed procedures.
- yes ↓

4. CHECK FREEZE FRAME DATA.
- no → Go to 16.
- yes ↓

5. CHECK IGNITION TIMING.
- no → Go to 11.
- yes ↓

6. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
- yes → Go to 11.
- no → Go to 7.

7. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
- no → Go to 34.
- yes ↓

8. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (OPEN).
- no → Go to 34.
- yes ↓

9. CHECK HARNESS BETWEEN ECM AND THE MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (SHORT TO GROUND).
- no → Go to 34.
- yes ↓

10. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (LINE-TO-LINE SHORT).
- yes → Perform the instructed procedures.
- no → Go to 34.

11. CHECK CRANKSHAFT POSITION SENSOR, INTAKE CAMSHAFT POSITION SENSOR.

yes → Go to 14.

no → Go to 12.

12. CHECK CRANKSHAFT POSITION SENSOR WAVEFORM.

no → Go to 14.

yes

13. CHECK CAMSHAFT POSITION SENSOR WAVEFORM.

yes → Go to 15.

no → Go to 15.

14. CHECK DTC.

no → Perform the instructed procedures.

yes

15. CHECK ENGINE OIL.

no → Go to 16.

yes

16. CHECK ENGINE COOLANT.

no → Go to 17.

yes

17. CHECK RADIATOR FAN.

no → Go to 18.

yes

18. CHECK AIR INTAKE SYSTEM.

no → Go to 19.

yes

19. CHECK FRONT OXYGEN (A/F) SENSOR DATA.

yes → Go to 33.

no → Go to 20.

20. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR.

no → Go to 33.

yes

21. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
- no → Go to 33.
- yes ↓

22. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
- no → Go to 33.
- yes ↓

23. CHECK FUEL PRESSURE.
- yes → Go to 26.
- no → Go to 24.

24. CHECK OF FUEL PUMP.
- yes → Go to 26.
- no → Go to 25.

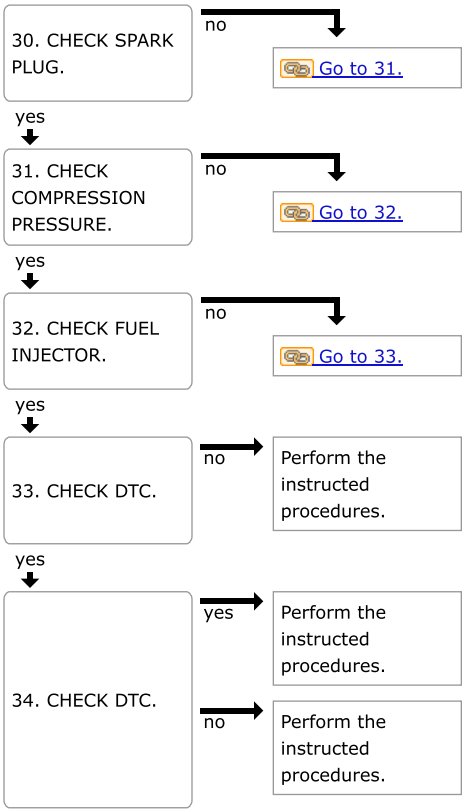
25. CHECK OF FUEL PUMP.
- no → Go to 26.
- yes ↓

26. CHECK FUEL TANK.
- yes → Go to 33.
- no → Go to 27.

27. CHECK FREEZE FRAME DATA.
- no → Go to 33.
- yes ↓

28. CHECK KNOCK SENSOR.
- no → Go to 30.
- yes ↓

29. CHECK KNOCK SENSOR.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1378 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK PHENOMENON.

For the result of the interview, check the problem of the following symptoms.

- Engine startability
- Rough idling
- Misfire or insufficient power
- Other symptom

Can the malfunction symptom be confirmed?

| | |
|---|---|
| Yes | Perform the diagnosis according to the phenomenon. |
| No | Go to 3. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1378 displayed? (Current code)

Yes — Go to 4.

No — Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

### 4. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [Number of Pre-Ignition Control (Detection) Operating].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is [Number of Pre-Ignition Control (Detection) Operating] 1 or more?

Yes — Go to 5.

No — Go to 16.

### 5. CHECK IGNITION TIMING.

1. Warm up the engine.
2. Fix the ignition timing to BTDC 10° by selecting the [Fixed Idle Ignition Timing] in [Active Test] using Subaru Select Monitor.
   **Note:**
   **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
3. Using the timing light, check the actual ignition timing at BTDC 10°.

Does the ignition timing match?

Yes — Go to 6.

No — Go to 11.

### 6. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Turn the ignition switch to OFF.
2. Remove the mass air flow and intake air temperature sensor from the vehicle, and cool down to the compartment temperature. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
3. Connect the mass air flow and intake air temperature sensor.
4. Turn the ignition switch to ON.
5. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Do the compartment temperature and the temperature displayed in the data monitor match?

Yes — Go to 11.

No — Go to 7.

### 7. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 8.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
Go to 34.

### 8. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   **Connector & terminal**
   (B61) No. 61 — (B92) No. 2:
   (B61) No. 34 — (B92) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the following item.
- Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Poor contact of J/C

Go to 34.

### 9. CHECK HARNESS BETWEEN ECM AND THE MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 34 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 10.

No — Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
Go to 34.

### 10. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR (LINE-TO-LINE SHORT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   **Connector & terminal**
   (B92) No. 2 — (B92) No. 4:

Is the resistance 1 MΩ or more?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Repair the line-to-line short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
Go to 34.

### 11. CHECK CRANKSHAFT POSITION SENSOR, INTAKE CAMSHAFT POSITION SENSOR.

1. Using an oscilloscope, measure waveform of crankshaft position sensor and camshaft position sensor.
2. Check if "Number of signals for every two crankshaft revolutions", "Phase difference of the crankshaft position sensor and intake camshaft position sensor signals", "Signal waveform" match according to the sample waveform described in the manual. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Control Module I/O Signal.

Is the check result OK?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
Go to 14.

No — Correct the displacement of the timing chain.
Go to 12.

### 12. CHECK CRANKSHAFT POSITION SENSOR WAVEFORM.

Check the number of signals and presence/absence of noise with waveform of the crankshaft position sensor.

Is the check result OK?

Yes — Go to 13.

No — Check for DTC P0335. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT.
Go to 14.

### 13. CHECK CAMSHAFT POSITION SENSOR WAVEFORM.

Check the number of signals and presence/absence of noise with waveform of the camshaft position sensor.

Is the check result OK?

Yes — Go to 15.

No — Check for DTC P0340 and P0345.
Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.
Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2.
Go to 15.

### 14. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the reproduction test.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1378 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 15. |
| No | Currently, it is normal. |

### 15. CHECK ENGINE OIL.

Check the engine oil. Ref. to LUBRICATION(H4DOTC)>Engine Oil>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 16. |
| No | Replace engine oil. Ref. to LUBRICATION(H4DOTC)>Engine Oil.<br>Go to 16. |

### 16. CHECK ENGINE COOLANT.

Check the engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 17. |
| No | Perform replacement and bleeding of the engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant.<br>Go to 17. |

### 17. CHECK RADIATOR FAN.

1. Using the Subaru Select Monitor, select [Radiator Fan Relay] of [Active Test].

   **Note:**
   **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
2. Check operation/stop of the radiator fan according to ON/OFF switching operation.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 18. |
| No | Check the radiator fan operation. Ref. to COOLING(H4DOTC)>Radiator Fan System.<br>Go to 18. |

### 18. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes — Repair or replace the air intake system.
Go to 19.

No — Go to 19.

### 19. CHECK FRONT OXYGEN (A/F) SENSOR DATA.

1. Start the engine and warm up completely.
2. Raise the engine speed up to 2,500 rpm and maintain it for approx. three minutes.
3. Release the accelerator pedal and idle the engine.
4. Using the Subaru Select Monitor, select [Injection Quantity Control] in [Active Test], and read the value of [A/F Sensor #1] at the increase rate of both 12% and −12%.

**Note:**
- **Perform the operation immediately after the engine comes into idling condition, otherwise the front oxygen (A/F) sensor will be cooled.**
- **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
- **The value of [A/F Sensor #1] will change to 0.93 or 1.17 when [Injection Quantity Control] in [Active Test] is changed between −12% — +12% with [Long term fuel trim B1] at −5%.**

Does the value of [A/F Sensor #1] change to less than 0.88 at the increase rate of 12%, and to 1.12 or more at the rate of −12%?

Yes — Go to 33.

No — Go to 20.

### 20. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.

**Connector & terminal**
(E76) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 21.

No — Repair or replace the power supply circuit. Go to 33.

**Note:**
**In this case, repair the following item:**
- **Open circuit in harness between M/B and front oxygen (A/F) sensor connector**
- **Poor contact of J/C**
- **Poor contact of coupling connector**
- **Blown out of fuse**

## 21. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 22.

No — Repair the open circuit of harness or replace the harness between ECM connector and front oxygen (A/F) sensor connector.
Go to 33.

## 22. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 (+) — Engine ground (−):
(E51) No. 52 (+) — Engine ground (−):
(E51) No. 53 (+) — Engine ground (−):

Is the resistance 1 MΩ or more?

Yes — Go to 23.

No — Repair the short circuit to ground in harness or replace the harness between ECM connector and front oxygen (A/F) sensor connector.
Go to 33.

## 23. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

**Note:**
**If the indication of the fuel pressure gauge is not stable, read the mean value of the indication.**

Is the check result OK?

Yes — Go to 26.

No — Check the fuel delivery line.
Go to 24.

## 24. CHECK OF FUEL PUMP.

Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test] to operate the fuel pump.

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the fuel pump emit operating sound?

Yes — Go to 26.

No — Go to 25.

### 25. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Repair the wiring malfunction of the fuel pump.
Go to 26.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.
Go to 26.

### 26. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Check if any foreign matters such as iron powder exist in the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Is there any foreign matter in the fuel tank?

Yes — Remove foreign matter from the fuel tank.
Go to 33.

No — Go to 27.

### 27. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value in [Fuel Rail Pressure A] synchronized with the one in [Commanded Fuel Rail Pressure A] in all freeze frame data?

Yes — Go to 28.

No — Check the high-pressure fuel pump, and if any fault is found, replace the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump.
Go to 33.

### 28. CHECK KNOCK SENSOR.

1. Warm up and then idle the engine.
2. Using the Subaru Select Monitor, read the value in [Knocking Signal].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Knocking Signal] [ON]?

Yes — Go to 29.

No — Go to 30.

### 29. CHECK KNOCK SENSOR.

Check the knock sensor signals using oscilloscope.

Does noise occur in the knocking sensor signals?

| | |
|---|---|
| Yes | Repair the noise cause. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 30. CHECK SPARK PLUG.

Check the spark plug. Ref. to IGNITION(H4DOTC)>Spark Plug>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 31. |
| No | Replace all spark plugs on all cylinders. Ref. to IGNITION(H4DOTC)>Spark Plug.<br>Go to 31. |

### 31. CHECK COMPRESSION PRESSURE.

Check the compression pressure. Ref. to MECHANICAL(H4DOTC)>Compression>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 32. |
| No | Check compression failure of the engine unit.<br>Go to 32. |

### 32. CHECK FUEL INJECTOR.

1. Remove the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.
2. Check fuel injector.

Is there any deposit in the tip of fuel injector?

| | |
|---|---|
| Yes | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.<br>Remove foreign objects such as carbon adhered inside the combustion chamber.<br>Go to 33. |
| No | Go to 33. |

### 33. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
3. Perform the reproduction test.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1378 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 34. |
| No | Currently, it is normal. |

### 34. CHECK DTC.

1. Turn the ignition switch to OFF.
2. Replace the entire fuel.
3. Turn the ignition switch to ON.
4. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
5. Perform the reproduction test.
6. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1378 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Currently, it is normal. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the pressure difference is equal to or more than the predetermined value by using fuel which does not match the standard.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

**<Pre-ignition detection control>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Delay value from the before top dead center 70 deg until the pre-ignition analysis starts<br>and<br>Delay value from the ignition timing until the pre-ignition analysis ends<br>and<br>Analyzed pressure change value | 0.277 or more<br><br>Value of Map1 or less<br><br>Value of Map2 or more |

**Map1**

| Diagnostic value | | Crankshaft angle (deg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| Engine speed (rpm) | 800 | 16.9 | 18.05 | 19.2 | 20.35 | 21.5 | 21.64 | 21.64 | 21.64 |
| | 1200 | 15.89 | 17.04 | 18.19 | 19.34 | 20.49 | 21.64 | 21.64 | 21.64 |
| | 1600 | 19.48 | 19.48 | 19.48 | 19.48 | 19.48 | 19.48 | 20.104 | 20.728 |
| | 2000 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 |
| | 2400 | 20.7 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 |
| | 2800 | 20.8 | 21.1 | 21.1 | 21.6 | 21.6 | 22.12 | 22.12 | 22.12 |
| | 3200 | 20.8 | 21.3 | 21.8 | 22.3 | 22.5 | 22.5 | 23.03 | 23.03 |
| | 3600 | 20.8 | 21.3 | 21.8 | 22.3 | 22.8 | 22.8 | 23.51 | 23.51 |
| | 4000 | 20.8 | 21.3 | 21.8 | 22.3 | 22.84 | 22.84 | 22.84 | 22.84 |
| | 4400 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 23.4 | 24.57 | 24.57 |
| | 4800 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 24.95 | 24.95 | 24.95 |
| | 5200 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 24.33 | 24.33 | 24.33 |
| | 5600 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 22.55 | 22.55 | 22.55 |
| | 6000 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 22.55 | 22.55 | 22.55 |
| | 6400 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 22.55 | 22.55 | 22.55 |
| | 6800 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 22.55 | 22.55 | 22.55 |

| Diagnostic value | Crankshaft angle (deg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Engine speed (rpm) | 800 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 |
| | 1200 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 | 21.64 |
| | 1600 | 20.728 | 20.728 | 20.728 | 20.728 | 20.728 | 20.728 | 20.728 | 20.728 |
| | 2000 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 | 20.44 |
| | 2400 | 20.77 | 20.34 | 20.2 | 20.06 | 20.06 | 20.06 | 20.06 | 20.06 |
| | 2800 | 21.83 | 21.54 | 21.54 | 21.54 | 21.54 | 21.54 | 21.54 | 21.54 |
| | 3200 | 22.985 | 22.94 | 22.795 | 22.65 | 22.455 | 22.26 | 22.065 | 21.87 |
| | 3600 | 23.51 | 23.51 | 23.51 | 23.51 | 22.79 | 22.07 | 22.07 | 22.07 |
| | 4000 | 22.84 | 22.84 | 22.84 | 22.84 | 22.84 | 22.84 | 22.84 | 22.84 |
| | 4400 | 24.57 | 24.57 | 24.28 | 23.99 | 22.935 | 21.88 | 21.88 | 21.88 |
| | 4800 | 24.665 | 24.38 | 24.38 | 24.38 | 23.59 | 22.8 | 22.8 | 22.8 |
| | 5200 | 24.565 | 24.8 | 24.8 | 24.8 | 24.39 | 23.2 | 23.2 | 23.2 |
| | 5600 | 23.225 | 23.9 | 23.9 | 23.9 | 23.2 | 22.5 | 22.5 | 22.5 |
| | 6000 | 23.225 | 23.9 | 23.9 | 23.9 | 23.2 | 22.5 | 22.5 | 22.5 |
| | 6400 | 23.225 | 23.9 | 23.9 | 23.9 | 23.2 | 22.5 | 22.5 | 22.5 |
| | 6800 | 23.225 | 23.9 | 23.9 | 23.9 | 23.2 | 22.5 | 22.5 | 22.5 |

**Map2**

| Diagnostic value | | Crankshaft angle (deg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 90 | 100 | 110 | 120 | 130 | 140 | 160 | 180 |
| Engine speed (rpm) | 800 | 10000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| | 1200 | 10000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| | 1600 | 10000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| | 2000 | 10000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| | 2400 | 10000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| | 2800 | 10000 | 2000 | 2000 | 2000 | 2000 | 2300 | 2300 | 2300 |
| | 3200 | 10000 | 2000 | 2000 | 2000 | 3100 | 2500 | 2500 | 2500 |
| | 3600 | 10000 | 2500 | 2500 | 2500 | 3200 | 2800 | 2800 | 2800 |
| | 4000 | 10000 | 2800 | 2800 | 3200 | 4500 | 3500 | 3500 | 3500 |
| | 4400 | 10000 | 4000 | 4000 | 4400 | 5600 | 4400 | 4400 | 4400 |
| | 4800 | 10000 | 4600 | 4600 | 4600 | 5300 | 4400 | 4400 | 4400 |
| | 5200 | 10000 | 4700 | 4700 | 4700 | 7200 | 5500 | 5500 | 5500 |
| | 5600 | 10000 | 5600 | 5600 | 5600 | 8500 | 6400 | 6400 | 6400 |
| | 6000 | 10000 | 6600 | 6600 | 6600 | 10000 | 7300 | 7300 | 7300 |
| | 6400 | 10000 | 7700 | 7700 | 7700 | 10000 | 8200 | 8200 | 8200 |
| | 6800 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 |

**<Control with non-standard fuel supplied>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Knocking compensation (DKNK)<br>and<br>Accumulation value of number of knocking cylinder | −12 deg or less<br>186 times or more |
| Knocking compensation (PCMP)<br>and<br>Accumulation value of number of knocking cylinder | −9.8 deg or less<br>186 times or more |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Does not illuminate.

## DTC P1449 EVAP SYSTEM CLOG DETECTED (AIR FILTER)

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DRAIN TUBE AND DRAIN PIPE BETWEEN LEAK CHECK VALVE ASSEMBLY AND DRAIN FILTER. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK DRAIN FILTER. | yes | Perform the instructed procedures. |
| | no | Go to 4. |
| 4. CHECK LEAK CHECK VALVE ASSEMBLY (PRESSURE SENSOR). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1449 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the “Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK DRAIN TUBE AND DRAIN PIPE BETWEEN LEAK CHECK VALVE ASSEMBLY AND DRAIN FILTER.

1. Turn the ignition switch to OFF.
2. Check the drain tube and the drain pipe between leak check valve assembly and drain filter.

Is the drain tube or the drain pipe between leak check valve assembly and drain filter clogged?

Yes — Replace the drain tube or the drain pipe between leak check valve assembly and drain filter.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Drain Filter.

No — Go to 3.

### 3. CHECK DRAIN FILTER.

Check the drain filter.

Is the drain filter clogged?

Yes — Replace the drain filter. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Drain Filter.

No — Go to 4.

### 4. CHECK LEAK CHECK VALVE ASSEMBLY (PRESSURE SENSOR).

1. Turn the ignition switch to ON.
2. Start monitoring of [Evap System Absolute Pressure] using [Generic OBDII] of Subaru Select Monitor.
   **Note:**
   **For detailed operation procedures, refer to "Help" of application.**
3. Check the value of [Evap System Absolute Pressure] by shaking the harness and connector between leak check valve assembly and ECM.

Does the value of [Evap System Absolute Pressure] change?

Yes — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of coupling connector
- Poor contact of J/C

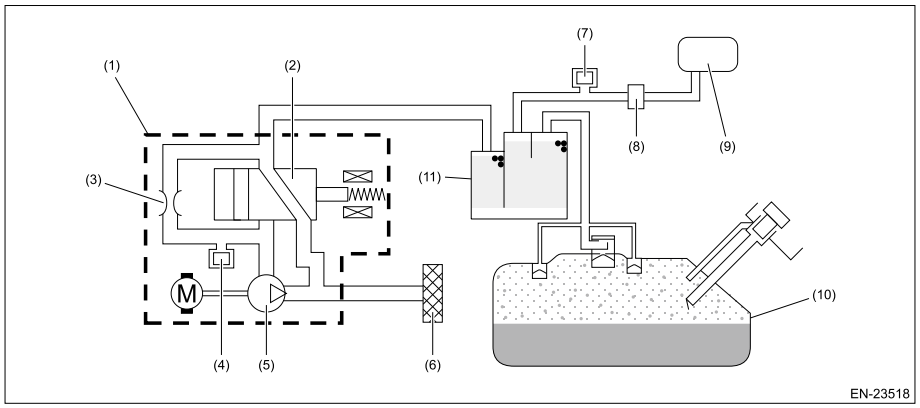
No — Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the drain filter clogging by the pressure change during purge introduction.
Judge as drain filter clogging malfunction if the pressure in the evaporative emission system piping suddenly decreases by the purging.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

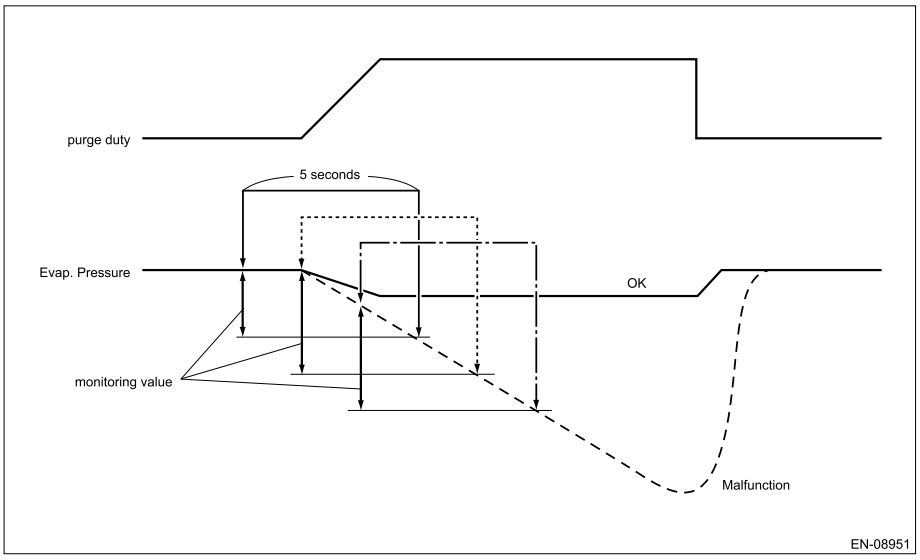
**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Elapsed time after ignition switch is turned to ON | 20 s or more |
| Vacuum pump in the leak check valve assembly | Not in operation |
| Switching valve in leak check valve assembly | Open |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously when purging is performed after 20 seconds have passed since the engine started.

**DIAGNOSTIC METHOD**




Calculate the difference between the pressure sensor output value in the leak check valve assembly as of 5 seconds ago and the current one, and if the value is greater than judgment value, detect and judge as filter clogging trouble.
Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Pressure sensor output value as of 5 seconds ago − Current pressure sensor output value\| | More than value of Map |

**Map**

| Vehicle speed (km/h (MPH)) | 0 (0) | 100 (62.1) | 110 (68.4) | 120 (74.6) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| \|Pressure sensor output value as of 5 seconds ago − Current pressure sensor output value\| (kPa (mmHg, inHg)) | 1.23 (9.2, 0.4) | 1.23 (9.2, 0.4) | 1.29 (9.7, 0.4) | 1.35 (10.1, 0.4) |

**Time needed for diagnosis:** 1000 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P1451 EVAP SYSTEM CLOG DETECTED (PIPE)

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DRAIN TUBE BETWEEN CANISTER AND LEAK CHECK VALVE ASSEMBLY. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HOSE AND TUBE BETWEEN CANISTER AND FUEL TANK. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DRAIN TUBE BETWEEN CANISTER AND LEAK CHECK VALVE ASSEMBLY.

Check the drain tube between the canister and leak check valve assembly.

Is the drain tube between canister and leak check valve assembly clogged?

Yes — Replace the drain tube between the canister and leak check valve assembly.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

No — Go to 2.

#### 2. CHECK HOSE AND TUBE BETWEEN CANISTER AND FUEL TANK.

Check the hose and tube between the canister and fuel tank.

Are the hose and tube between the canister and fuel tank clogged?

Yes — Replace the hose or tube between the canister and fuel tank.
Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

No — Replace the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Canister.
Go to 3.

**3. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.**

1. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1451 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |
| No | End. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

**Note:**
**For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1492 COIL 1 EGR "A" CONTROL CIRCUIT LOW

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1498. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1498 COIL 4 EGR "A" CONTROL CIRCUIT LOW.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1493 COIL 1 EGR "A" CONTROL CIRCUIT HIGH

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1499. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1499 COIL 4 EGR "A" CONTROL CIRCUIT HIGH.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1494 COIL 2 EGR "A" CONTROL CIRCUIT LOW

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1498. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1498 COIL 4 EGR "A" CONTROL CIRCUIT LOW.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1495 COIL 2 EGR "A" CONTROL CIRCUIT HIGH

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1499. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1499 COIL 4 EGR "A" CONTROL CIRCUIT HIGH.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1496 COIL 3 EGR "A" CONTROL CIRCUIT LOW

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1498. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1498 COIL 4 EGR "A" CONTROL CIRCUIT LOW.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P1497 COIL 3 EGR "A" CONTROL CIRCUIT HIGH

**Note:**
**For the diagnostic procedure and detection standard, refer to DTC P1499. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1499 COIL 4 EGR "A" CONTROL CIRCUIT HIGH.**

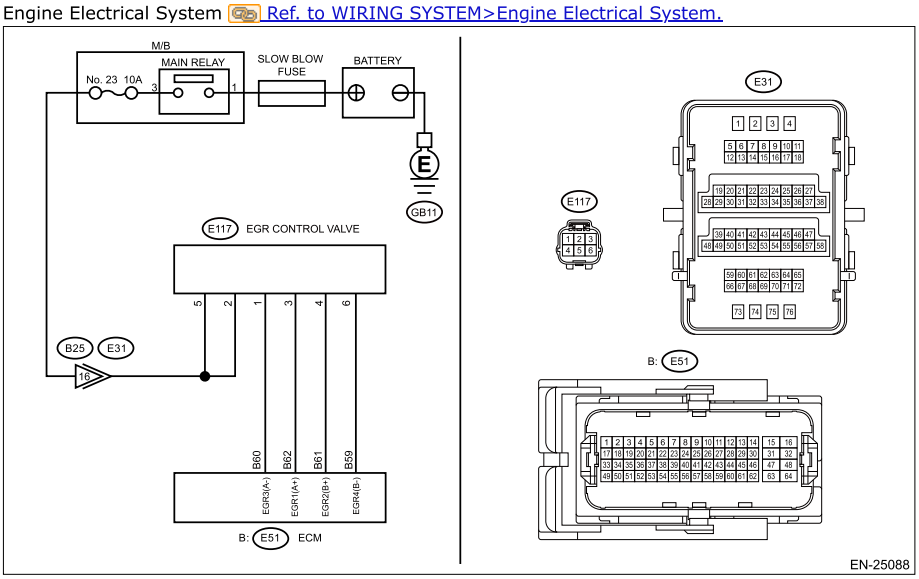
## DTC P1498 COIL 4 EGR "A" CONTROL CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine breathing

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK EGR CONTROL VALVE POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |

| | | |
|---|---|---|
| 4. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK EGR CONTROL VALVE POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the EGR control valve.
3. Turn the ignition switch to ON.
4. Measure the voltage between EGR control valve connector and engine ground.
   **Connector & terminal**
   (E117) No. 2 (+) — Engine ground (−):
   (E117) No. 5 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the following item.
- Open circuit in harness between EGR control valve and M/B
- Poor contact of coupling connector
- Blown out of fuse

### 2. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and EGR control valve connector.
   **Connector & terminal**
   DTC P1492; (E51) No. 62 — (E117) No. 3:
   DTC P1494; (E51) No. 60 — (E117) No. 1:
   DTC P1496; (E51) No. 61 — (E117) No. 4:
   DTC P1498; (E51) No. 59 — (E117) No. 6:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the open circuit of the harness between the ECM connector and EGR control valve connector.

### 3. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
DTC P1492; (E51) No. 62 — Engine ground:
DTC P1494; (E51) No. 60 — Engine ground:
DTC P1496; (E51) No. 61 — Engine ground:
DTC P1498; (E51) No. 59 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair ground short circuit of harness between ECM connector and EGR control valve connector.

### 4. CHECK FOR POOR CONTACT.

Check for poor contact between ECM connector and EGR control valve connector.

Is there poor contact in ECM or EGR control valve connector?

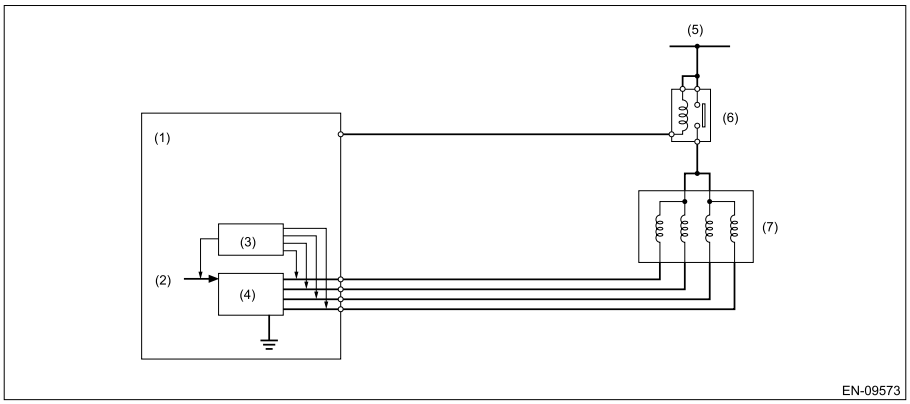
| | |
|---|---|
| Yes | Repair the poor contact of ECM or EGR control valve connector. |
| No | Replace EGR control valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect open or short circuit of EGR.
Judge as NG when the ECM output level differs from the actual terminal level.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switch circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| EGR control signal | OFF |

**GENERAL DRIVING CYCLE**

Perform diagnosis continuously during EGR operation.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Terminal voltage<br>Terminal current | More than 2.3 V<br>Less than 0.03 mA |
| Or, | |
| Terminal voltage | 1.9 V or less |

**Time needed for diagnosis:** 2500 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

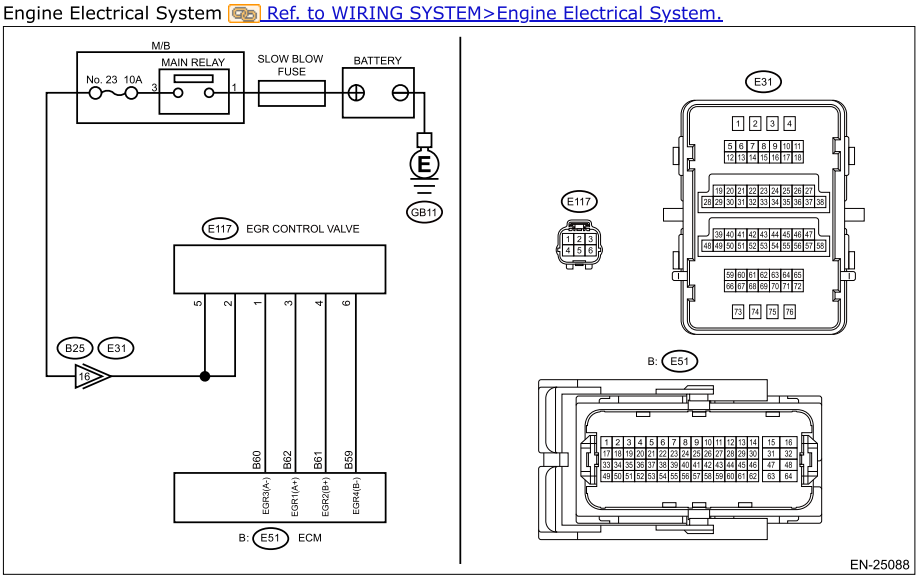
## DTC P1499 COIL 4 EGR "A" CONTROL CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine breathing

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK EGR CONTROL VALVE. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the EGR control valve.
4. Turn the ignition switch to ON.
5. Measure the voltage between defective ECM connector and engine ground.

**Connector & terminal**

DTC P1493; (E51) No. 62 (+) — Engine ground (−):
DTC P1495; (E51) No. 60 (+) — Engine ground (−):
DTC P1497; (E51) No. 61 (+) — Engine ground (−):
DTC P1499; (E51) No. 59 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in the harness between the ECM connector and EGR control valve connector. |
| No | Go to 2. |

### 2. CHECK EGR CONTROL VALVE.

Check the EGR control valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve>INSPECTION.

Is the check result OK?

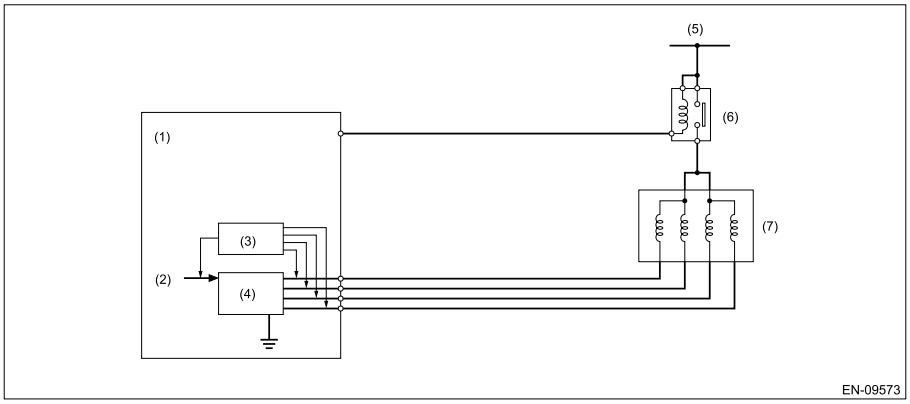
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace EGR control valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of EGR.
Judge as NG when the ECM output level differs from the actual terminal level.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Computer unit (CPU)
(3) Detecting circuit
(4) Switch circuit
(5) Battery voltage
(6) Main relay
(7) EGR control valve

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| EGR control signal | ON |

**GENERAL DRIVING CYCLE**

Perform diagnosis continuously during EGR operation.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

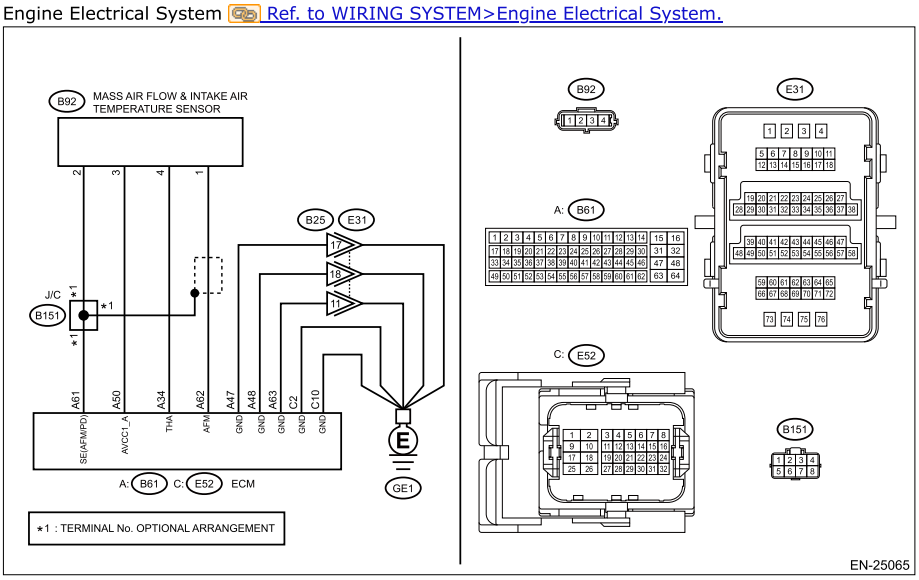
| Malfunction Criteria | Threshold Value |
| --- | --- |
| EGR terminal current | 5 A or more |

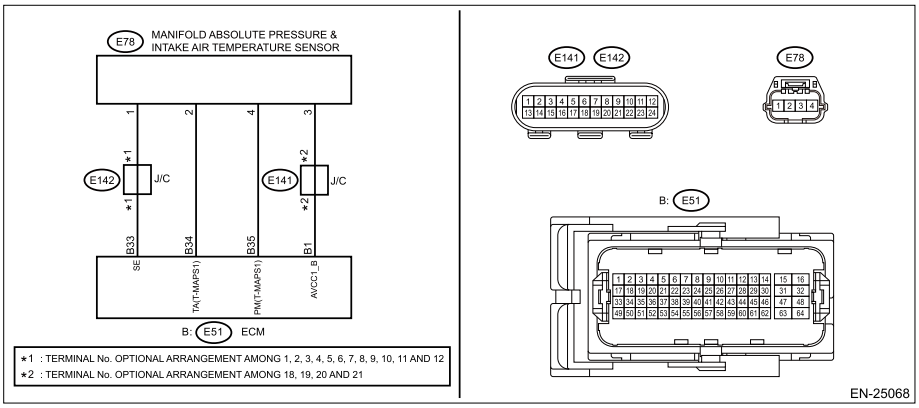
**Time needed for diagnosis:** 220 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

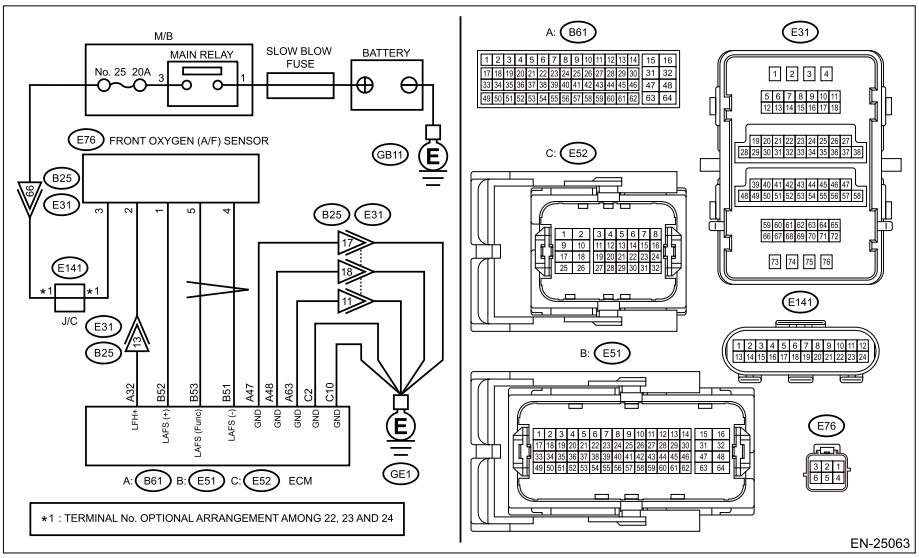
## DTC P1603 ENGINE STALL HISTORY

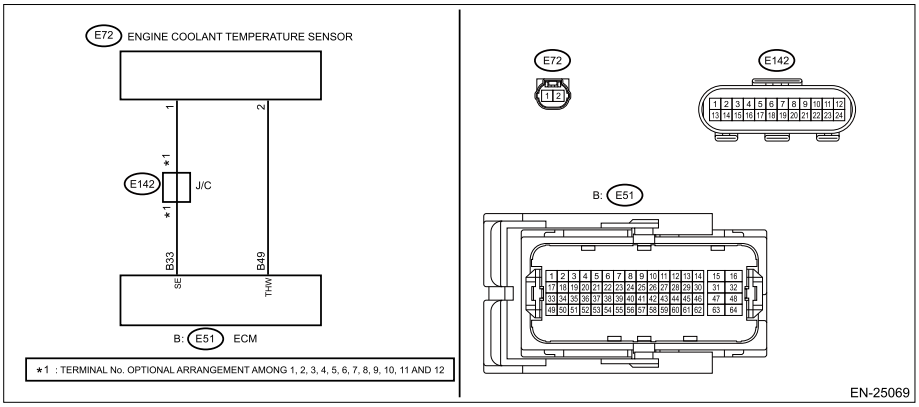
### 1. —

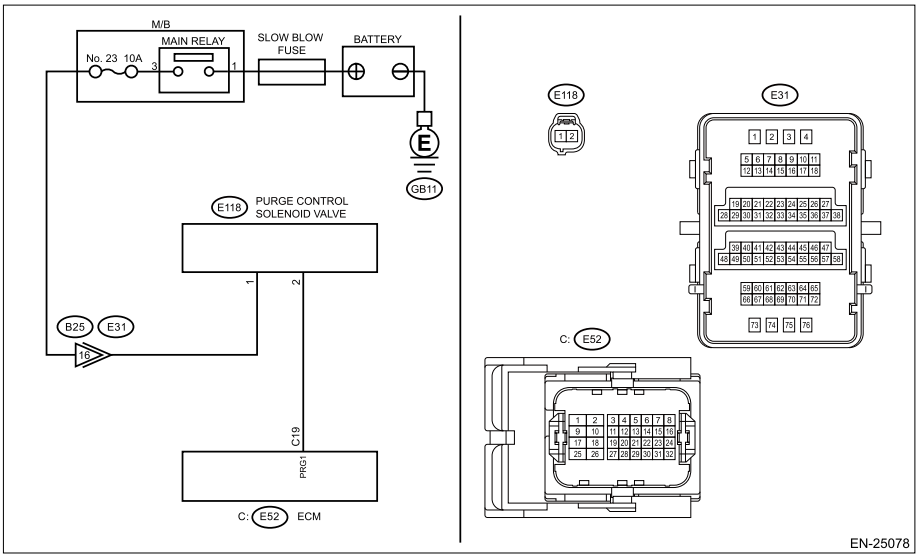
**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

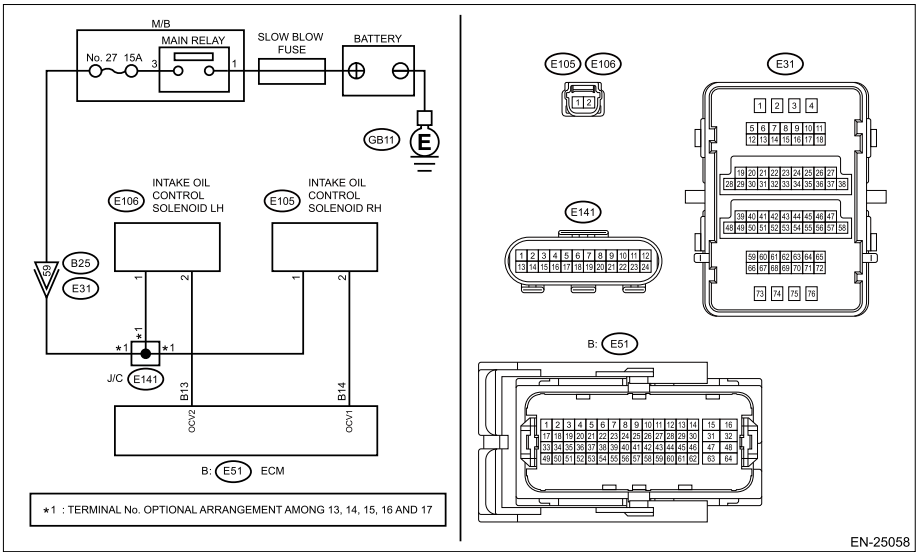


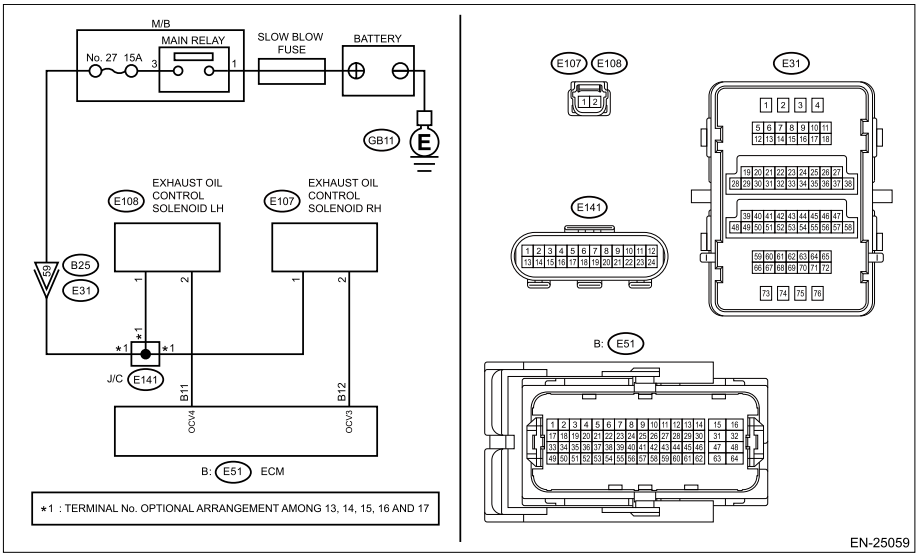



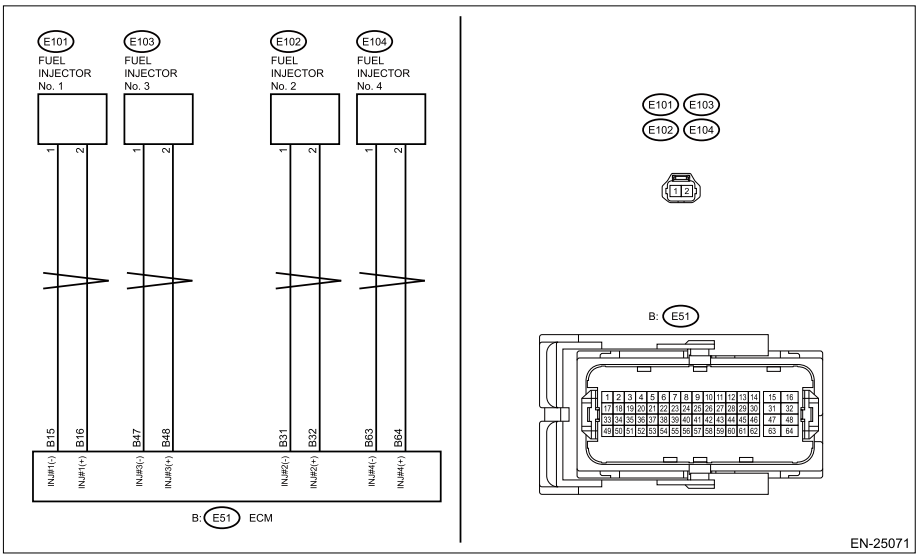




E72 ENGINE COOLANT TEMPERATURE SENSOR
1
2
∗1
E142 J/C
∗1
B33
B49
SE
THW
B: E51 ECM
∗1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 AND 12
E72
E142
B: E51
EN-25069


M/B
MAIN RELAY
No. 23 10A
SLOW BLOW FUSE
BATTERY
GB11
E118 PURGE CONTROL SOLENOID VALVE
B25
E31
16
C19
PRG1
C: E52 ECM
E118
E31
C: E52
EN-25078


M/B
MAIN RELAY
No. 27 15A
SLOW BLOW FUSE
BATTERY
GB11
E106 INTAKE OIL CONTROL SOLENOID LH
E105 INTAKE OIL CONTROL SOLENOID RH
B25
E31
∗1
J/C E141
B13
B14
OCV2
OCV1
B: E51 ECM
∗1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 13, 14, 15, 16 AND 17
E105
E106
E31
E141
B: E51
EN-25058



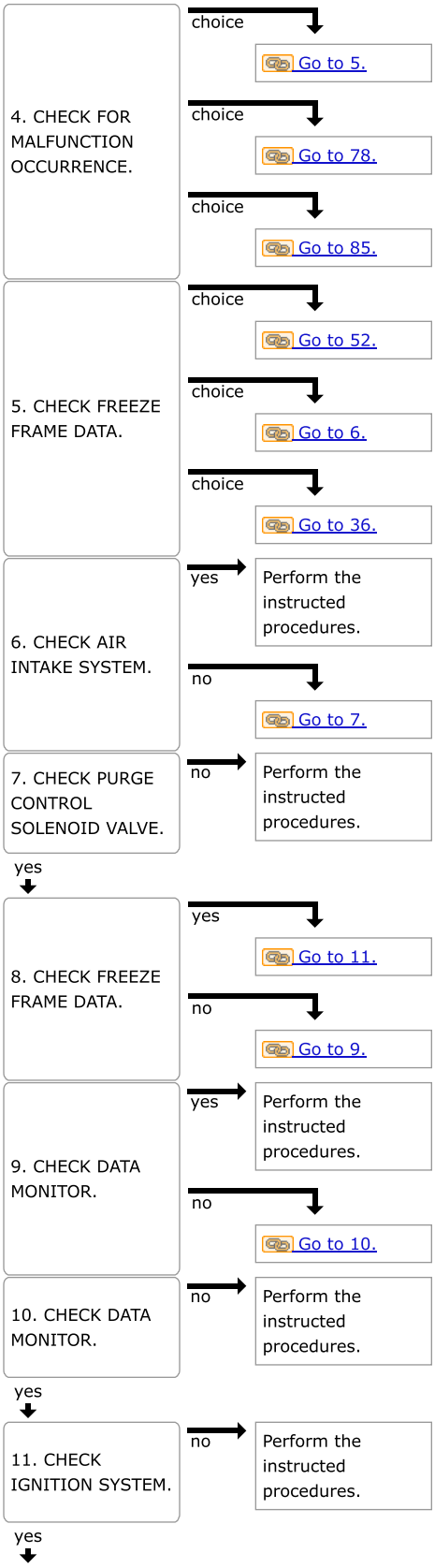

**Caution:**

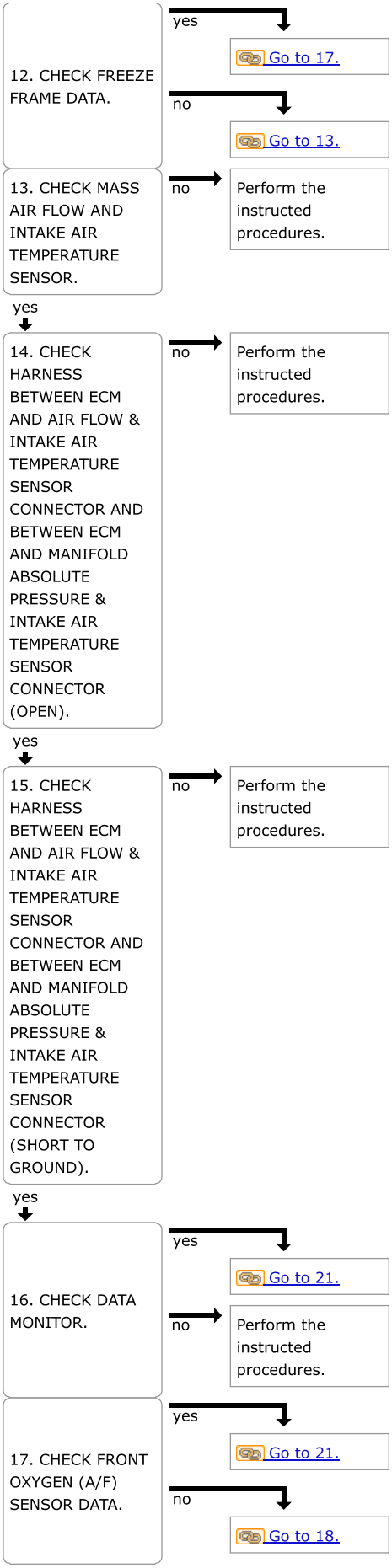
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

- **This DTC may be detected even if fault does not occur in the vehicle. If the customer does not ask for inspection, clear memory instead of inspection and return the vehicle to the user. Ref. to COMMON (DIAGNOSTICS)>Clear memory.**
- **After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK FREEZE FRAME DATA. | no → | Go to 3. |
| yes ↓ | | |
| 3. CHECK FREEZE FRAME DATA. | no → | Perform the instructed procedures. |
| yes ↓ | | |


4. CHECK FOR MALFUNCTION OCCURRENCE.
choice
Go to 5.
choice
Go to 78.
choice
Go to 85.
5. CHECK FREEZE FRAME DATA.
choice
Go to 52.
choice
Go to 6.
choice
Go to 36.
6. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 7.
7. CHECK PURGE CONTROL SOLENOID VALVE.
no
Perform the instructed procedures.
yes
8. CHECK FREEZE FRAME DATA.
yes
Go to 11.
no
Go to 9.
9. CHECK DATA MONITOR.
yes
Perform the instructed procedures.
no
Go to 10.
10. CHECK DATA MONITOR.
no
Perform the instructed procedures.
yes
11. CHECK IGNITION SYSTEM.
no
Perform the instructed procedures.
yes


12. CHECK FREEZE FRAME DATA.
yes
Go to 17.
no
Go to 13.
13. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
14. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
15. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
16. CHECK DATA MONITOR.
yes
Go to 21.
no
Perform the instructed procedures.
17. CHECK FRONT OXYGEN (A/F) SENSOR DATA.
yes
Go to 21.
no
Go to 18.

18. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR.
no → Perform the instructed procedures.
yes ↓

19. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

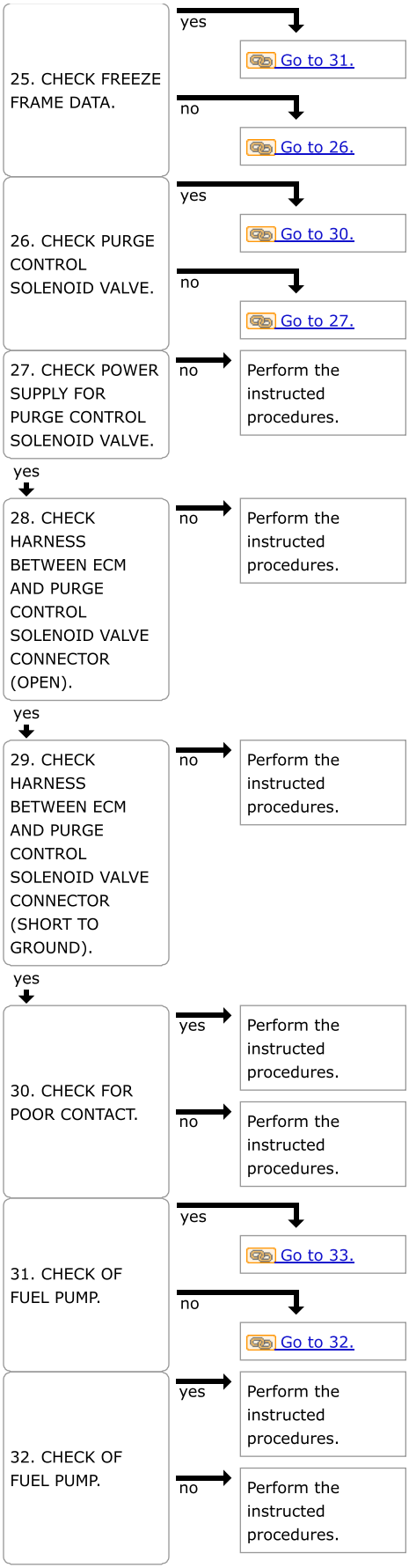
20. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

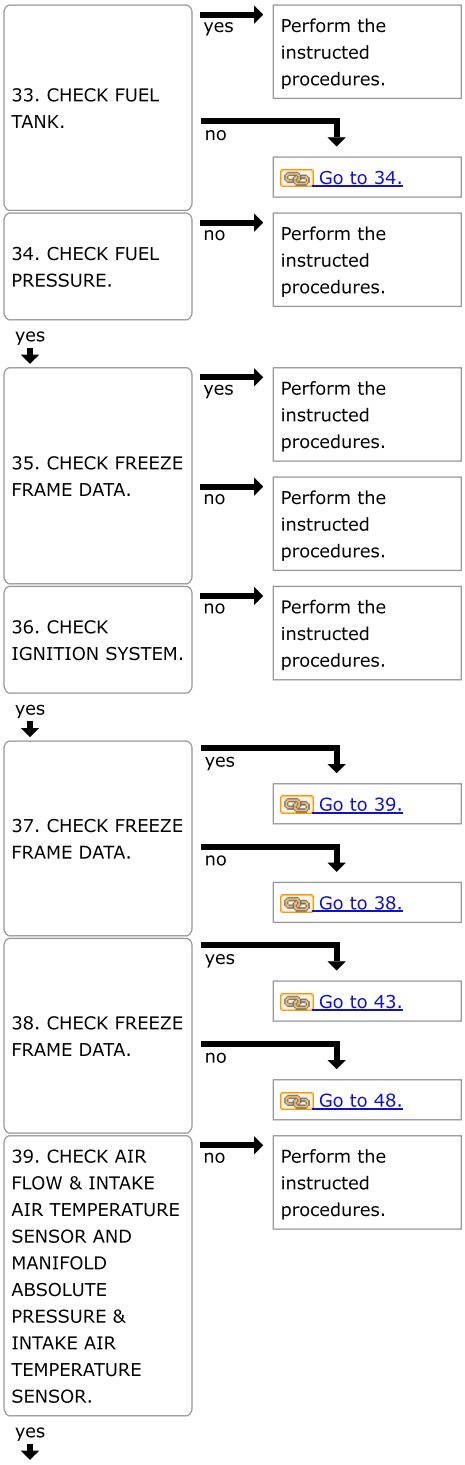
21. CHECK FREEZE FRAME DATA.
no → Go to 25.
yes ↓

22. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no → Perform the instructed procedures.
yes ↓

23. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

24. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).
no → Perform the instructed procedures.
yes ↓


25. CHECK FREEZE FRAME DATA.
yes
Go to 31.
no
Go to 26.
26. CHECK PURGE CONTROL SOLENOID VALVE.
yes
Go to 30.
no
Go to 27.
27. CHECK POWER SUPPLY FOR PURGE CONTROL SOLENOID VALVE.
no
Perform the instructed procedures.
yes
28. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
29. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
30. CHECK FOR POOR CONTACT.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
31. CHECK OF FUEL PUMP.
yes
Go to 33.
no
Go to 32.
32. CHECK OF FUEL PUMP.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.


33. CHECK FUEL TANK.
yes
Perform the instructed procedures.
no
Go to 34.
34. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
35. CHECK FREEZE FRAME DATA.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
36. CHECK IGNITION SYSTEM.
no
Perform the instructed procedures.
yes
37. CHECK FREEZE FRAME DATA.
yes
Go to 39.
no
Go to 38.
38. CHECK FREEZE FRAME DATA.
yes
Go to 43.
no
Go to 48.
39. CHECK AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes

40. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

no → Perform the instructed procedures.

yes ↓

41. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

no → Perform the instructed procedures.

yes ↓

42. CHECK DATA MONITOR.

no → Perform the instructed procedures.

yes ↓

43. CHECK DATA MONITOR.

yes → Go to 48.

no → Go to 44.

44. CHECK FREEZE FRAME DATA.

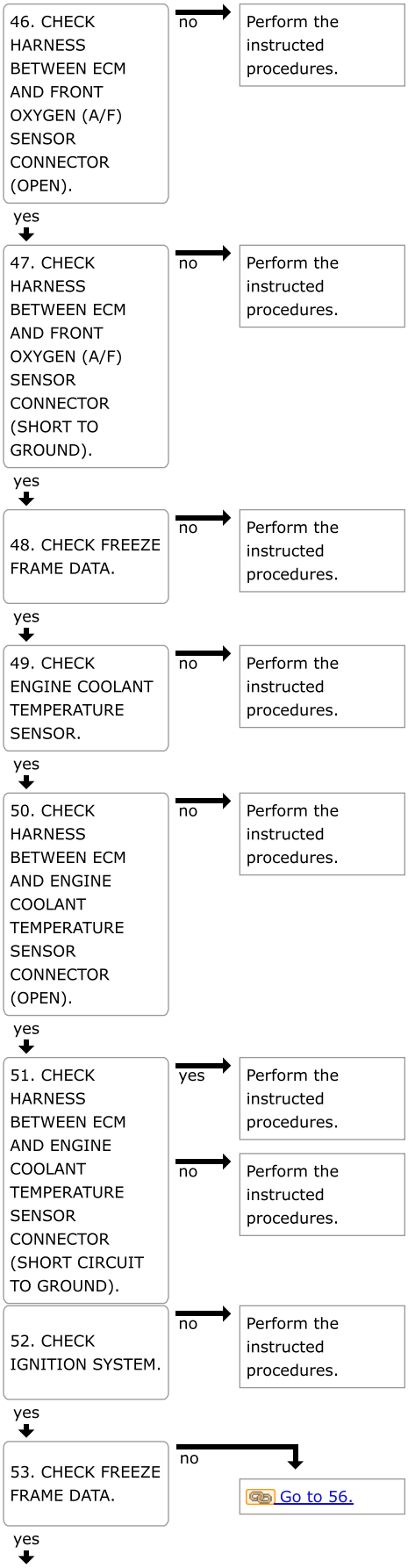
yes → Perform the instructed procedures.

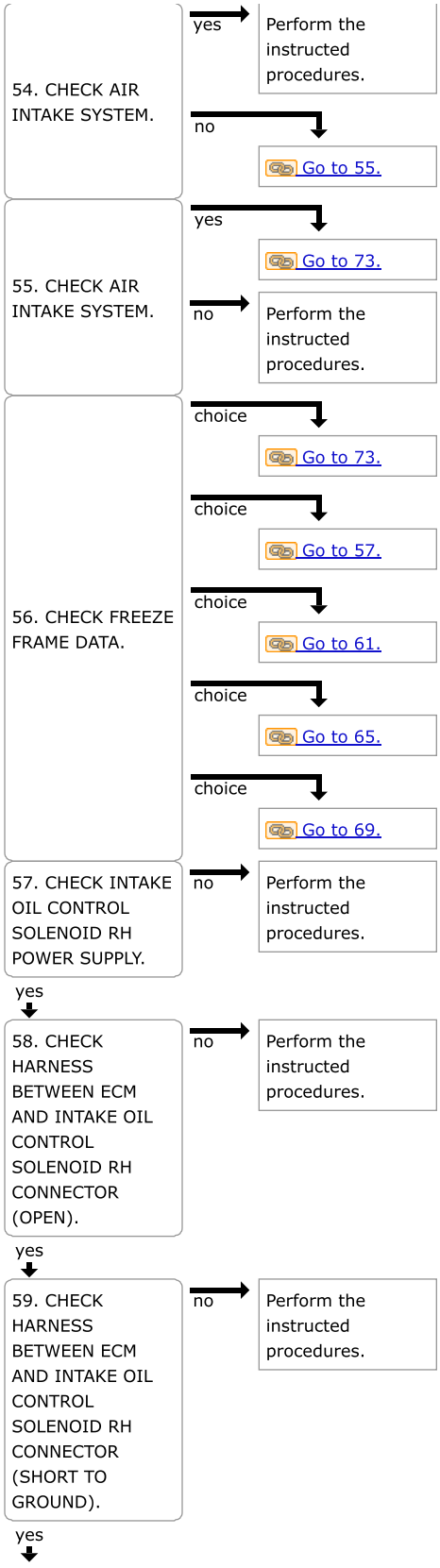
no → Go to 45.

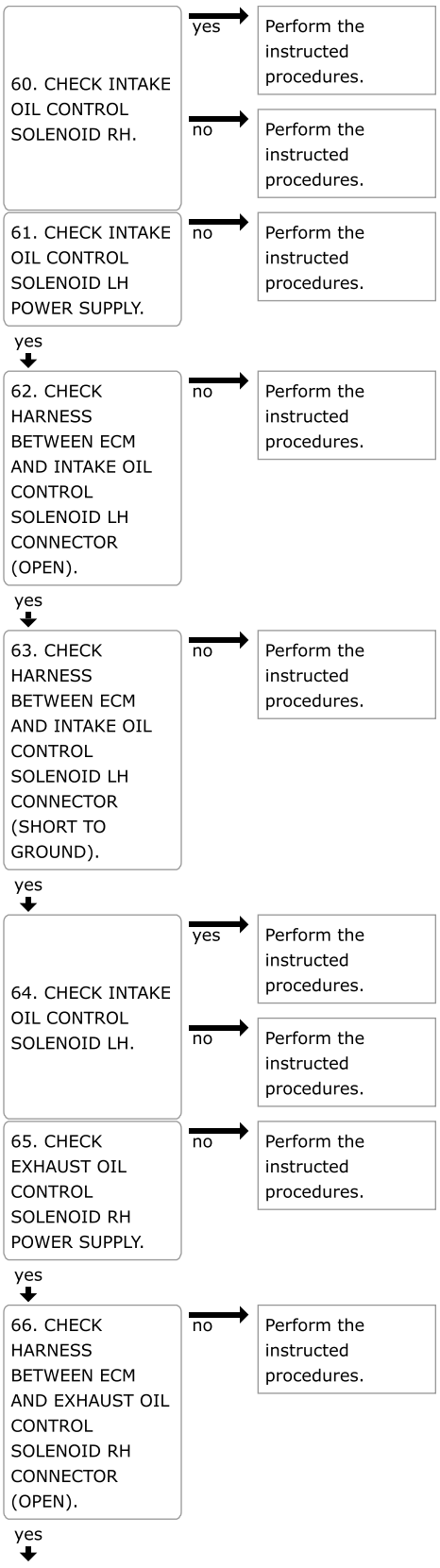
45. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR POWER SUPPLY.

no → Perform the instructed procedures.

yes ↓


46. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
47. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
48. CHECK FREEZE FRAME DATA.
no
Perform the instructed procedures.
yes
49. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
50. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
51. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
52. CHECK IGNITION SYSTEM.
no
Perform the instructed procedures.
yes
53. CHECK FREEZE FRAME DATA.
no
Go to 56.
yes


54. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 55.
55. CHECK AIR INTAKE SYSTEM.
yes
Go to 73.
no
Perform the instructed procedures.
56. CHECK FREEZE FRAME DATA.
choice
Go to 73.
choice
Go to 57.
choice
Go to 61.
choice
Go to 65.
choice
Go to 69.
57. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.
no
Perform the instructed procedures.
yes
58. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
59. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes


60. CHECK INTAKE OIL CONTROL SOLENOID RH.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
61. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.
no
Perform the instructed procedures.
yes
62. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
63. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
64. CHECK INTAKE OIL CONTROL SOLENOID LH.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
65. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.
no
Perform the instructed procedures.
yes
66. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes

67. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

68. CHECK EXHAUST OIL CONTROL SOLENOID RH.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

69. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.
- no → Perform the instructed procedures.
- yes ↓

70. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

71. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

72. CHECK EXHAUST OIL CONTROL SOLENOID LH.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

73. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
- no → Perform the instructed procedures.
- yes ↓

74. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

75. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

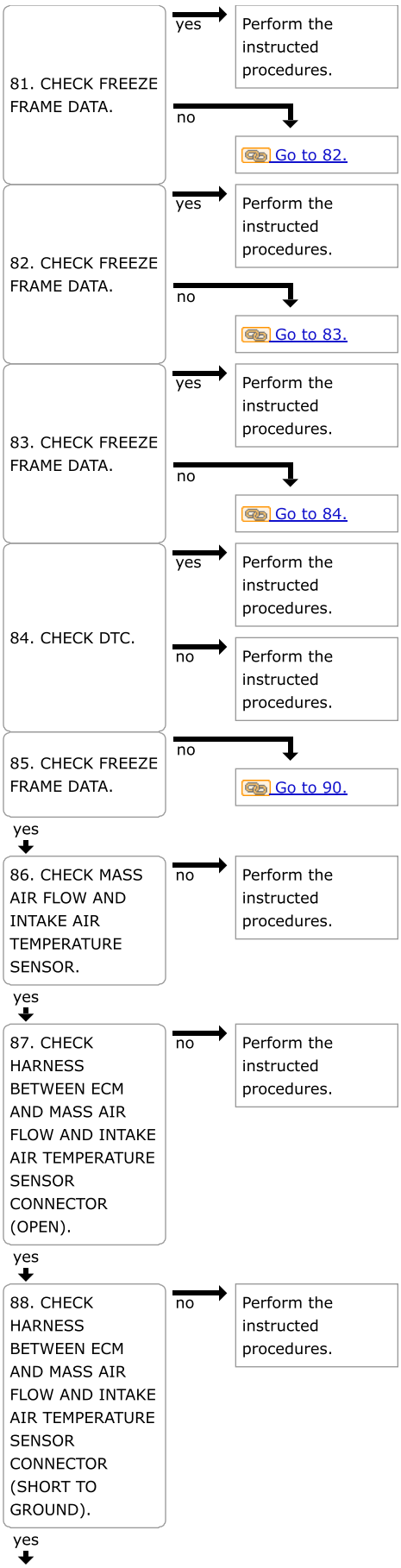
76. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
- no → Perform the instructed procedures.
- yes ↓

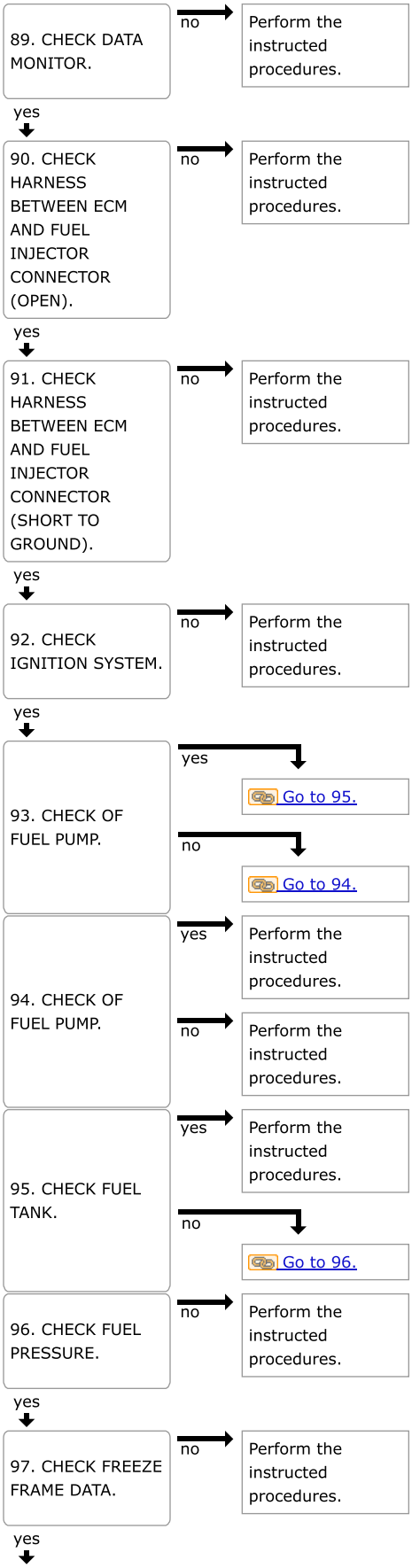
77. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

78. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

79. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

80. CHECK IGNITION SYSTEM.
- no → Perform the instructed procedures.
- yes ↓


81. CHECK FREEZE FRAME DATA.
yes
Perform the instructed procedures.
no
Go to 82.
82. CHECK FREEZE FRAME DATA.
yes
Perform the instructed procedures.
no
Go to 83.
83. CHECK FREEZE FRAME DATA.
yes
Perform the instructed procedures.
no
Go to 84.
84. CHECK DTC.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
85. CHECK FREEZE FRAME DATA.
no
Go to 90.
yes
86. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
87. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
88. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes


89. CHECK DATA MONITOR.
no
Perform the instructed procedures.
yes
90. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
91. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
92. CHECK IGNITION SYSTEM.
no
Perform the instructed procedures.
yes
93. CHECK OF FUEL PUMP.
yes
Go to 95.
no
Go to 94.
94. CHECK OF FUEL PUMP.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
95. CHECK FUEL TANK.
yes
Perform the instructed procedures.
no
Go to 96.
96. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
97. CHECK FREEZE FRAME DATA.
no
Perform the instructed procedures.
yes

| | | |
|---|---|---|
| 98. CHECK ENGINE RUNNING CONDITION. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1603 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [Fuel Level].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Fuel Level] 16.4[%] or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Fuel may run out. If the fault occurs after refueling, continue the diagnosis. Go to 3. |

### 3. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [Control module voltage].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Control module voltage] 11 [V] or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Check the battery and generator.<br>Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.<br>Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator>INSPECTION. |

### 4. CHECK FOR MALFUNCTION OCCURRENCE.

Ask the customer about the driving condition and engine speed status when fault occurred.

If the engine speed dropped slowly and then the engine stalled during idling or deceleration, go to A.
If the engine speed dropped rapidly and then the engine stalled during idling or deceleration, go to B.
If the engine stalled during standing start, acceleration, or constant speed driving, go to C.

| | |
|---|---|
| A | Go to 5. |
| B | Go to 78. |
| C | Go to 85. |

### 5. CHECK FREEZE FRAME DATA.

1. Using the Subaru Select Monitor, read the values in [Short term fuel trim B1] and [Long term fuel trim B1].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

2. Obtain the sum values of [Short term fuel trim B1] and [Long term fuel trim B1] in each freeze frame data.

If the sum value of [Short term fuel trim B1] and [Long term fuel trim B1] is within ±15[%] in each freeze frame data, go to A.
If more than 15% in each freeze frame data, go to B.
If less than −15% in any one of freeze frame data, go to C.

| | |
|---|---|
| A | Go to 52. |
| B | Go to 6. |
| C | Go to 36. |

### 6. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 7. |

### 7. CHECK PURGE CONTROL SOLENOID VALVE.

Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 8. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 8. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [Stop Light Switch].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Stop Light Switch] [OFF] in all freeze frame data?

Yes — Go to 11.

No — Go to 9.

### 9. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. Read the value of [Short term fuel trim B1] both when the brake pedal is released and depressed using Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Short term fuel trim B1] with the brake pedal depressed increase by 10[%] or more compared to when the pedal is released?

Yes — Replace the brake booster. Ref. to BRAKE>Brake Booster.

No — Go to 10.

### 10. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. While reproducing the faulty condition of the vehicle, read the values of [Short term fuel trim B1] and [Long term fuel trim B1] using the Subaru Select Monitor.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

3. Obtain the sum values of [Short term fuel trim B1] and [Long term fuel trim B1].

Is the sum value of [Short term fuel trim B1] and [Long term fuel trim B1] within ±15[%]?

Yes — Go to 11.

No — Replace the brake booster. Ref. to BRAKE>Brake Booster.

### 11. CHECK IGNITION SYSTEM.

Check the ignition system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 12.

No — Repair the ignition system. Ref. to IGNITION(H4DOTC)>General Description.

### 12. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [A/F Sensor #1].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [A/F Sensor #1] 1 or more?

Yes — Go to 17.

No — Go to 13.

### 13. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 14. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
5. Measure the resistance of harness between ECM connector and air flow & intake air temperature sensor connector, and between ECM connector and manifold absolute pressure & intake air temperature sensor connector.
   **Connector & terminal**
   (B61) No. 62 — (B92) No. 1:
   (B61) No. 61 — (B92) No. 2:
   (B61) No. 50 — (B92) No. 3:
   (B61) No. 34 — (B92) No. 4:
   (E51) No. 33 — (E78) No. 1:
   (E51) No. 34 — (E78) No. 2:
   (E51) No. 1 — (E78) No. 3:
   (E51) No. 35 — (E78) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 15.

No — Repair the following item.
- Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of J/C

### 15. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(B61) No. 34 — Engine ground:
(B61) No. 50 — Engine ground:
(B61) No. 62 — Engine ground:
(E51) No. 1 — Engine ground:
(E51) No. 34 — Engine ground:
(E51) No. 35 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 16.

No — Repair the following item.
- Short circuit to ground in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Ground short circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector

### 16. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. Run the engine at idle.
3. Using the Subaru Select Monitor, read the value in [Calculated load value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

4. Compare with the reference value (at idling) of [Calculated load value], listed under the data monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.

**Note:**
**The value of [Calculated load value] changes depending on how the engine internal parts settle in. If the value is out of threshold value below, judge it again by comparing the vehicle with another one with the same specifications and similar conditions such as travel distance.**

Does the value of [Calculated load value] fall between 90 — 110 [%] of the value described in the list?

Yes — Go to 21.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 17. CHECK FRONT OXYGEN (A/F) SENSOR DATA.

1. Start the engine and warm up completely.
2. Raise the engine speed up to 2,500 rpm and maintain it for approx. three minutes.
3. Release the accelerator pedal and idle the engine.
4. Select [Injection Quantity Control] in [Active Test], and read the value of [A/F Sensor #1] at the increase rate of both 12% and −12%.

**Note:**
- **Perform the operation immediately after the engine comes into idling condition, otherwise the front oxygen (A/F) sensor will be cooled.**
- **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the value of [A/F Sensor #1] change to less than 0.88 at the increase rate of 12%, and to 1.12 or more at the rate of −12%?

Yes — Go to 21.

No — Go to 18.

### 18. CHECK POWER SUPPLY OF FRONT OXYGEN (A/F) SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.

**Connector & terminal**

(E76) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 19.

No — Repair the following item.

- Open circuit in harness between M/B and front oxygen (A/F) sensor connector
- Poor contact of coupling connector
- Poor contact of J/C
- Blown out of fuse

### 19. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(B61) No. 32 — (E76) No. 2:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 20.

No — Repair the following item.

- Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector
- Poor contact of coupling connector

### 20. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(B61) No. 32 — Engine ground:
(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 21.

No — Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

### 21. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Coolant Temp.] and [Ambient Temperature].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Coolant Temp.] 120[°C] (248°F) or more? Or is the value of [Coolant Temp.] 15[°C] (27°F) or more lower than that of [Ambient Temperature]?

Yes — Go to 22.

No — Go to 25.

### 22. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 23.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

### 23. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.

**Connector & terminal**
(E51) No. 33 — (E72) No. 1:
(E51) No. 49 — (E72) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 24.

No — Repair the following item.
- Open circuit in harness between ECM connector and engine coolant temperature sensor connector
- Poor contact of J/C

### 24. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E51) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 25.

No — Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.

## 25. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [Evap Purge Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Evap Purge Flow] 0[%] in all freeze frame data?

Yes — Go to 31.

No — Go to 26.

## 26. CHECK PURGE CONTROL SOLENOID VALVE.

1. Using the Subaru Select Monitor, select [CPC Solenoid Valve] of [Active Test].

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

2. Check if the ventilation changes according to ON/OFF switching operation.

Does the ventilation of purge control solenoid valve change correctly?

Yes — Go to 30.

No — Go to 27.

## 27. CHECK POWER SUPPLY FOR PURGE CONTROL SOLENOID VALVE.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the purge control solenoid valve.
3. Turn the ignition switch to ON.
4. Measure the voltage between purge control solenoid valve connector and engine ground.
   **Connector & terminal**
   (E118) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 28.

No — Repair the following item.
- Open circuit of harness between M/B and purge control solenoid valve connector
- Poor contact of coupling connector
- Blown out of fuse

## 28. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and purge control solenoid valve connector.
   **Connector & terminal**
   (E52) No. 19 — (E118) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 29.

No — Repair the open circuit in harness between ECM connector and purge control solenoid valve connector.

### 29. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR (SHORT TO GROUND).

Measure the resistance between the purge control solenoid valve connector and engine ground.
**Connector & terminal**
(E118) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 30.

No — Repair the short circuit to ground in harness between ECM connector and purge control solenoid valve connector.

### 30. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes — Repair the poor contact of ECM connector.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 31. CHECK OF FUEL PUMP.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test].
   **Note:**
   **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
3. Check if operating sound occurs in the fuel pump according to ON/OFF switching operation.

Does the fuel pump emit operating sound?

Yes — Go to 33.

No — Go to 32.

### 32. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.

### 33. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Check if any foreign matters such as iron powder exist in the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Is there any foreign matter in the fuel tank?

Yes — Remove foreign matter from the fuel tank.

No — Go to 34.

## 34. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 35.

No — Check the fuel pump and fuel delivery line.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

## 35. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value in [Fuel Rail Pressure A] synchronized with the one in [Commanded Fuel Rail Pressure A] in all freeze frame data?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION.

## 36. CHECK IGNITION SYSTEM.

Check the ignition system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 37.

No — Repair the ignition system. Ref. to IGNITION(H4DOTC)>General Description.

## 37. CHECK FREEZE FRAME DATA.

1. Start the engine and warm up completely.
2. Run the engine at idle.
3. Using the Subaru Select Monitor, read the value in [Calculated load value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

4. Compare with the reference value (at idling) of [Calculated load value], listed under the data monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.

**Note:**
**The value of [Calculated load value] changes depending on how the engine internal parts settle in. If the value is out of threshold value below, judge it again by comparing the vehicle with another one with the same specifications and similar conditions such as travel distance.**

Is the value of [Calculated load value] 110[%] or more of the value described in the list?

Yes — Go to 39.

No — Go to 38.

## 38. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [A/F Sensor #1].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [A/F Sensor #1] less than 1?

Yes — Go to 43.

No — Go to 48.

## 39. CHECK AIR FLOW & INTAKE AIR TEMPERATURE SENSOR AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR.

Check air flow & intake air temperature sensor and manifold absolute pressure & intake air temperature sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 40.

No — Replace air flow & intake air temperature sensor or manifold absolute pressure & intake air temperature sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor.

## 40. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
5. Measure the resistance of harness between ECM connector and air flow & intake air temperature sensor connector, and between ECM connector and manifold absolute pressure & intake air temperature sensor connector.
   **Connector & terminal**
   (B61) No. 62 — (B92) No. 1:
   (B61) No. 61 — (B92) No. 2:
   (B61) No. 50 — (B92) No. 3:
   (B61) No. 34 — (B92) No. 4:
   (E51) No. 33 — (E78) No. 1:
   (E51) No. 34 — (E78) No. 2:
   (E51) No. 1 — (E78) No. 3:
   (E51) No. 35 — (E78) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 41.

No — Repair the following item.
- Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of J/C

### 41. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(B61) No. 34 — Engine ground:
(B61) No. 50 — Engine ground:
(B61) No. 62 — Engine ground:
(E51) No. 1 — Engine ground:
(E51) No. 34 — Engine ground:
(E51) No. 35 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 42.

No — Repair the following item.
- Short circuit to ground in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Ground short circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector

### 42. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. Run the engine at idle.
3. Using the Subaru Select Monitor, read the value in [Calculated load value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

4. Compare with the reference value (at idling) of [Calculated load value], listed under the data monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.

**Note:**
**The value of [Calculated load value] changes depending on how the engine internal parts settle in. If the value is out of threshold value below, judge it again by comparing the vehicle with another one with the same specifications and similar conditions such as travel distance.**

Does the value of [Calculated load value] fall between 90 — 110 [%] of the value described in the list?

Yes — Go to 43.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 43. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. Raise the engine speed up to 2,500 rpm and maintain it for approx. three minutes.
3. Release the accelerator pedal and idle the engine.
4. Select [Injection Quantity Control] in [Active Test], and read the value of [A/F Sensor #1] at the increase rate of both 12% and −12%.

**Note:**
- **Perform the operation immediately after the engine comes into idling condition, otherwise the front oxygen (A/F) sensor will be cooled.**
- **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the value of [A/F Sensor #1] change to less than 0.88 at the increase rate of 12%, and to 1.12 or more at the rate of −12%?

Yes — Go to 48.

No — Go to 44.

### 44. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [A/F Sensor #1 Resistance].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [A/F Sensor #1 Resistance] 500 [ohm] or more?

Yes — Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor.

No — Go to 45.

### 45. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.
   **Connector & terminal**
   (E76) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 46.

No — Repair the following item.
- Open circuit in harness between M/B and front oxygen (A/F) sensor connector
- Poor contact of coupling connector
- Poor contact of J/C

### 46. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.
   **Connector & terminal**
   (E51) No. 52 — (E76) No. 1:
   (B61) No. 32 — (E76) No. 2:
   (E51) No. 51 — (E76) No. 4:
   (E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 47.

No — Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

## 47. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(B61) No. 32 — Engine ground:
(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 48.

No — Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

## 48. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Coolant Temp.] and [Ambient Temperature].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Coolant Temp.] 120[°C] (248°F) or more? Or is the value of [Coolant Temp.] 15[°C] (27°F) or more lower than that of [Ambient Temperature]?

Yes — Go to 49.

No — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

## 49. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 50.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

## 50. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.

**Connector & terminal**
(E51) No. 33 — (E72) No. 1:
(E51) No. 49 — (E72) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 51.

No — Repair the following item.
- Open circuit in harness between ECM connector and engine coolant temperature sensor connector
- Poor contact of J/C

## 51. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E51) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

No — Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.

## 52. CHECK IGNITION SYSTEM.

Check the ignition system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 53.

No — Repair the ignition system. Ref. to IGNITION(H4DOTC)>General Description.

## 53. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values of the Freeze Frame Data in [Idle Mass Air Flow Feedback correct], [ISC Learning Value] and [Idle dirty throttle correct].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**
3. Obtain the sum values of [Idle Mass Air Flow Feedback correct], [ISC Learning Value] and [Idle dirty throttle correct].
4. Start the engine and warm up completely.
5. Using the Subaru Select Monitor, read the values of data monitor in [Idle Mass Air Flow Feedback correct], [ISC Learning Value] and [Idle dirty throttle correct] during normal idling.

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
6. Obtain the sum values of [Idle Mass Air Flow Feedback correct], [ISC Learning Value] and [Idle dirty throttle correct].

Is the sum value of freeze frame data less than 80% of the sum value of data monitor?

Yes — Go to 54.

No — Go to 56.

## 54. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes — Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description.

No — Go to 55.

### 55. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.
- Brake booster: Ref. to BRAKE>Brake Booster.
- Mass air flow and intake air temperature sensor: Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
- PCV pipe: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Pipe.
- PCV connector: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose Assembly.
- PCV hose: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose.
- PCV hose assembly: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Hose Assembly.
- PCV valve: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>PCV Valve.
- Purge control solenoid valve: Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 73. |
| No | Replace the parts if defective. |

### 56. CHECK FREEZE FRAME DATA.

1. Using the Subaru Select Monitor, read the values in [VVT Adv. Ang. Amount R], [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount L], [VVT Advance Target Angle Amount L], [Exh. VVT Retard Ang. R], [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. L] and [Ex VVT Retard Target Angle L].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**
2. Using the Subaru Select Monitor, compare the respective values between the followings: [VVT Adv. Ang. Amount R] and [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount L] and [VVT Advance Target Angle Amount L], [Exh. VVT Retard Ang. R] and [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. L] and [Ex VVT Retard Target Angle L].

If all of the advance angle amount and retard angle amount synchronize with their target values, go to A.
If the advance angle amount of the intake oil control solenoid RH does not synchronize with its target value, go to B.
If the advance angle amount of the intake oil control solenoid LH does not synchronize with its target value, go to C.
If the retard angle amount of the exhaust oil control solenoid RH does not synchronize with its target value, go to D.
If the retard angle amount of the exhaust oil control solenoid LH does not synchronize with its target value, go to E.

| | |
|---|---|
| A | Go to 73. |
| B | Go to 57. |
| C | Go to 61. |
| D | Go to 65. |
| E | Go to 69. |

### 57. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake oil control solenoid RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake oil control solenoid RH connector and engine ground.
   **Connector & terminal**
   (E105) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 58. |
| No | Repair the following item.<br>• Open circuit in harness between M/B and intake oil control solenoid RH connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

### 58. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and intake oil control solenoid RH connector.
   **Connector & terminal**
   (E51) No. 14 — (E105) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 59. |
| No | Repair the open circuit in harness between ECM connector and intake oil control solenoid RH connector. |

### 59. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake oil control solenoid RH connector and engine ground.
**Connector & terminal**
(E105) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 60. |
| No | Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid RH connector. |

### 60. CHECK INTAKE OIL CONTROL SOLENOID RH.

Check the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Replace the intake cam sprocket RH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket. |
| No | Replace the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

### 61. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake oil control solenoid LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake oil control solenoid LH connector and engine ground.
   **Connector & terminal**
   (E106) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 62. |
| No | Repair the following item.<br>• Open circuit in harness between M/B and intake oil control solenoid LH connector<br>• Poor contact of coupling connector<br>• Poor contact of J/C |

### 62. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and intake oil control solenoid LH connector.
   **Connector & terminal**
   (E51) No. 13 — (E106) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 63. |
| No | Repair the open circuit in harness between ECM connector and intake oil control solenoid LH connector. |

### 63. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake oil control solenoid LH connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E106) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 64. |
| No | Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid LH connector. |

### 64. CHECK INTAKE OIL CONTROL SOLENOID LH.

Check the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Replace the intake cam sprocket LH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket. |
| No | Replace the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid. |

### 65. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust oil control solenoid RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust oil control solenoid RH connector and engine ground.
   **Connector & terminal**
   (E107) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 66.

No — Repair the following item.
- Open circuit in harness between M/B and exhaust oil control solenoid RH connector
- Poor contact of coupling connector
- Poor contact of J/C

### 66. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and exhaust oil control solenoid RH connector.
   **Connector & terminal**
   (E51) No. 12 — (E107) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 67.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid RH connector.

### 67. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust oil control solenoid RH connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E107) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 68.

No — Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid RH connector.

### 68. CHECK EXHAUST OIL CONTROL SOLENOID RH.

Check the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the exhaust cam sprocket RH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 69. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust oil control solenoid LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust oil control solenoid LH connector and engine ground.
   **Connector & terminal**
   (E108) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 70.

No — Repair the following item.
- Open circuit in harness between M/B and exhaust oil control solenoid LH connector
- Poor contact of coupling connector
- Poor contact of J/C

### 70. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and exhaust oil control solenoid LH connector.
   **Connector & terminal**
   (E51) No. 11 — (E108) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 71.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid LH connector.

### 71. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust oil control solenoid LH connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E108) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 72.

No — Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid LH connector.

### 72. CHECK EXHAUST OIL CONTROL SOLENOID LH.

Check the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the exhaust cam sprocket LH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 73. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 74. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

### 74. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.

**Connector & terminal**

(E51) No. 33 — (E72) No. 1:

(E51) No. 49 — (E72) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 75. |
| No | Repair the open circuit of the harness between the ECM connector and engine coolant temperature sensor connector. |

### 75. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(E51) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 76. |
| No | Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector. |

### 76. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 77. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

### 77. CHECK MANIFOLD ABSOLUTE PRESSURE AND INTAKE AIR TEMPERATURE SENSOR.

Check the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor.

### 78. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM connector and fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 79.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 79. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 80.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 80. CHECK IGNITION SYSTEM.

Check the ignition system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 81.

No — Repair the ignition system. Ref. to IGNITION(H4DOTC)>General Description.

### 81. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [A/C Compressor Signal] and [Idle A/C load correct].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Does the value of [A/C Compressor Signal] indicate [ON], and does the value of [Idle A/C load correct] increase?

Yes — Check the air conditioner. Ref. to AIR CONDITIONER(DIAGNOSTICS)>Diagnostics with Phenomenon>INSPECTION. Ref. to AIR CONDITIONER(DIAGNOSTICS)>Basic Diagnostic Procedure>PROCEDURE.

No — Go to 82.

### 82. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [Electric Load Feedback Val].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

3. Compare the value of [Electric Load Feedback Val] with the reference value (at idling) of [Idle Mass Air Flow], listed under the "Data Monitor". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.

Is the value of [Electric Load Feedback Val] 20% or more to the value of [Idle Mass Air Flow]?

Yes — Check the generator and power assisted system (power steering).
Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator>INSPECTION.
Ref. to POWER STEERING (DIAGNOSTICS)>Basic Diagnostic Procedure.

No — Go to 83.

### 83. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Vehicle Speed], [Engine Speed] and [AT turbine speed].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is there any freeze frame data indicating that the value of [Vehicle Speed] is less than 30 [km/h] (18.6 MPH), and that the difference in values between [Engine Speed] and [AT turbine speed] is less than 100 rpm?

Yes — Repair the CVT. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description.

No — Go to 84.

### 84. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Transmission]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC for [Transmission] displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to TRANSMISSION (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

No — Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 85. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Calculated load value] and [Relative Throttle Pos.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Calculated load value] decreasing while that of [Relative Throttle Pos.] is increasing?

Yes — Go to 86.

No — Go to 90.

### 86. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 87.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 87. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

**Connector & terminal**
(B61) No. 62 — (B92) No. 1:
(B61) No. 61 — (B92) No. 2:
(B61) No. 50 — (B92) No. 3:
(B61) No. 34 — (B92) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 88.

No — Repair the open circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

### 88. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(B61) No. 34 — Engine ground:
(B61) No. 50 — Engine ground:
(B61) No. 62 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 89.

No — Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

### 89. CHECK DATA MONITOR.

1. Start the engine and warm up completely.
2. Run the engine at idle.
3. Using the Subaru Select Monitor, read the value in [Calculated load value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

4. Compare with the reference value (at idling) of [Calculated load value], listed under the data monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Data Monitor>LIST.

**Note:**
**The value of [Calculated load value] changes depending on how the engine internal parts settle in. If the value is out of threshold value below, judge it again by comparing the vehicle with another one with the same specifications and similar conditions such as travel distance.**

Does the value of [Calculated load value] fall between 90 — 110 [%] of the value described in the list?

Yes — Go to 90.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 90. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM connector and fuel injector connector.

**Connector & terminal**
#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 91.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 91. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 92.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 92. CHECK IGNITION SYSTEM.

Check the ignition system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 93.

No — Repair the ignition system. Ref. to IGNITION(H4DOTC)>General Description.

### 93. CHECK OF FUEL PUMP.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test].

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

3. Check if operating sound occurs in the fuel pump according to ON/OFF switching operation.

Does the fuel pump emit operating sound?

Yes — Go to 95.

No — Go to 94.

### 94. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.

### 95. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Check if any foreign matters such as iron powder exist in the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Is there any foreign matter in the fuel tank?

| | |
|---|---|
| Yes | Remove foreign matter from the fuel tank. |
| No | Go to 96. |

### 96. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 97. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 97. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value in [Fuel Rail Pressure A] synchronized with the one in [Commanded Fuel Rail Pressure A] in all freeze frame data?

| | |
|---|---|
| Yes | Go to 98. |
| No | Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION. |

### 98. CHECK ENGINE RUNNING CONDITION.

Check the engine running condition using [High-Grade Roughness Monitor (without harness)] in the Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Work Support.

**Note:**
**For detailed operation procedures, refer to "Help" of application.**

Is there a large difference in the speed between each cylinder?

| | |
|---|---|
| Yes | It is possible that the compression pressure of the engine is not sufficient. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION. |
| No | Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the engine stops except by operating the ignition switch after starting the engine.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Engine condition | After engine starting |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Engine speed | 300 rpm or less |

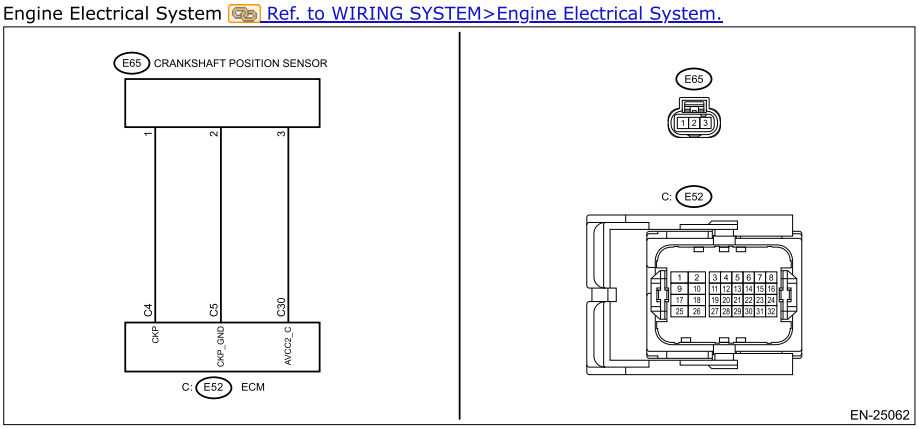
**Time needed for diagnosis:** 60 ms

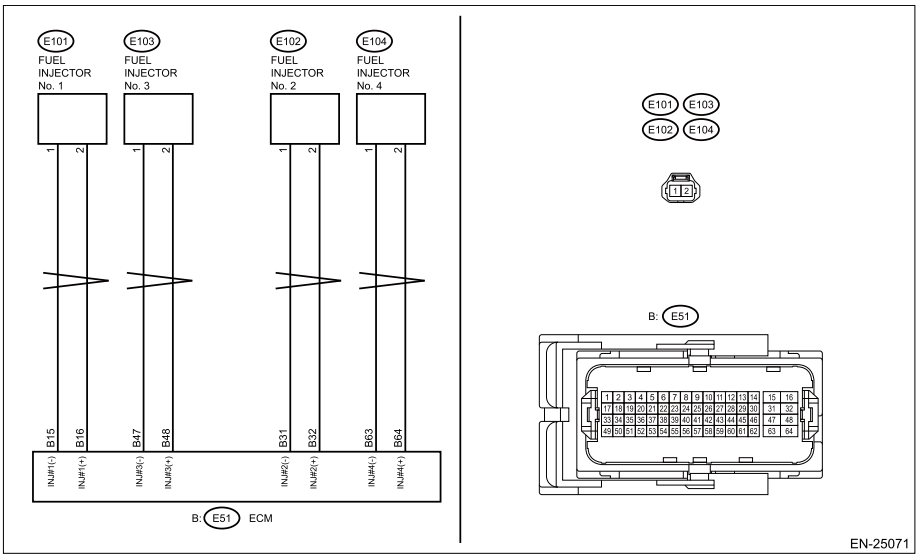
**Malfunction indicator light illumination:** Does not illuminate.

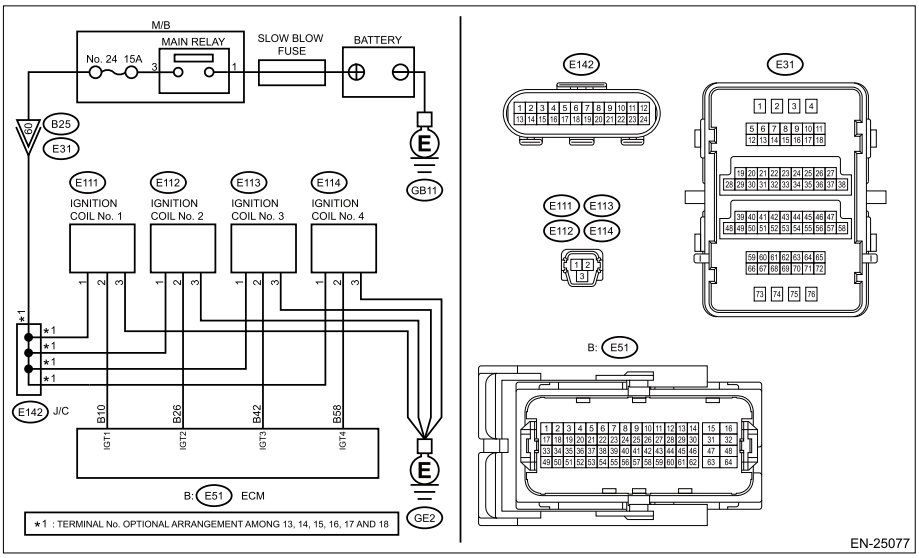
## DTC P1604 STARTABILITY MALFUNCTION

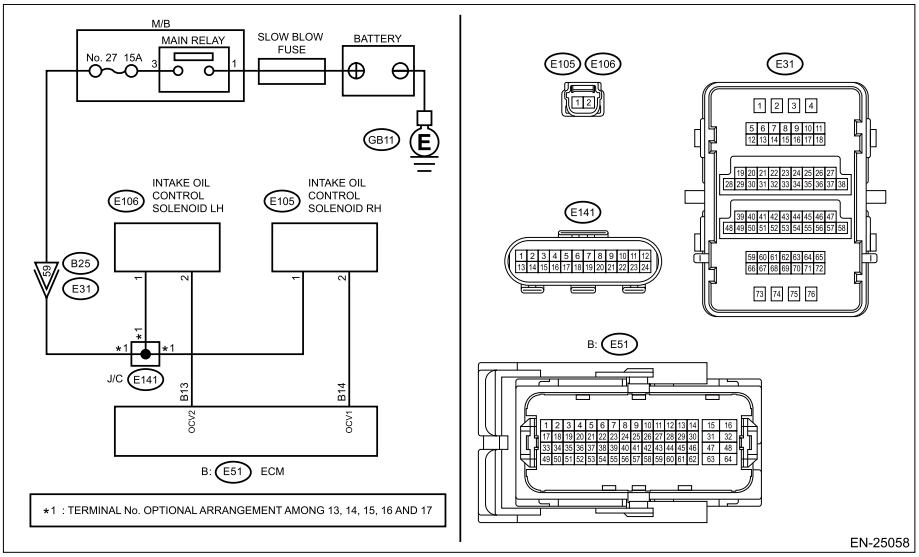
### 1. —

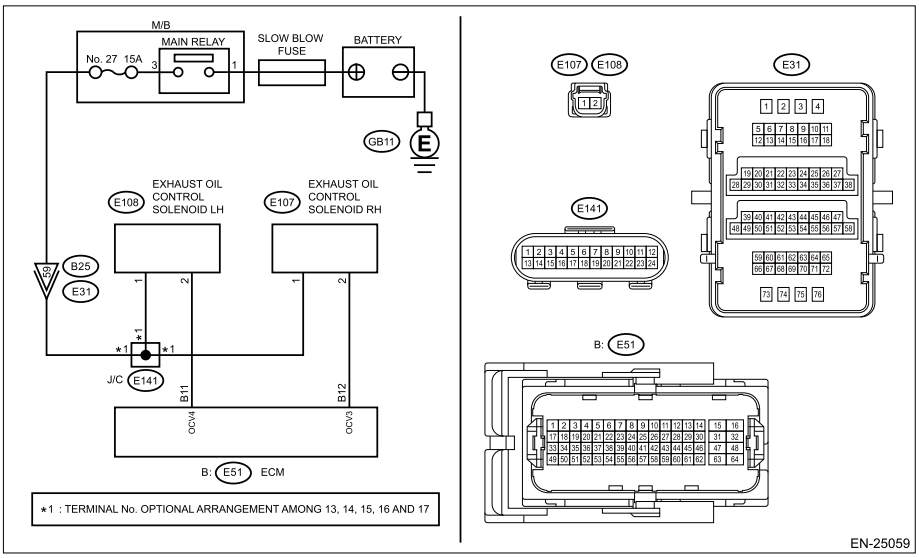
**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

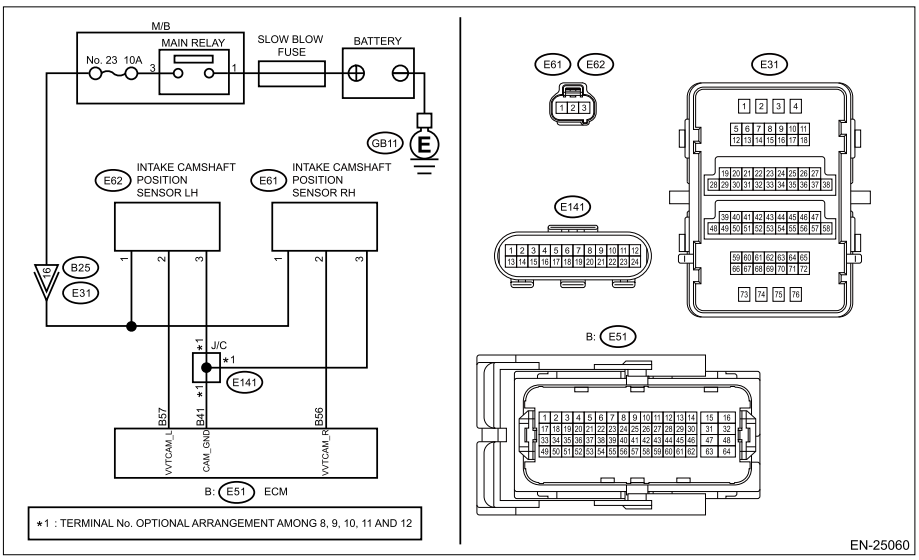


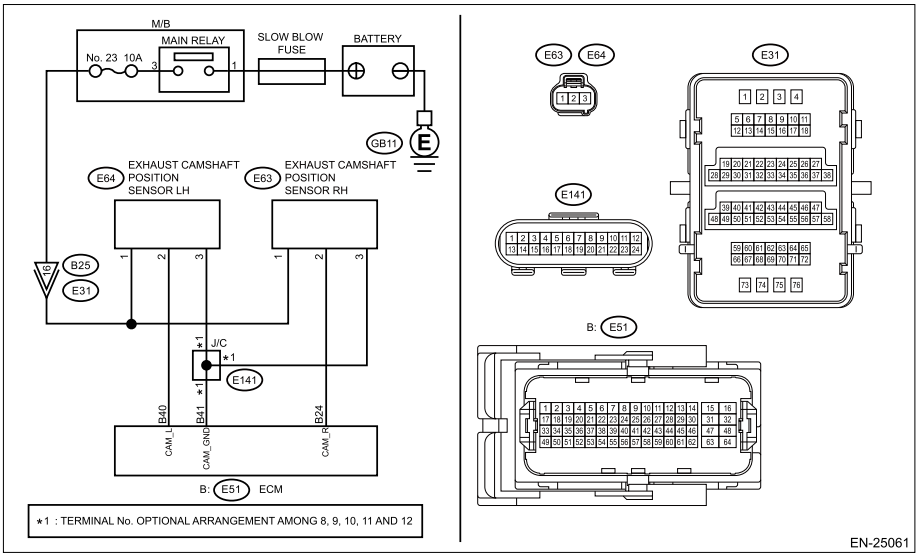



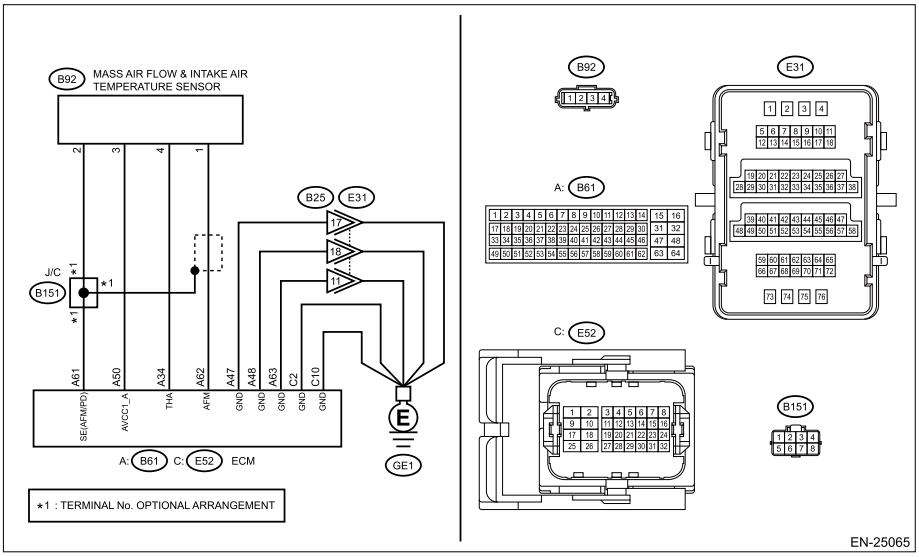

M/B
MAIN RELAY
No. 27 15A
SLOW BLOW FUSE
BATTERY
GB11
INTAKE OIL CONTROL SOLENOID LH
E106
INTAKE OIL CONTROL SOLENOID RH
E105
B25
E31
J/C
E141
B13
B14
OCV2
OCV1
B: E51 ECM
E105 E106
E31
E141
B: E51
∗1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 13, 14, 15, 16 AND 17
EN-25058


M/B
MAIN RELAY
No. 27 15A
SLOW BLOW FUSE
BATTERY
GB11
EXHAUST OIL CONTROL SOLENOID LH
E108
EXHAUST OIL CONTROL SOLENOID RH
E107
B25
E31
J/C
E141
B11
B12
OCV4
OCV3
B: E51 ECM
E107 E108
E31
E141
B: E51
∗1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 13, 14, 15, 16 AND 17
EN-25059

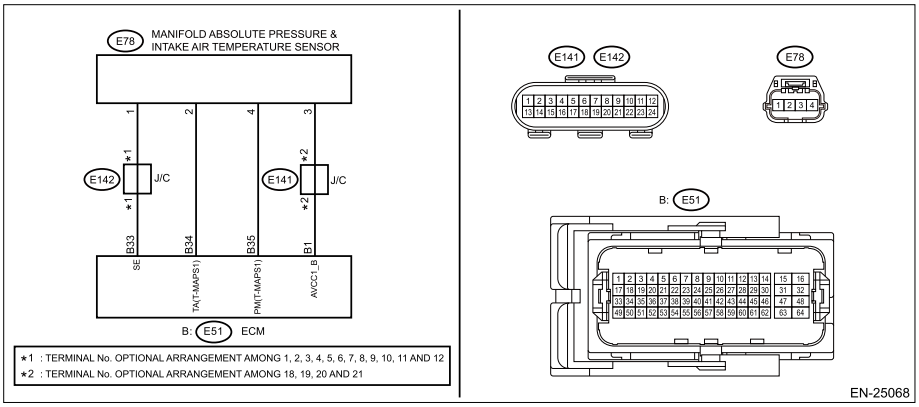

M/B
MAIN RELAY
No. 23 10A
SLOW BLOW FUSE
BATTERY
GB11
INTAKE CAMSHAFT POSITION SENSOR LH
E62
INTAKE CAMSHAFT POSITION SENSOR RH
E61
B25
E31
J/C
E141
B57
B41
B56
VVTCAM_L
CAM_GND
VVTCAM_R
B: E51 ECM
E61 E62
E31
E141
B: E51
∗1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 8, 9, 10, 11 AND 12
EN-25060



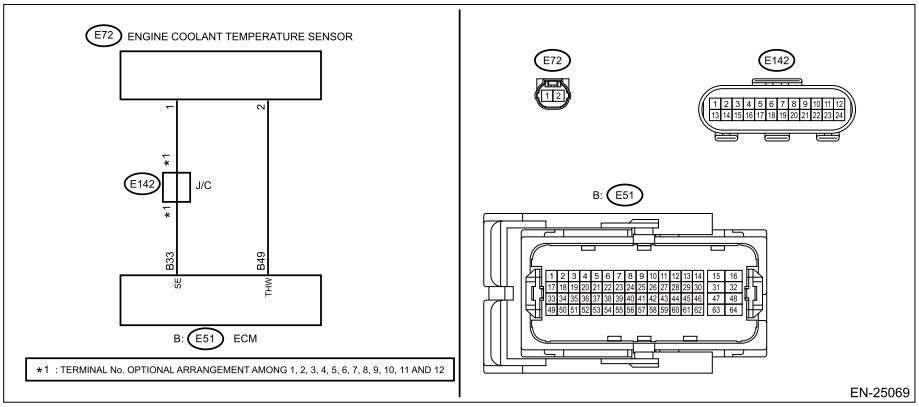

EN-25061




EN-25065




EN-25068



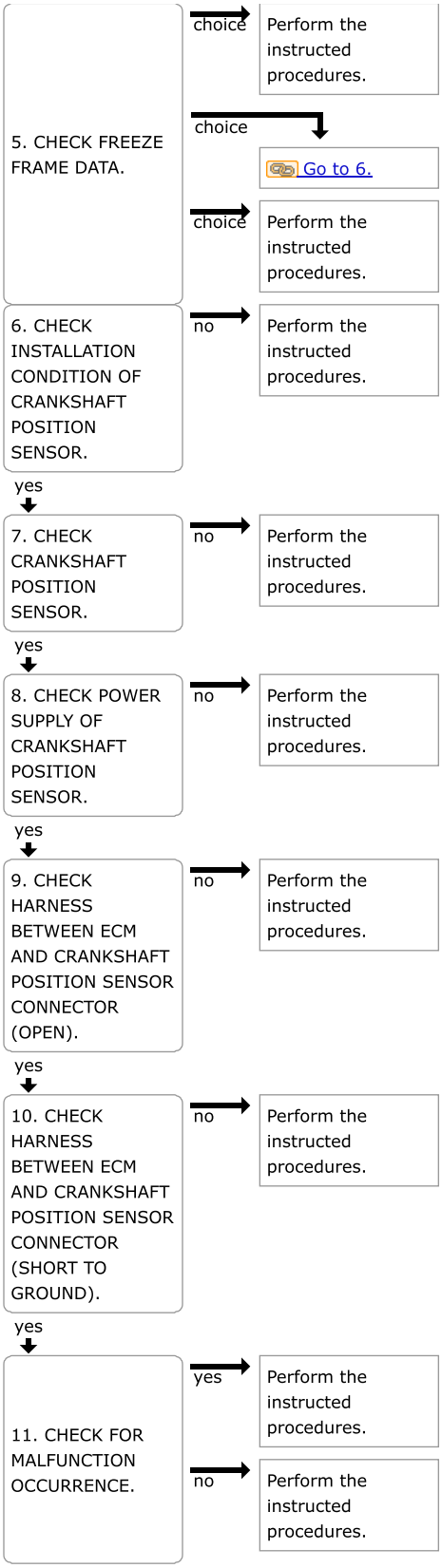

**Caution:**

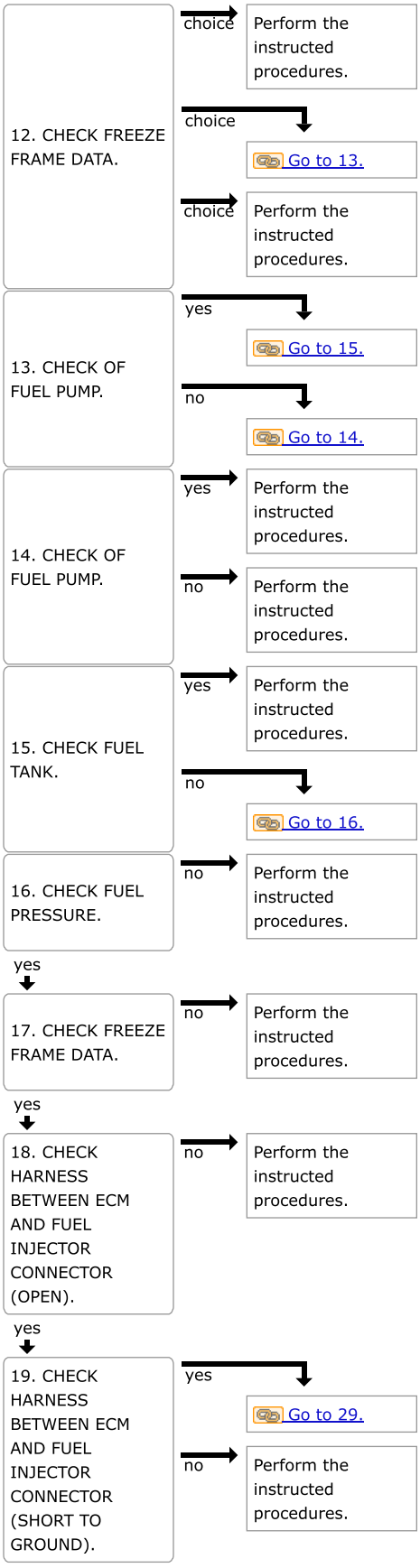
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

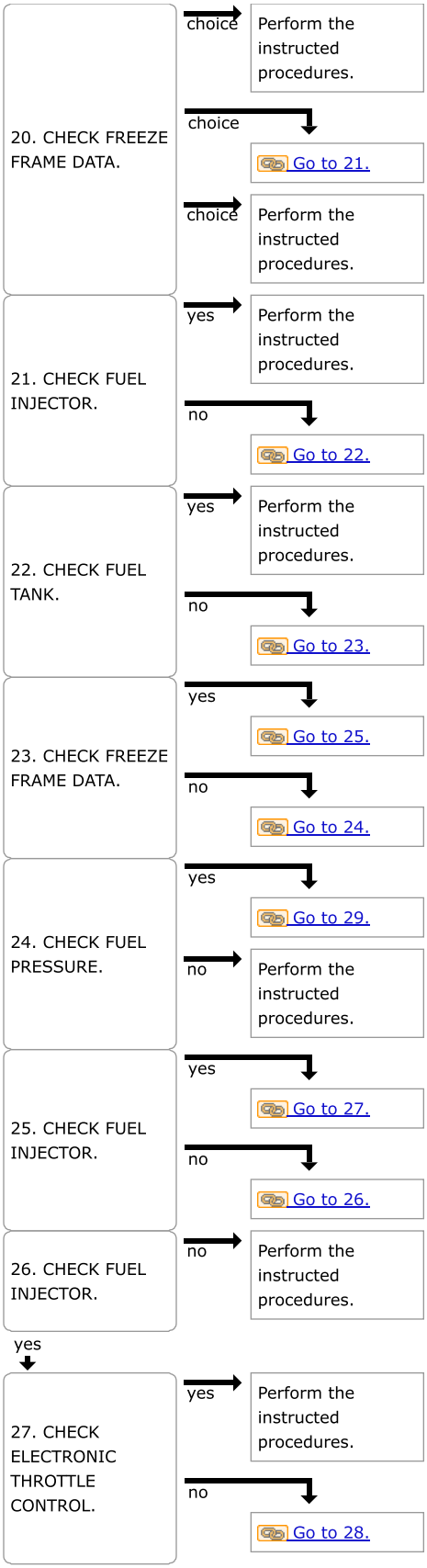
**Note:**

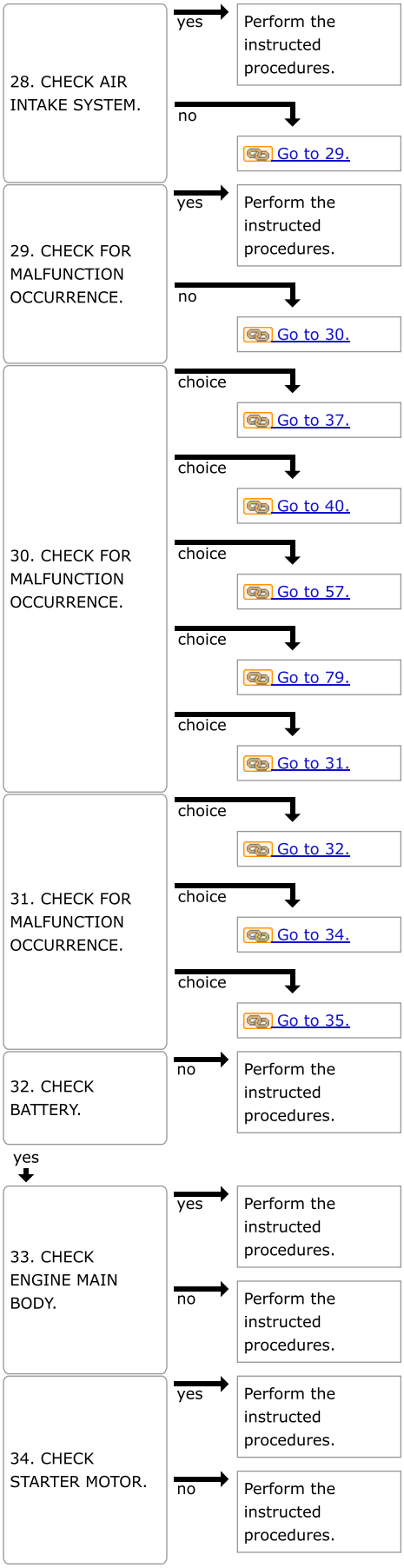
- **This DTC may be detected even if fault does not occur in the vehicle. If the customer does not ask for inspection, clear memory instead of inspection and return the vehicle to the user. Ref. to COMMON (DIAGNOSTICS)>Clear memory.**
- **After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

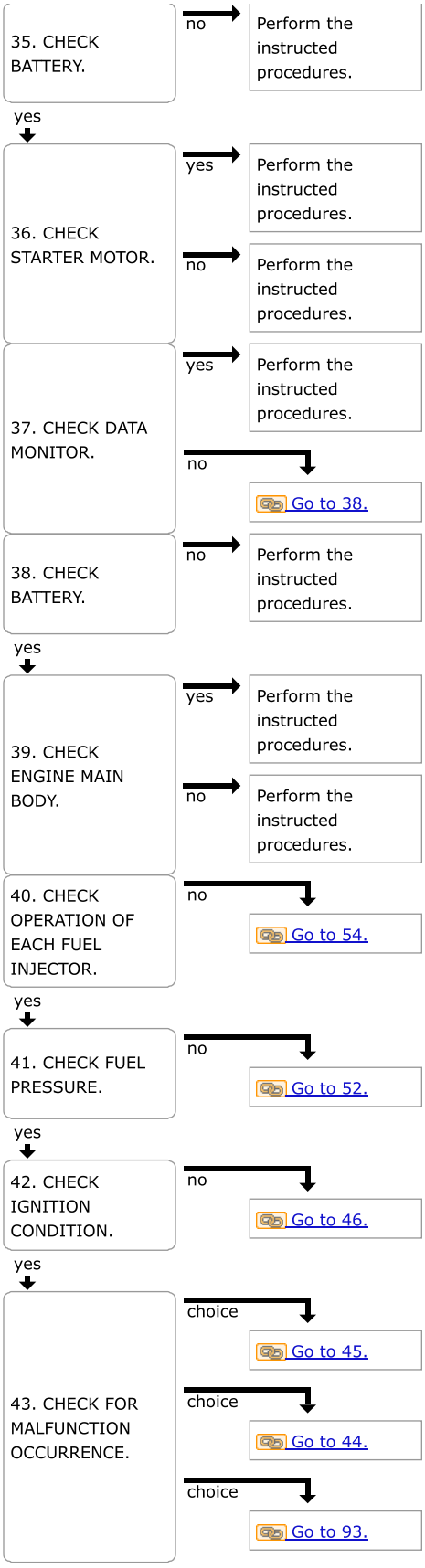
| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK IMMOBILIZER. | no | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK FOR MALFUNCTION OCCURRENCE. | yes | Go to 30. |
| | no | Go to 4. |
| 4. CHECK FREEZE FRAME DATA. | choice | Perform the instructed procedures. |
| | choice | Go to 5. |
| | choice | Go to 12. |
| | choice | Go to 20. |

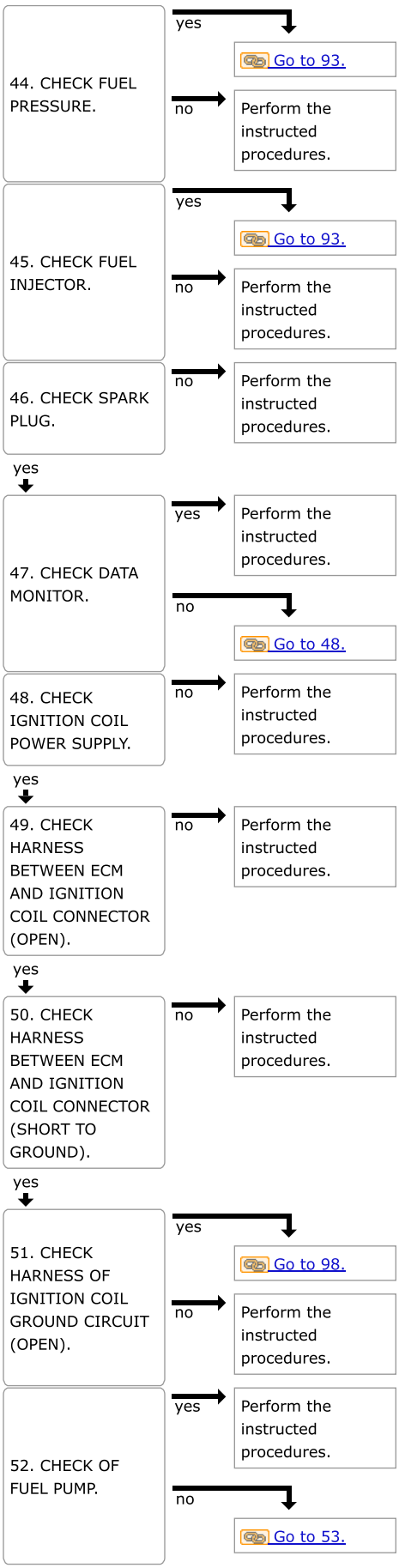

5. CHECK FREEZE FRAME DATA.
choice
Perform the instructed procedures.
choice
Go to 6.
choice
Perform the instructed procedures.
6. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
7. CHECK CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
8. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
9. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
10. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
11. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

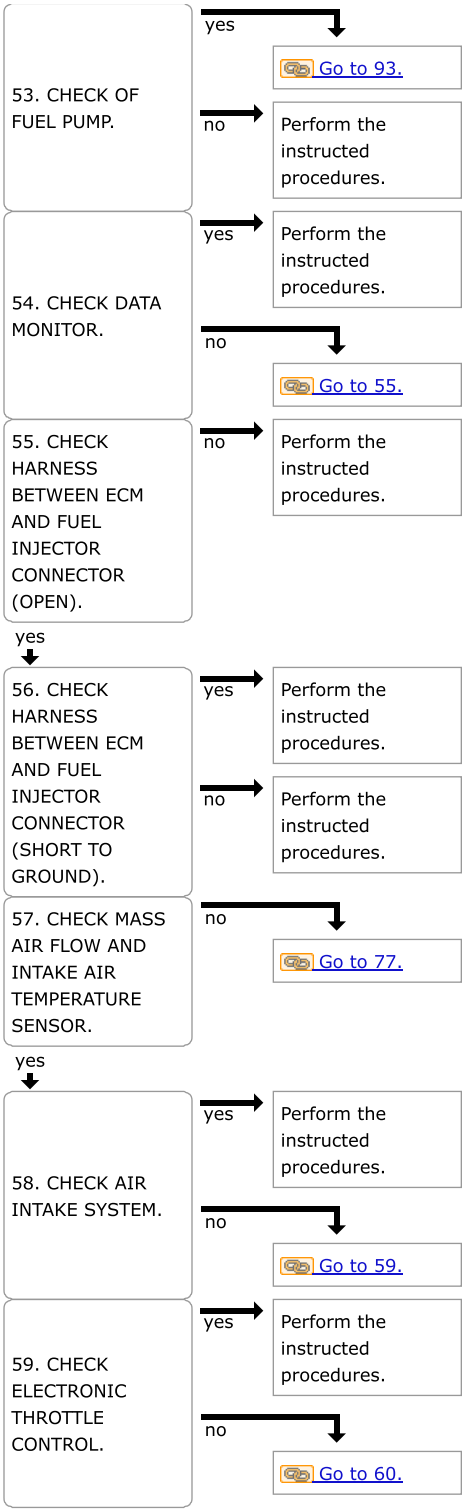

12. CHECK FREEZE FRAME DATA.
choice
Perform the instructed procedures.
choice
Go to 13.
choice
Perform the instructed procedures.
13. CHECK OF FUEL PUMP.
yes
Go to 15.
no
Go to 14.
14. CHECK OF FUEL PUMP.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
15. CHECK FUEL TANK.
yes
Perform the instructed procedures.
no
Go to 16.
16. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
17. CHECK FREEZE FRAME DATA.
no
Perform the instructed procedures.
yes
18. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
19. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
yes
Go to 29.
no
Perform the instructed procedures.

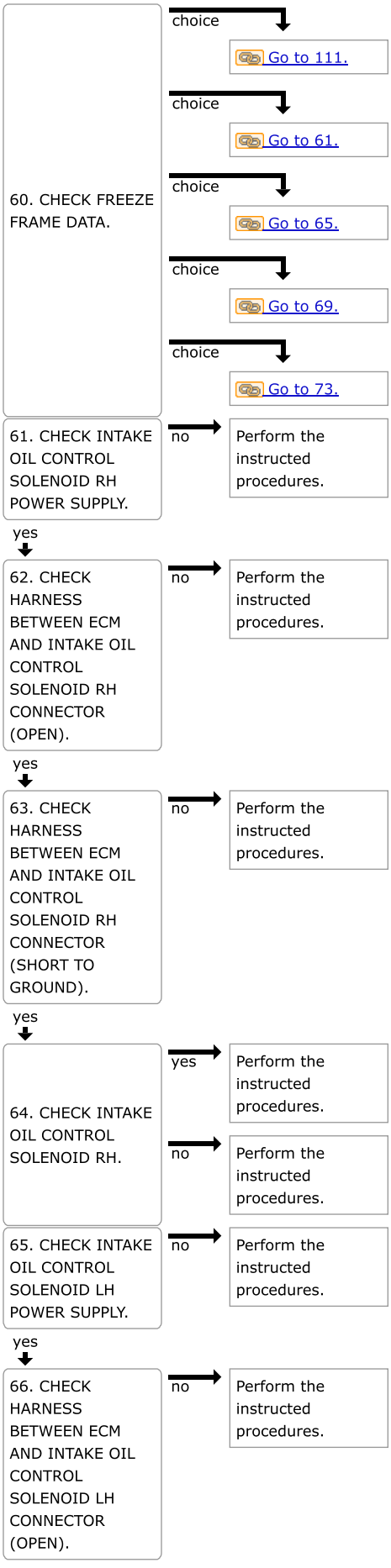

20. CHECK FREEZE FRAME DATA.
choice
Perform the instructed procedures.
choice
Go to 21.
choice
Perform the instructed procedures.
21. CHECK FUEL INJECTOR.
yes
Perform the instructed procedures.
no
Go to 22.
22. CHECK FUEL TANK.
yes
Perform the instructed procedures.
no
Go to 23.
23. CHECK FREEZE FRAME DATA.
yes
Go to 25.
no
Go to 24.
24. CHECK FUEL PRESSURE.
yes
Go to 29.
no
Perform the instructed procedures.
25. CHECK FUEL INJECTOR.
yes
Go to 27.
no
Go to 26.
26. CHECK FUEL INJECTOR.
no
Perform the instructed procedures.
yes
27. CHECK ELECTRONIC THROTTLE CONTROL.
yes
Perform the instructed procedures.
no
Go to 28.

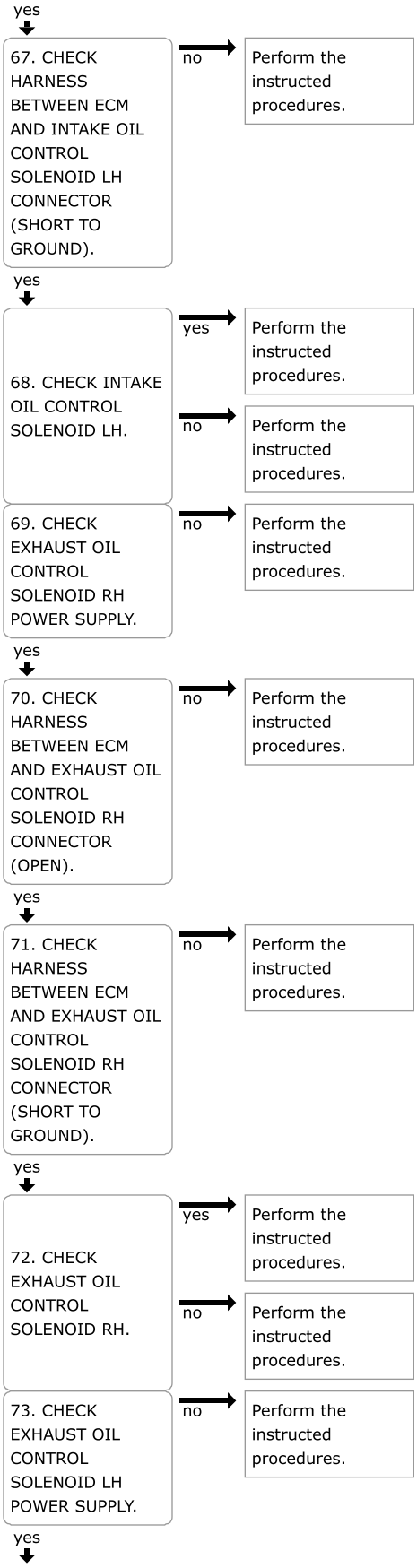

28. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 29.
29. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Go to 30.
30. CHECK FOR MALFUNCTION OCCURRENCE.
choice
Go to 37.
choice
Go to 40.
choice
Go to 57.
choice
Go to 79.
choice
Go to 31.
31. CHECK FOR MALFUNCTION OCCURRENCE.
choice
Go to 32.
choice
Go to 34.
choice
Go to 35.
32. CHECK BATTERY.
no
Perform the instructed procedures.
yes
33. CHECK ENGINE MAIN BODY.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
34. CHECK STARTER MOTOR.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.


35. CHECK BATTERY.
no
Perform the instructed procedures.
yes
36. CHECK STARTER MOTOR.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
37. CHECK DATA MONITOR.
yes
Perform the instructed procedures.
no
Go to 38.
38. CHECK BATTERY.
no
Perform the instructed procedures.
yes
39. CHECK ENGINE MAIN BODY.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
40. CHECK OPERATION OF EACH FUEL INJECTOR.
no
Go to 54.
yes
41. CHECK FUEL PRESSURE.
no
Go to 52.
yes
42. CHECK IGNITION CONDITION.
no
Go to 46.
yes
43. CHECK FOR MALFUNCTION OCCURRENCE.
choice
Go to 45.
choice
Go to 44.
choice
Go to 93.


44. CHECK FUEL PRESSURE.
yes
Go to 93.
no
Perform the instructed procedures.
45. CHECK FUEL INJECTOR.
yes
Go to 93.
no
Perform the instructed procedures.
46. CHECK SPARK PLUG.
no
Perform the instructed procedures.
yes
47. CHECK DATA MONITOR.
yes
Perform the instructed procedures.
no
Go to 48.
48. CHECK IGNITION COIL POWER SUPPLY.
no
Perform the instructed procedures.
yes
49. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
50. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
51. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT (OPEN).
yes
Go to 98.
no
Perform the instructed procedures.
52. CHECK OF FUEL PUMP.
yes
Perform the instructed procedures.
no
Go to 53.


53. CHECK OF FUEL PUMP.
yes
Go to 93.
no
Perform the instructed procedures.
54. CHECK DATA MONITOR.
yes
Perform the instructed procedures.
no
Go to 55.
55. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
56. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
57. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Go to 77.
yes
58. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 59.
59. CHECK ELECTRONIC THROTTLE CONTROL.
yes
Perform the instructed procedures.
no
Go to 60.


60. CHECK FREEZE FRAME DATA.
choice
Go to 111.
choice
Go to 61.
choice
Go to 65.
choice
Go to 69.
choice
Go to 73.
61. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.
no
Perform the instructed procedures.
yes
62. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
63. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
64. CHECK INTAKE OIL CONTROL SOLENOID RH.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
65. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.
no
Perform the instructed procedures.
yes
66. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (OPEN).
no
Perform the instructed procedures.


yes
67. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
68. CHECK INTAKE OIL CONTROL SOLENOID LH.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
69. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.
no
Perform the instructed procedures.
yes
70. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
71. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
72. CHECK EXHAUST OIL CONTROL SOLENOID RH.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
73. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.
no
Perform the instructed procedures.
yes

74. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

no → Perform the instructed procedures.

yes ↓

75. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

no → Perform the instructed procedures.

yes ↓

76. CHECK EXHAUST OIL CONTROL SOLENOID LH.

yes → Perform the instructed procedures.

no → Perform the instructed procedures.

77. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

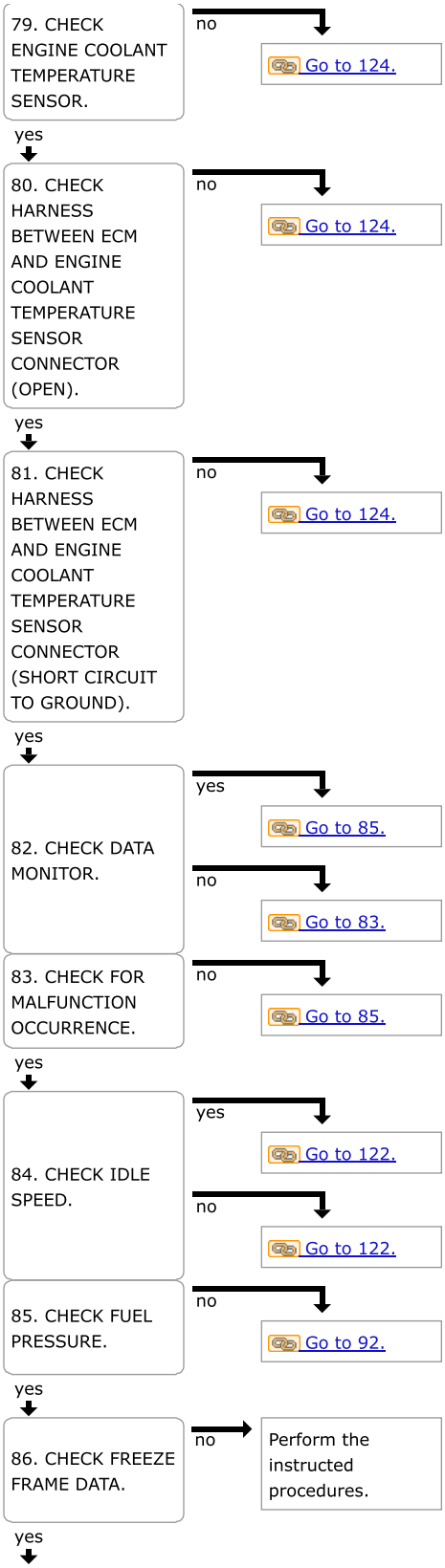
no → Perform the instructed procedures.

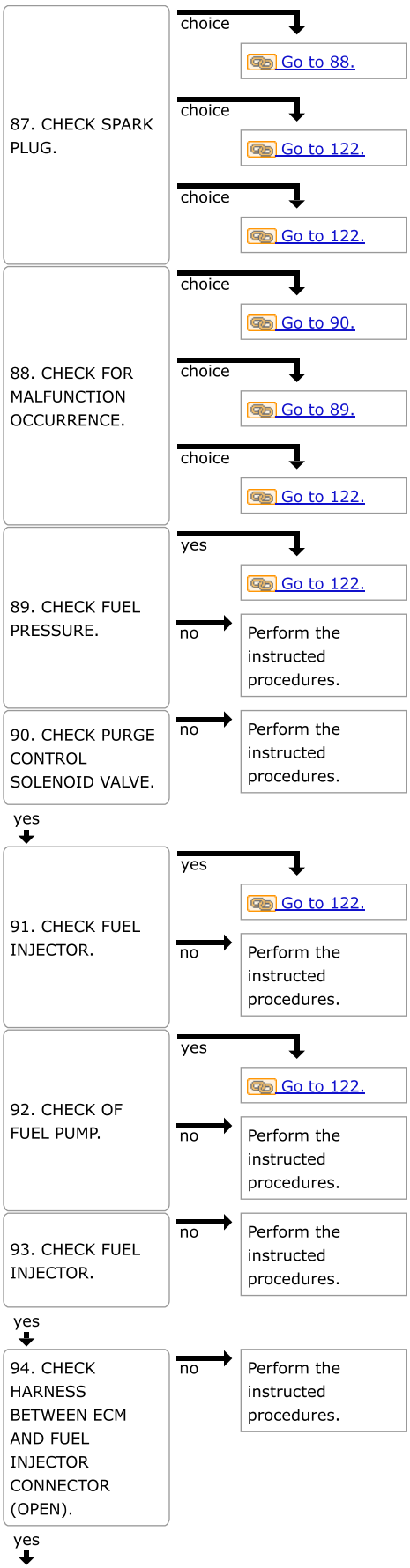
yes ↓

78. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

yes → Go to 111.

no → Perform the instructed procedures.


79. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Go to 124.
yes
80. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).
no
Go to 124.
yes
81. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).
no
Go to 124.
yes
82. CHECK DATA MONITOR.
yes
Go to 85.
no
Go to 83.
83. CHECK FOR MALFUNCTION OCCURRENCE.
no
Go to 85.
yes
84. CHECK IDLE SPEED.
yes
Go to 122.
no
Go to 122.
85. CHECK FUEL PRESSURE.
no
Go to 92.
yes
86. CHECK FREEZE FRAME DATA.
no
Perform the instructed procedures.
yes


87. CHECK SPARK PLUG.
choice
Go to 88.
choice
Go to 122.
choice
Go to 122.
88. CHECK FOR MALFUNCTION OCCURRENCE.
choice
Go to 90.
choice
Go to 89.
choice
Go to 122.
89. CHECK FUEL PRESSURE.
yes
Go to 122.
no
Perform the instructed procedures.
90. CHECK PURGE CONTROL SOLENOID VALVE.
no
Perform the instructed procedures.
yes
91. CHECK FUEL INJECTOR.
yes
Go to 122.
no
Perform the instructed procedures.
92. CHECK OF FUEL PUMP.
yes
Go to 122.
no
Perform the instructed procedures.
93. CHECK FUEL INJECTOR.
no
Perform the instructed procedures.
yes
94. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes

95. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

96. CHECK FOR MALFUNCTION OCCURRENCE.
- yes → Perform the instructed procedures.
- no → Go to 97.

97. CHECK FOR MALFUNCTION OCCURRENCE.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

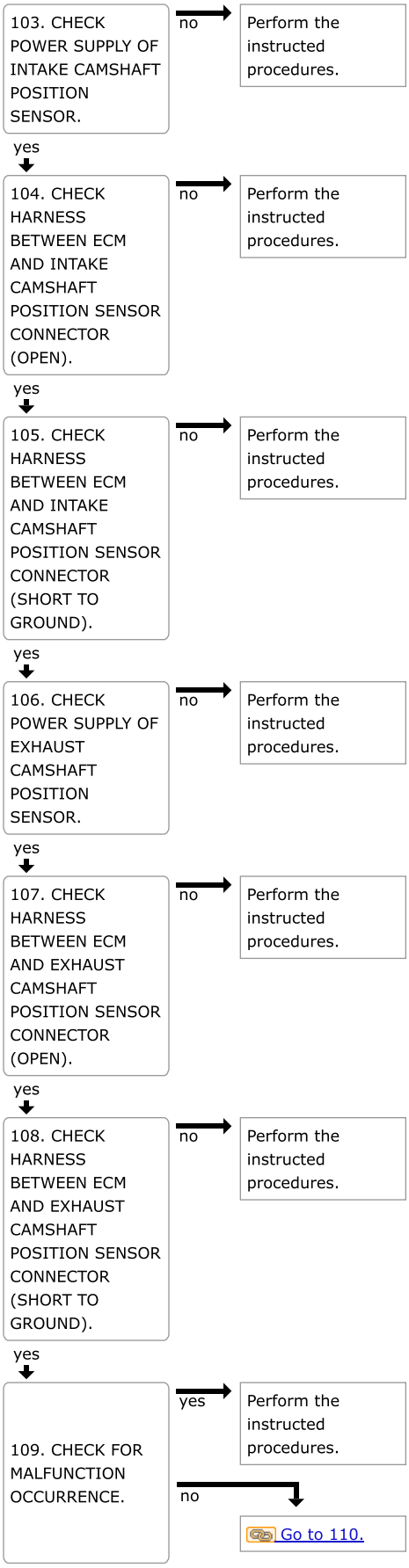
98. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.
- no → Perform the instructed procedures.
- yes ↓

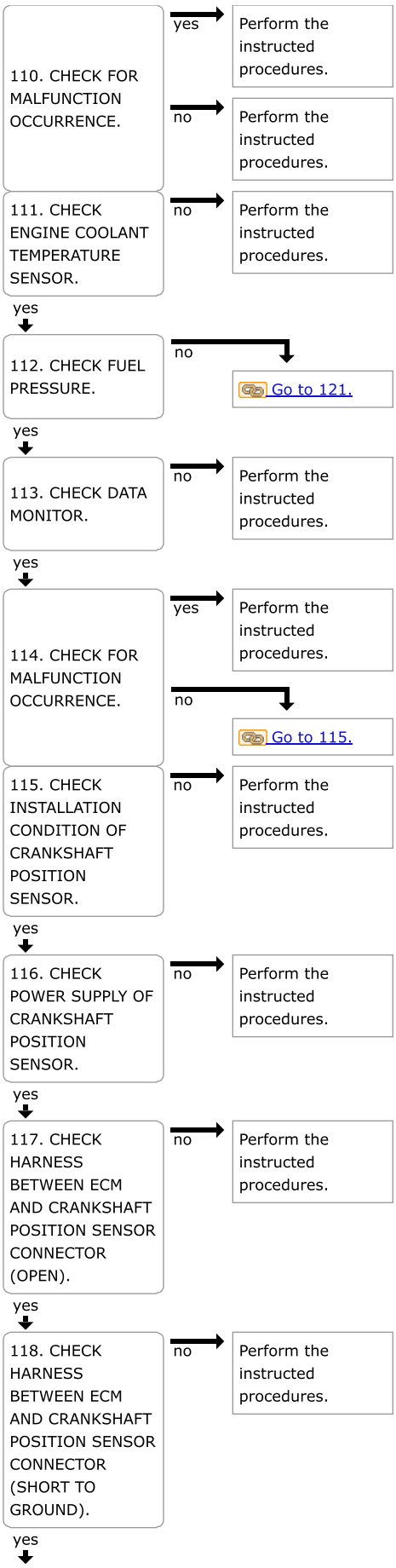
99. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR.
- no → Perform the instructed procedures.
- yes ↓

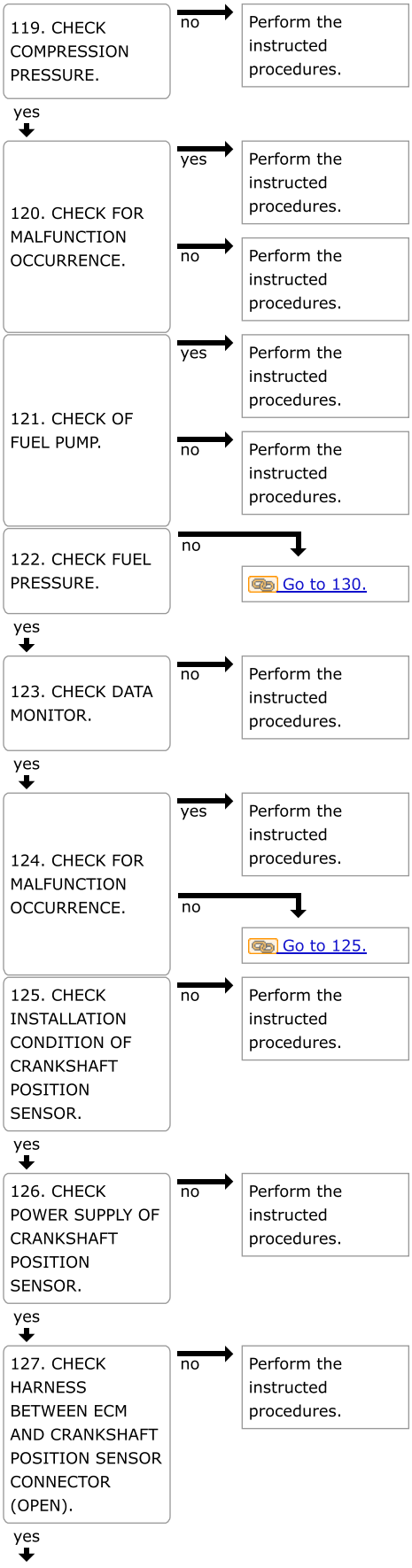
100. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.
- no → Perform the instructed procedures.
- yes ↓

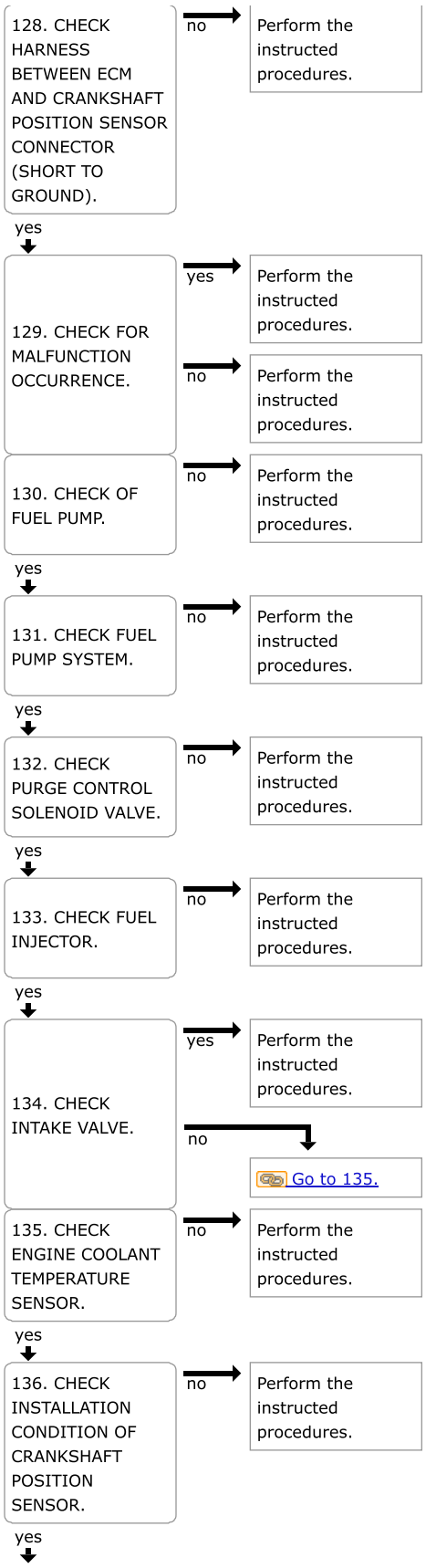
101. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

102. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓


103. CHECK POWER SUPPLY OF INTAKE CAMSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
104. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
105. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
106. CHECK POWER SUPPLY OF EXHAUST CAMSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
107. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
108. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
109. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Go to 110.


110. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
111. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
112. CHECK FUEL PRESSURE.
no
Go to 121.
yes
113. CHECK DATA MONITOR.
no
Perform the instructed procedures.
yes
114. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Go to 115.
115. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
116. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
117. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
118. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes


119. CHECK COMPRESSION PRESSURE.
no
Perform the instructed procedures.
yes
120. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
121. CHECK OF FUEL PUMP.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
122. CHECK FUEL PRESSURE.
no
Go to 130.
yes
123. CHECK DATA MONITOR.
no
Perform the instructed procedures.
yes
124. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Go to 125.
125. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
126. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes
127. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes


128. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
129. CHECK FOR MALFUNCTION OCCURRENCE.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
130. CHECK OF FUEL PUMP.
no
Perform the instructed procedures.
yes
131. CHECK FUEL PUMP SYSTEM.
no
Perform the instructed procedures.
yes
132. CHECK PURGE CONTROL SOLENOID VALVE.
no
Perform the instructed procedures.
yes
133. CHECK FUEL INJECTOR.
no
Perform the instructed procedures.
yes
134. CHECK INTAKE VALVE.
yes
Perform the instructed procedures.
no
Go to 135.
135. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
136. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.
no
Perform the instructed procedures.
yes

137. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR.
no → Perform the instructed procedures.
yes ↓

138. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.
no → Perform the instructed procedures.
yes ↓

139. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

140. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

141. CHECK POWER SUPPLY OF INTAKE CAMSHAFT POSITION SENSOR.
no → Perform the instructed procedures.
yes ↓

142. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

143. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

144. CHECK POWER SUPPLY OF EXHAUST CAMSHAFT POSITION SENSOR.
no → Perform the instructed procedures.
yes ↓

145. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

146. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

147. CHECK COMPRESSION PRESSURE.
no → Perform the instructed procedures.
yes ↓

148. CHECK FOR MALFUNCTION OCCURRENCE.
yes → Perform the instructed procedures.
no → Go to 149.

149. CHECK FOR MALFUNCTION OCCURRENCE.
yes → Perform the instructed procedures.
no → Perform the instructed procedures.

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P1604 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

## 2. CHECK IMMOBILIZER.

Check the immobilizer. Ref. to IMMOBILIZER (DIAGNOSTICS)>Basic Diagnostic Procedure.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the immobilizer. Ref. to IMMOBILIZER (DIAGNOSTICS)>Basic Diagnostic Procedure. |

## 3. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

Is it possible to reproduce the faulty phenomenon or to identify the faulty condition?

| | |
|---|---|
| Yes | Go to 30. |
| No | Go to 4. |

## 4. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Engine Speed] and [Control module voltage].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

If the value of [Engine Speed] is 0 [rpm] and the value of [Control module voltage] is less than 5 V, go to A.
If the value of [Engine Speed] is 0 [rpm] and the value of [Control module voltage] is 5 V or more, go to B.
If the value of [Engine Speed] is not 0 [rpm] and is less than 250 [rpm], go to C.
If the value of [Engine Speed] is 250 [rpm] or more, go to D.

| | |
|---|---|
| A | Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION. |
| B | Go to 5. |
| C | Go to 12. |
| D | Go to 20. |

## 5. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the value in [Control module voltage].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

If the value of [Control module voltage] is less than 9 [V], go to A.
If the value of [Control module voltage] changes in any one of freeze frame data, go to B.
If the value of [Control module voltage] does not change in any one of freeze frame data, go to C.

| | |
|---|---|
| A | It is possible that the engine friction is too large. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION. |
| B | Go to 6. |
| C | Check the starter motor circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>STARTER MOTOR CIRCUIT. |

### 6. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 7. |
| No | Install the crankshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 7. CHECK CRANKSHAFT POSITION SENSOR.

Check the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 8. |
| No | Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 8. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the crankshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 9. |
| No | Repair open or short circuit to ground in the harness between ECM connector and crankshaft position sensor connector. |

### 9. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:
   (E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 10. |
| No | Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector. |

## 10. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 11.

No — Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.

## 11. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## 12. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Coolant Temp.], [Ambient Temperature] and [Fuel Pump Duty].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

3. Check if the values from step 2) satisfy the following conditions.

**Condition**
The value of [Coolant Temp.] is 120[°C] (248°F) or more, or the value of [Coolant Temp.] is 15[°C] (27°F) lower than that of [Ambient Temperature].

If this condition is met, go to A.
If this condition is not met and the value of [Fuel Pump Duty] is 60% or more, go to B.
If this condition is not met and the value of [Fuel Pump Duty] is less than 60%, go to C.

A — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

B — Go to 13.

C — Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

## 13. CHECK OF FUEL PUMP.

1. Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test].

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

2. Check if operating sound occurs in the fuel pump according to ON/OFF switching operation.

Does the fuel pump emit operating sound?

Yes — Go to 15.

No — Go to 14.

### 14. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT. |
| No | Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly. |

### 15. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Check if any foreign matters such as iron powder exist in the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Is there any foreign matter in the fuel tank?

| | |
|---|---|
| Yes | Remove foreign matter from the fuel tank. |
| No | Go to 16. |

### 16. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 17. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 17. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value in [Fuel Rail Pressure A] synchronized with the one in [Commanded Fuel Rail Pressure A] in all freeze frame data?

| | |
|---|---|
| Yes | Go to 18. |
| No | Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION. |

### 18. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM connector and fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 19.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 19. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 29.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

## 20. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [Coolant Temp.], [Ambient Temperature] and [Engine Speed].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

3. Check if the values from step 2) satisfy the following conditions.

**Condition**

The value of [Coolant Temp.] is 120[°C] (248°F) or more, or the value of [Coolant Temp.] is 15[°C] (27°F) lower than that of [Ambient Temperature].

If this condition is met, go to A.
If this condition is not met and the minimum value of [Engine Speed] is less than 300 rpm, go to B.
If this condition is not met and the minimum value of [Engine Speed] is 300 rpm or more, go to C.

| | |
|---|---|
| A | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |
| B | Go to 21. |
| C | It is possible that the compression pressure of the engine is not sufficient. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION. |

## 21. CHECK FUEL INJECTOR.

Check fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

Is there any deposit in the fuel injectors?

| | |
|---|---|
| Yes | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |
| No | Go to 22. |

## 22. CHECK FUEL TANK.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

Check if any foreign matters such as iron powder exist in the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Tank.

Is there any foreign matter in the fuel tank?

| | |
|---|---|
| Yes | Remove foreign matter from the fuel tank. |
| No | Go to 23. |

## 23. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value of [Coolant Temp.] 40 — 90 [°C] (104 — 194 °F)?

| | |
|---|---|
| Yes | Go to 25. |
| No | Go to 24. |

## 24. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Measure the fuel pressure five minutes after the engine is stopped. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure.

**Note:**
**If the engine does not start, measure the fuel pressure five minutes after cranking is completed.**

Is the measured value 147 kPa (1.5 kg/cm$^2$, 21 psi) or more?

Yes — Go to 29.

No — Replace the pressure regulator. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Filter.

## 25. CHECK FUEL INJECTOR.

1. After the engine is stopped, scavenge inside of the intake manifold by applying compressed air.
2. Measure the HC concentration inside the intake manifold 15 minutes after scavenging is completed.

**Note:**
**Remove the vacuum hose between intake manifold and purge control solenoid valve and perform the measurement. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT > FUEL PIPE 1.**

Is the HC concentration less than 4000 ppm?

Yes — Go to 27.

No — Go to 26.

## 26. CHECK FUEL INJECTOR.

Check fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes — Go to 27.

No — Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

## 27. CHECK ELECTRONIC THROTTLE CONTROL.

Check the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.

Is there any deposit inside the electronic throttle control?

Yes — Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.

No — Go to 28.

### 28. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 29. |

### 29. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

Is the fault removed?

| | |
|---|---|
| Yes | Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory. |
| No | Go to 30. |

### 30. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

If the engine speed during cranking is abnormal, go to A.
If an initial combustion does not occur, go to B.
If the engine stalls immediately after engine start, go to C.
If the engine takes time to start, go to D.
If the engine does not crank, go to E.

| | |
|---|---|
| A | Go to 37. |
| B | Go to 40. |
| C | Go to 57. |
| D | Go to 79. |
| E | Go to 31. |

### 31. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

If the starter motor does not rotate, go to A.
If the starter motor rotates but does not engage, go to B.
If the sound does not occur by a protruding starter pinion gear during cranking, go to C.

| | |
|---|---|
| A | Go to 32. |
| B | Go to 34. |
| C | Go to 35. |

### 32. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 33. |
| No | Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery. |

### 33. CHECK ENGINE MAIN BODY.

Using the Subaru ST, rotate the crankshaft.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Does the crankshaft rotate smoothly?

| | |
|---|---|
| Yes | Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION.<br>**Note:**<br>**It is possible that the engine friction increased temporarily. Check if any foreign matter is mixed in engine oil. If a foreign matter is found, check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION.** |
| No | It is possible that the engine friction is too large. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION. |

### 34. CHECK STARTER MOTOR.

Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION.

Is there any wear or damage in the starter pinion gear?

| | |
|---|---|
| Yes | Repair the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter. |
| No | CVT model: Replace the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Torque Converter.<br>MT model: Replace the flywheel. Ref. to CLUTCH SYSTEM>Flywheel. |

### 35. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 36. |
| No | Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery. |

### 36. CHECK STARTER MOTOR.

Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Check the starter motor circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>STARTER MOTOR CIRCUIT. |
| No | Repair the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter. |

### 37. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value of [Engine Speed] during cranking.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Engine Speed] 300 [rpm] or more?

Yes — It is possible that the compression pressure of the engine is not sufficient. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION.

No — Go to 38.

### 38. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.

Is the check result OK?

Yes — Go to 39.

No — Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery.

### 39. CHECK ENGINE MAIN BODY.

Using the Subaru ST, rotate the crankshaft.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Does the crankshaft rotate smoothly?

Yes — Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION.

**Note:**
**It is possible that the engine friction increased temporarily. Check if any foreign matter is mixed in engine oil. If a foreign matter is found, check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION.**

No — It is possible that the engine friction is too large. Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION.

### 40. CHECK OPERATION OF EACH FUEL INJECTOR.

Using a sound scope, check each fuel injector for operation sound during cranking.

Does the fuel injector emit operating sound?

Yes — Go to 41.

No — Go to 54.

## 41. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 42.

No — Go to 52.

## 42. CHECK IGNITION CONDITION.

Check the ignition condition. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

Is the check result OK?

Yes — Go to 43.

No — Go to 46.

## 43. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

If a fault occurs only within approx. 15 to 120 minutes after the engine is stopped, go to A.
If a fault occurs in two or three minutes or a long time after the engine is stopped, go to B.
If the fault occurrence pattern is inconsistent, go to C.

A — Go to 45.

B — Go to 44.

C — Go to 93.

## 44. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Measure the fuel pressure five minutes after the engine is stopped. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure.

**Note:**
**If the engine does not start, measure the fuel pressure five minutes after cranking is completed.**

Is the measured value 147 kPa (1.5 kg/cm$^2$, 21 psi) or more?

Yes — Go to 93.

No — Replace the pressure regulator. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Filter.

## 45. CHECK FUEL INJECTOR.

1. After the engine is stopped, scavenge inside of the intake manifold by applying compressed air.
2. Measure the HC concentration inside the intake manifold 15 minutes after scavenging is completed.

**Note:**
**Remove the vacuum hose between intake manifold and purge control solenoid valve and perform the measurement. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT > FUEL PIPE 1.**

Is the HC concentration less than 4000 ppm?

Yes — Go to 93.

No — Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

## 46. CHECK SPARK PLUG.

Check the spark plug. Ref. to IGNITION(H4DOTC)>Spark Plug>INSPECTION.

Is the check result OK?

Yes — Go to 47.

No — Replace all spark plugs on all cylinders. Ref. to IGNITION(H4DOTC)>Spark Plug.

## 47. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, record the value of [Engine Speed] during cranking.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the recorded value of [Engine Speed] contain data of 0 [rpm]?

Yes — It is possible that temporary fault occurs in the crankshaft position sensor circuit. Check the crankshaft position sensor circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT.

No — Go to 48.

## 48. CHECK IGNITION COIL POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition coil.
3. Turn the ignition switch to ON.
4. Measure the voltage between ignition coil connector and engine ground.

**Connector & terminal**
(E111) No. 1 (+) — Engine ground (−):
(E112) No. 1 (+) — Engine ground (−):
(E113) No. 1 (+) — Engine ground (−):
(E114) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 49.

No — Repair the following item.
- Open or short to ground in power supply circuit
- Poor contact of coupling connector
- Poor contact of J/C
- Blown out of fuse

## 49. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and ignition coil connector.

**Connector & terminal**

(E51) No. 10 — (E111) No. 2:
(E51) No. 26 — (E112) No. 2:
(E51) No. 42 — (E113) No. 2:
(E51) No. 58 — (E114) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 50. |
| No | Repair the open circuit in harness between ECM connector and ignition coil connector. |

## 50. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (SHORT TO GROUND).

Measure the resistance of harness between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 10 — Engine ground:
(E51) No. 26 — Engine ground:
(E51) No. 42 — Engine ground:
(E51) No. 58 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 51. |
| No | Repair the ground short circuit of harness between ECM connector and ignition coil connector. |

## 51. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between ignition coil connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(E111) No. 3 — Engine ground:
(E112) No. 3 — Engine ground:
(E113) No. 3 — Engine ground:
(E114) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Replace the ignition coil. Ref. to IGNITION(H4DOTC)>Ignition Coil.<br>If the fault occurs after servicing, continue the diagnosis. Go to 98. |
| No | Repair the open circuit in harness between ignition coil connector and engine ground terminal. |

## 52. CHECK OF FUEL PUMP.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, select [Fuel Pump Relay] of [Active Test].

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

3. Check if operating sound occurs in the fuel pump according to ON/OFF switching operation.

Does the fuel pump emit operating sound?

Yes — Check the fuel pump and fuel delivery line.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION.

No — Go to 53.

## 53. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.
If the fault occurs after servicing, continue the diagnosis. Go to 93.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.

## 54. CHECK DATA MONITOR.

Using the Subaru Select Monitor, record the value of [Engine Speed] during cranking.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the recorded value of [Engine Speed] contain data of 0 [rpm]?

Yes — It is possible that temporary fault occurs in the crankshaft position sensor circuit. Check the crankshaft position sensor circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT.

No — Go to 55.

### 55. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM connector and fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 56.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 56. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 57. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 58.

No — Go to 77.

### 58. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 59. |

### 59. CHECK ELECTRONIC THROTTLE CONTROL.

Check the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body.

Is there any deposit inside the electronic throttle control?

| | |
|---|---|
| Yes | Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |
| No | Go to 60. |

### 60. CHECK FREEZE FRAME DATA.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the values in [VVT Adv. Ang. Amount R], [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount L], [VVT Advance Target Angle Amount L], [Exh. VVT Retard Ang. R], [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. L] and [Ex VVT Retard Target Angle L].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**
3. Using the Subaru Select Monitor, compare the respective values between the followings: [VVT Adv. Ang. Amount R] and [VVT Advance Target Angle Amount R], [VVT Adv. Ang. Amount L] and [VVT Advance Target Angle Amount L], [Exh. VVT Retard Ang. R] and [Ex VVT Retard Target Angle R], [Exh. VVT Retard Ang. L] and [Ex VVT Retard Target Angle L].

If all of the advance angle amount and retard angle amount synchronize with their target values, go to A.
If the difference between the advance angle amount of the intake oil control solenoid RH and its target value is 10 degrees or more, go to B.
If the difference between the advance angle amount of the intake oil control solenoid LH and its target value is 10 degrees or more, go to C.
If the difference between the retard angle amount of the exhaust oil control solenoid RH and its target value is 10 degrees or more, go to D.
If the difference between the retard angle amount of the exhaust oil control solenoid LH and its target value is 10 degrees or more, go to E.

| | |
|---|---|
| A | Go to 111. |
| B | Go to 61. |
| C | Go to 65. |
| D | Go to 69. |
| E | Go to 73. |

### 61. CHECK INTAKE OIL CONTROL SOLENOID RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake oil control solenoid RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake oil control solenoid RH connector and engine ground.
   **Connector & terminal**
   (E105) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 62.

No — Repair the following item.
- Open circuit in harness between M/B and intake oil control solenoid RH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 62. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and intake oil control solenoid RH connector.
   **Connector & terminal**
   (E51) No. 14 — (E105) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 63.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid RH connector.

### 63. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake oil control solenoid RH connector and engine ground.
**Connector & terminal**
(E105) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 64.

No — Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid RH connector.

### 64. CHECK INTAKE OIL CONTROL SOLENOID RH.

Check the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the intake cam sprocket RH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the intake oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 65. CHECK INTAKE OIL CONTROL SOLENOID LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake oil control solenoid LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake oil control solenoid LH connector and engine ground.
   **Connector & terminal**
   (E106) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 66.

No — Repair the following item.
- Open circuit in harness between M/B and intake oil control solenoid LH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 66. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and intake oil control solenoid LH connector.
   **Connector & terminal**
   (E51) No. 13 — (E106) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 67.

No — Repair the open circuit in harness between ECM connector and intake oil control solenoid LH connector.

### 67. CHECK HARNESS BETWEEN ECM AND INTAKE OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake oil control solenoid LH connector and engine ground.
**Connector & terminal**
(E106) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 68.

No — Repair the short circuit to ground in harness between ECM connector and intake oil control solenoid LH connector.

### 68. CHECK INTAKE OIL CONTROL SOLENOID LH.

Check the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the intake cam sprocket LH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the intake oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 69. CHECK EXHAUST OIL CONTROL SOLENOID RH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust oil control solenoid RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust oil control solenoid RH connector and engine ground.
   **Connector & terminal**
   (E107) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 70.

No — Repair the following item.
- Open circuit in harness between M/B and exhaust oil control solenoid RH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 70. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and exhaust oil control solenoid RH connector.
   **Connector & terminal**
   (E51) No. 12 — (E107) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 71.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid RH connector.

### 71. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust oil control solenoid RH connector and engine ground.
**Connector & terminal**
(E107) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 72.

No — Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid RH connector.

### 72. CHECK EXHAUST OIL CONTROL SOLENOID RH.

Check the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the exhaust cam sprocket RH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the exhaust oil control solenoid RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 73. CHECK EXHAUST OIL CONTROL SOLENOID LH POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust oil control solenoid LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust oil control solenoid LH connector and engine ground.
   **Connector & terminal**
   (E108) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 74.

No — Repair the following item.
- Open circuit in harness between M/B and exhaust oil control solenoid LH connector
- Blown out of fuse
- Poor contact of coupling connector
- Poor contact of J/C

### 74. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and exhaust oil control solenoid LH connector.
   **Connector & terminal**
   (E51) No. 11 — (E108) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 75.

No — Repair the open circuit in harness between ECM connector and exhaust oil control solenoid LH connector.

### 75. CHECK HARNESS BETWEEN ECM AND EXHAUST OIL CONTROL SOLENOID LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust oil control solenoid LH connector and engine ground.
**Connector & terminal**
(E108) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 76.

No — Repair the short circuit to ground in harness between ECM connector and exhaust oil control solenoid LH connector.

### 76. CHECK EXHAUST OIL CONTROL SOLENOID LH.

Check the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid>INSPECTION.

Is the check result OK?

Yes — Replace the exhaust cam sprocket LH. Ref. to MECHANICAL(H4DOTC)>Cam Sprocket.

No — Replace the exhaust oil control solenoid LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Oil Control Solenoid.

### 77. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Disconnect the connector from the manifold absolute pressure and intake air temperature sensor.
5. Measure the resistance of harness between ECM connector and air flow & intake air temperature sensor connector, and between ECM connector and manifold absolute pressure & intake air temperature sensor connector.

**Connector & terminal**

(B61) No. 62 — (B92) No. 1:
(B61) No. 61 — (B92) No. 2:
(B61) No. 50 — (B92) No. 3:
(B61) No. 34 — (B92) No. 4:
(E51) No. 33 — (E78) No. 1:
(E51) No. 34 — (E78) No. 2:
(E51) No. 1 — (E78) No. 3:
(E51) No. 35 — (E78) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 78.

No — Repair the following item.
- Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Open circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector
- Poor contact of J/C

### 78. CHECK HARNESS BETWEEN ECM AND AIR FLOW & INTAKE AIR TEMPERATURE SENSOR CONNECTOR AND BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE & INTAKE AIR TEMPERATURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(B61) No. 34 — Engine ground:
(B61) No. 50 — Engine ground:
(B61) No. 62 — Engine ground:
(E51) No. 1 — Engine ground:
(E51) No. 34 — Engine ground:
(E51) No. 35 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace air flow & intake air temperature sensor or manifold absolute pressure & intake air temperature sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor.
If the fault occurs after servicing, continue the diagnosis. Go to 111.

No — Repair the following item.
- Short circuit to ground in harness between ECM connector and the mass air flow and intake air temperature sensor connector
- Ground short circuit of harness between ECM connector and the manifold absolute pressure and intake air temperature sensor connector

### 79. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 80.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.
If the fault occurs after servicing, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
If the fault still occurs after replacing the ECM, continue the diagnosis. Go to 124.

### 80. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.

**Connector & terminal**
(E51) No. 33 — (E72) No. 1:
(E51) No. 49 — (E72) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 81.

No — Repair the open circuit of the harness between the ECM connector and engine coolant temperature sensor connector.
If the fault occurs after servicing, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
If the fault still occurs after replacing the ECM, continue the diagnosis. Go to 124.

### 81. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR (SHORT CIRCUIT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E51) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 82.

No — Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.
If the fault occurs after servicing, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
If the fault still occurs after replacing the ECM, continue the diagnosis. Go to 124.

## 82. CHECK DATA MONITOR.

1. Turn the ignition switch to ON. (Engine OFF)
2. Using the Subaru Select Monitor, read the values in [Long term fuel trim B1] and [Atmosphere Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Long term fuel trim B1] −25 — 25 [%]? And is the value of [Atmosphere Pressure] 80 [kPa] (600 mmHg, 23.6 inHg) or more?

Yes — Go to 85.

No — Go to 83.

## 83. CHECK FOR MALFUNCTION OCCURRENCE.

1. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Start the engine.

Does the engine start?

Yes — Go to 84.

No — Go to 85.

## 84. CHECK IDLE SPEED.

Check the idle speed.

Is the idle speed stable?

Yes — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.
If the fault occurs after servicing, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
If the fault still occurs after replacing the ECM, continue the diagnosis. Go to 122.

No — Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.
If the fault occurs after servicing, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).
If the fault still occurs after replacing the ECM, continue the diagnosis. Go to 122.

## 85. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

Yes — Go to 86.

No — Go to 92.

### 86. CHECK FREEZE FRAME DATA.

Using the Subaru Select Monitor, read the values in [Fuel Rail Pressure A] and [Commanded Fuel Rail Pressure A].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Freeze Frame Data.**

Is the value in [Fuel Rail Pressure A] synchronized with the one in [Commanded Fuel Rail Pressure A] in all freeze frame data?

| | |
|---|---|
| Yes | Go to 87. |
| No | Check the high-pressure fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>High Pressure Fuel Pump>INSPECTION. |

### 87. CHECK SPARK PLUG.

Check all spark plugs on all cylinders. Ref. to IGNITION(H4DOTC)>Spark Plug>INSPECTION.

If the check result is OK, go to A.
If spark plugs in some cylinders are faulty, go to B.
If all spark plugs in all cylinders are faulty, go to C.

| | |
|---|---|
| A | Go to 88. |
| B | Replace the faulty spark plugs of the cylinders, then check the ignition system and fuel system in the faulty cylinders. Ref. to IGNITION(H4DOTC)>Spark Plug.<br>If the fault occurs after servicing, continue the diagnosis. Go to 122. |
| C | Replace all spark plugs on all cylinders. Ref. to IGNITION(H4DOTC)>Spark Plug.<br>If the fault occurs after servicing, continue the diagnosis. Go to 122. |

### 88. CHECK FOR MALFUNCTION OCCURRENCE.

Check for the condition of fault occurrence.

If a fault occurs only within approx. 15 to 120 minutes after the engine is stopped, go to A.
If a fault occurs in two or three minutes or a long time after the engine is stopped, go to B.
If the fault occurrence pattern is inconsistent, go to C.

| | |
|---|---|
| A | Go to 90. |
| B | Go to 89. |
| C | Go to 122. |

### 89. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Measure the fuel pressure five minutes after the engine is stopped. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

**Note:**
**If the engine does not start, measure the fuel pressure five minutes after cranking is completed.**

Is the measured value 147 kPa (1.5 kg/cm$^2$, 21 psi) or more?

| | |
|---|---|
| Yes | Go to 122. |
| No | Replace the pressure regulator. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Filter. |

### 90. CHECK PURGE CONTROL SOLENOID VALVE.

Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 91. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 91. CHECK FUEL INJECTOR.

1. After the engine is stopped, scavenge inside of the intake manifold by applying compressed air.
2. Measure the HC concentration inside the intake manifold 15 minutes after scavenging is completed.

**Note:**
**Remove the vacuum hose between intake manifold and purge control solenoid valve and perform the measurement. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT > FUEL PIPE 1.**

Is the HC concentration less than 4000 ppm?

| | |
|---|---|
| Yes | Go to 122. |
| No | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 92. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.<br>If the fault occurs after servicing, continue the diagnosis. Go to 122. |
| No | Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly. |

### 93. CHECK FUEL INJECTOR.

Check fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 94. |
| No | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 94. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM connector and fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 95.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 95. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

#1 (E51) No. 15 — Engine ground:
#1 (E51) No. 16 — Engine ground:
#2 (E51) No. 31 — Engine ground:
#2 (E51) No. 32 — Engine ground:
#3 (E51) No. 47 — Engine ground:
#3 (E51) No. 48 — Engine ground:
#4 (E51) No. 63 — Engine ground:
#4 (E51) No. 64 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 96.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 96. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Go to 97.

### 97. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the camshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

| | |
|---|---|
| Yes | Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 98. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 99. |
| No | Install the crankshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 99. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR.

Check the installation condition of camshaft position sensor.

Is the camshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 100. |
| No | Install the camshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |

### 100. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the crankshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 101. |
| No | Repair open or short circuit to ground in the harness between ECM connector and crankshaft position sensor connector. |

### 101. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:
   (E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 102.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.

### 102. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.
**Connector & terminal**
(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 103.

No — Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.

### 103. CHECK POWER SUPPLY OF INTAKE CAMSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake camshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake camshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E61) No. 1 (+) — Engine ground (−):
   (E62) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 104.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between M/B and intake camshaft position sensor connector
- Poor contact of coupling connector
- Blown out of fuse

### 104. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and intake camshaft position sensor connector.

**Connector & terminal**

(E51) No. 56 — (E61) No. 2:
(E51) No. 41 — (E61) No. 3:
(E51) No. 57 — (E62) No. 2:
(E51) No. 41 — (E62) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 105.

No — Repair the following item.
- Open circuit in the harness between ECM connector and intake camshaft position sensor connector
- Poor contact of J/C

### 105. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake camshaft position sensor connector and engine ground.

**Connector & terminal**

(E61) No. 2 — Engine ground:
(E62) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 106.

No — Repair short circuit to ground in the harness between ECM connector and intake camshaft position sensor connector.

### 106. CHECK POWER SUPPLY OF EXHAUST CAMSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust camshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust camshaft position sensor connector and engine ground.

**Connector & terminal**

(E63) No. 1 (+) — Engine ground (−):
(E64) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 107.

No — Repair the following item.
- Open circuit in harness between M/B and exhaust camshaft position sensor connector
- Blown out of fuse
- Poor contact of coupling connector

### 107. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and exhaust camshaft position sensor connector.

**Connector & terminal**

(E51) No. 24 — (E63) No. 2:
(E51) No. 41 — (E63) No. 3:
(E51) No. 40 — (E64) No. 2:
(E51) No. 41 — (E64) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 108.

No — Repair the following item.
- Open circuit in harness between ECM connector and exhaust camshaft position sensor connector
- Poor contact of J/C

### 108. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust camshaft position sensor connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(E63) No. 2 — Engine ground:
(E64) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 109.

No — Repair short circuit to ground in the harness between ECM connector and exhaust camshaft position sensor connector.

### 109. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Go to 110.

### 110. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the camshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 111. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

Yes — Go to 112.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

### 112. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Measure the fuel pressure during cranking or five minutes after the engine is stopped. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure.

Is the fuel pressure during cranking 315 — 400 kPa (3.2 — 4.1 kg/cm$^2$, 46 — 58 psi), and is the fuel pressure five minutes after engine stop 147 kPa (1.5 kg/cm$^2$, 21 psi) or more?

Yes — Go to 113.

No — Go to 121.

### 113. CHECK DATA MONITOR.

1. Turn the ignition switch to ON. (Engine OFF)
2. Using the Subaru Select Monitor, read the value in [Long term fuel trim B1].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Long term fuel trim B1] fall within a range of −15 — 15 [%]?

Yes — Go to 114.

No — Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

### 114. CHECK FOR MALFUNCTION OCCURRENCE.

Start the engine and check the idling speed.

Is the idling speed stable all time?

Yes — It is possible that the fault comes from fuel. Replace fuel. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel.

No — Go to 115.

### 115. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 116. |
| No | Install the crankshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 116. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the crankshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between crankshaft position sensor connector and engine ground.

**Connector & terminal**

(E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 117. |
| No | Repair open or short circuit to ground in the harness between ECM connector and crankshaft position sensor connector. |

### 117. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.

**Connector & terminal**

(E52) No. 4 — (E65) No. 1:

(E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 118. |
| No | Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector. |

### 118. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 119. |
| No | Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector. |

### 119. CHECK COMPRESSION PRESSURE.

Check the compression pressure. Ref. to MECHANICAL(H4DOTC)>Compression>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 120. |
| No | Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION. |

### 120. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

| | |
|---|---|
| Yes | Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory. |
| No | Check the valve timing. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.<br>When the valve timing is normal, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 121. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT. |
| No | Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly. |

### 122. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Measure the fuel pressure during cranking or five minutes after the engine is stopped. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure.

Is the fuel pressure during cranking 315 — 400 kPa (3.2 — 4.1 kg/cm$^2$, 46 — 58 psi), and is the fuel pressure five minutes after engine stop 147 kPa (1.5 kg/cm$^2$, 21 psi) or more?

| | |
|---|---|
| Yes | Go to 123. |
| No | Go to 130. |

### 123. CHECK DATA MONITOR.

1. Turn the ignition switch to ON. (Engine OFF)
2. Using the Subaru Select Monitor, read the value in [Long term fuel trim B1].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Long term fuel trim B1] fall within a range of −15 — 15 [%]?

| | |
|---|---|
| Yes | Go to 124. |
| No | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 124. CHECK FOR MALFUNCTION OCCURRENCE.

Start the engine and check the idling speed.

Is the idling speed stable all time?

| | |
|---|---|
| Yes | It is possible that the fault comes from fuel. Replace fuel. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel. |
| No | Go to 125. |

### 125. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 126. |
| No | Install the crankshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 126. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the crankshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 127. |
| No | Repair open or short circuit to ground in the harness between ECM connector and crankshaft position sensor connector. |

### 127. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.

**Connector & terminal**

(E52) No. 4 — (E65) No. 1:
(E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 128.

No — Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector.

### 128. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**

(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 129.

No — Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.

### 129. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 130. CHECK OF FUEL PUMP.

Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Go to 131.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.

### 131. CHECK FUEL PUMP SYSTEM.

Check fuel pump circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 132. |
| No | Repair the fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT. |

### 132. CHECK PURGE CONTROL SOLENOID VALVE.

Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 133. |
| No | Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Purge Control Solenoid Valve. |

### 133. CHECK FUEL INJECTOR.

1. After the engine is stopped, scavenge inside of the intake manifold by applying compressed air.
2. Measure the HC concentration inside the intake manifold 15 minutes after scavenging is completed.

**Note:**
**Remove the vacuum hose between intake manifold and purge control solenoid valve and perform the measurement. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>General Description>COMPONENT > FUEL PIPE 1.**

Is the HC concentration less than 4000 ppm?

| | |
|---|---|
| Yes | Go to 134. |
| No | Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

### 134. CHECK INTAKE VALVE.

Check the intake valve. Ref. to MECHANICAL(H4DOTC)>Cylinder Head.

Is there any deposit in the intake valve?

| | |
|---|---|
| Yes | Clean the intake valve. Ref. to MECHANICAL(H4DOTC)>Cylinder Head. |
| No | Go to 135. |

### 135. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 136. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

### 136. CHECK INSTALLATION CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the installation condition of crankshaft position sensor.

Is the crankshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 137. |
| No | Install the crankshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor. |

### 137. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR.

Check the installation condition of camshaft position sensor.

Is the camshaft position sensor installed correctly?

| | |
|---|---|
| Yes | Go to 138. |
| No | Install the camshaft position sensor correctly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor. |

### 138. CHECK POWER SUPPLY OF CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the crankshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between crankshaft position sensor connector and engine ground.
   **Connector & terminal**
   (E65) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 139. |
| No | Repair open or short circuit to ground in the harness between ECM connector and crankshaft position sensor connector. |

### 139. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.
   **Connector & terminal**
   (E52) No. 4 — (E65) No. 1:
   (E52) No. 5 — (E65) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 140. |
| No | Repair the open circuit in the harness between the ECM connector and crankshaft position sensor connector. |

### 140. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between crankshaft position sensor connector and engine ground.

**Connector & terminal**

(E65) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 141.

No — Repair short circuit to ground in harness between ECM connector and crankshaft position sensor connector.

### 141. CHECK POWER SUPPLY OF INTAKE CAMSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the intake camshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between intake camshaft position sensor connector and engine ground.

**Connector & terminal**

(E61) No. 1 (+) — Engine ground (−):

(E62) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 142.

No — Repair the following item.

- Open circuit or short circuit to ground in harness between M/B and intake camshaft position sensor connector
- Blown out of fuse
- Poor contact of coupling connector

### 142. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and intake camshaft position sensor connector.

**Connector & terminal**

(E51) No. 56 — (E61) No. 2:

(E51) No. 41 — (E61) No. 3:

(E51) No. 57 — (E62) No. 2:

(E51) No. 41 — (E62) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 143.

No — Repair the following item.

- Open circuit in the harness between ECM connector and intake camshaft position sensor connector
- Poor contact of J/C

### 143. CHECK HARNESS BETWEEN ECM AND INTAKE CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between intake camshaft position sensor connector and engine ground.

**Connector & terminal**

(E61) No. 2 — Engine ground:

(E62) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 144.

No — Repair short circuit to ground in the harness between ECM connector and intake camshaft position sensor connector.

### 144. CHECK POWER SUPPLY OF EXHAUST CAMSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the exhaust camshaft position sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between exhaust camshaft position sensor connector and engine ground.

**Connector & terminal**

(E63) No. 1 (+) — Engine ground (−):

(E64) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 145.

No — Repair the following item.

- Open circuit in harness between M/B and exhaust camshaft position sensor connector
- Blown out of fuse
- Poor contact of coupling connector

### 145. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and exhaust camshaft position sensor connector.

**Connector & terminal**

(E51) No. 24 — (E63) No. 2:

(E51) No. 41 — (E63) No. 3:

(E51) No. 40 — (E64) No. 2:

(E51) No. 41 — (E64) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 146.

No — Repair the open circuit in the harness between ECM connector and exhaust camshaft position sensor connector.

### 146. CHECK HARNESS BETWEEN ECM AND EXHAUST CAMSHAFT POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between exhaust camshaft position sensor connector and engine ground.

**Note:**
**Connect all connectors after measurement.**

**Connector & terminal**
(E63) No. 2 — Engine ground:
(E64) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 147.

No — Repair short circuit to ground in the harness between ECM connector and exhaust camshaft position sensor connector.

### 147. CHECK COMPRESSION PRESSURE.

Check the compression pressure. Ref. to MECHANICAL(H4DOTC)>Compression>INSPECTION.

Is the check result OK?

Yes — Go to 148.

No — Check the engine. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes>INSPECTION.

### 148. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Go to 149.

### 149. CHECK FOR MALFUNCTION OCCURRENCE.

1. Replace the camshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
2. Check that the fault is removed.

Is the fault removed?

Yes — Clear the memory to complete. Ref. to COMMON (DIAGNOSTICS)>Clear memory.

No — Check the valve timing. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.
When the valve timing is normal, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG when the status enters into any one of the followings.
- Although starter signal input is present in ECM, the engine does not start (diagnosis 1)
- Although starter signal input is present in ECM, starting takes more time than it should (diagnosis 1)
- The engine stops immediately after starting except by operating the ignition switch (diagnosis 2)

**EXECUTION CONDITION**
**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Starter signal | ON |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Elapsed time after starting the engine | 2 s or less |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Engine speed | Less than 500 rpm |

Judge as NG when the following conditions are established.

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Engine speed | Less than 300 rpm |

**Time needed for diagnosis:**

Diagnosis 1: 2 — 26 s

Diagnosis 2: Less than 1 s

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.

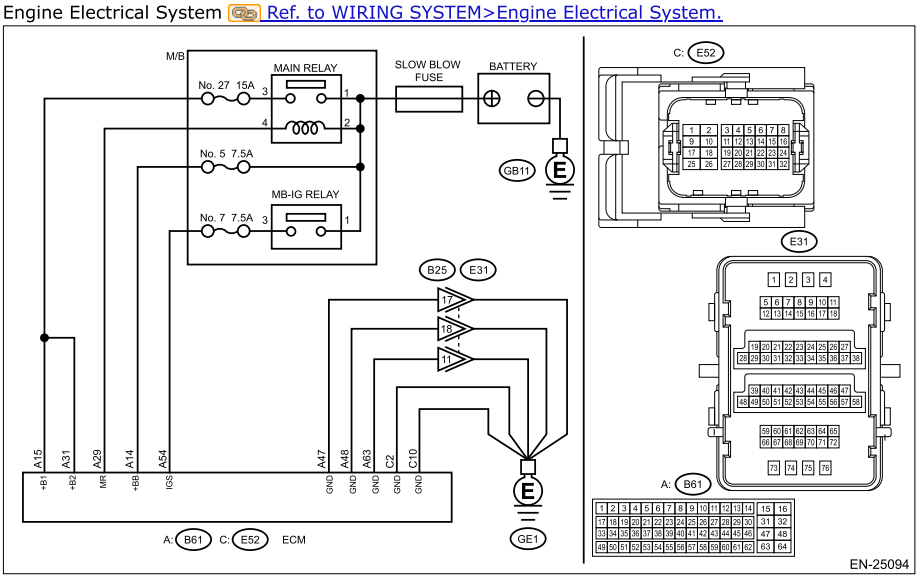
## DTC P162A STARTER INTERLOCK INTERNAL CIRCUIT

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance.** **Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure.** **Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INPUT VOLTAGE OF ECM. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK ECM GROUND HARNESS. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK INPUT VOLTAGE OF ECM.

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 10 — 13 V?

| | |
|---|---|
| Yes | Go to 2. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and battery terminal<br>• Blown out of fuse<br>• Defective main relay<br>• Replace M/B |

### 2. CHECK ECM GROUND HARNESS.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 47 (+) — Engine ground (−):
   (B61) No. 48 (+) — Engine ground (−):
   (B61) No. 63 (+) — Engine ground (−):
   (E52) No. 2 (+) — Engine ground (−):
   (E52) No. 10 (+) — Engine ground (−):

Is the voltage less than 1 V?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit in ground circuit<br>• Loose engine ground terminal<br>• Poor contact of coupling connector |

### 3. CHECK DTC.

1. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.
3. Using Subaru Select Monitor, check the readiness code of [Engine]. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>All Readiness Diagnostic Code(s).

Is DTC P162A displayed as a readiness code?

| | |
|---|---|
| Yes | Check the connector for poor contact and check the harness. Replace the ECM if no fault is found. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG when the monitor value of the starter interlock inner circuit does not correspond to the expected value.

**COMPONENT DESCRIPTION**
Inner circuit to inhibit starter drive operation in drive range

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Ignition switch | ON |
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Interlock inner circuit monitor value | Different from expected value |

**Time needed for diagnosis:** 400 ms

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.

## DTC P1C00 BATTERY MONITOR MODULE "A" PERFORMANCE

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P1C00 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the battery sensor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery Sensor. |
| No | Even if DTC is detected, it has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Diagnosis 1: Judge as NG when faulty signal of each part is sent from the battery sensor.
Diagnosis 2: Judge as battery sensor malfunction when the battery current value sent from the battery sensor is out of normal range for a predetermined time or more.
Diagnosis 3: Judge as battery sensor malfunction when the battery voltage value sent from the battery sensor is out of normal range for a predetermined time or more.
Diagnosis 4: Judge as battery sensor malfunction when the battery temperature value sent from the battery sensor is out of normal range for a predetermined time or more.
Diagnosis 5: Judge as battery sensor malfunction when the battery SOC value sent from the battery sensor is out of normal range for a predetermined time or more.
Diagnosis 6: Judge as battery sensor malfunction when the amount of change of the battery current value sent from the battery sensor is less than the predetermined value for a predetermined time or more.

**COMPONENT DESCRIPTION**
The battery sensor monitors the data of battery voltage, current, temperature, etc.
ECM receives these data via LIN communication with the battery sensor.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Ignition switch | ON |
| SOC calibration* | Completed |

*: The ignition switch and SOC calibration are conditions for the battery SOC diagnosis only. For others, the condition is the ignition switch only.

**GENERAL DRIVING CYCLE**
Perform the diagnosis every time after the enable conditions have been established.

**DIAGNOSTIC METHOD**
Judge as NG when the following conditions are established.
**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Receives the battery sensor information "pulse discharge malfunction" Or, | ON |

| Malfunction Criteria | Threshold Value |
|---|---|
| Receives the battery sensor information “voltage measurement malfunction”<br>Or,<br>Receives the battery sensor information “current measurement malfunction” | ON<br><br><br>ON |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Battery current | Less than −1000 A<br>Or,<br>More than 300 A |

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Battery voltage | Less than 6 V<br>Or,<br>More than 16.2 V |

**Judgment value (diagnosis 4)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Battery temperature | More than 105°C (221°F) |

**Judgment value (diagnosis 5)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Battery SOC | More than 100% |

**Judgment value (diagnosis 6)**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Battery current (current value) − Battery current (previous value)\| | 0.003 A or less |

**Time needed for diagnosis:**
**Diagnosis 1:** Less than 1 s
**Diagnosis 2, 3, 4 and 5:** 10 s
**Diagnosis 6:** 60 s
**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.

## DTC P2004 TGV CONTROL STUCK OPEN BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK TUMBLE GENERATOR VALVE RH. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2004 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK TUMBLE GENERATOR VALVE RH.

1. Remove the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly.
2. Check the tumble generator valve.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

| | |
|---|---|
| Yes | Clean the tumble generator valve. |
| No | Replace the tumble generator valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve.<br>**Note:**<br>**The tumble generator valve cannot be disassembled.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of tumble generator valve motor function.
Judge open fixing malfunction when the opening degree is large even after finishing the tumble generator valve closing driving.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Tumble generator valve "close" signal output time | 1.8 s or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Tumble generator valve opening angle | 39.5 deg or more |

**Time needed for diagnosis:** 3000 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2005 TGV CONTROL STUCK OPEN BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK TUMBLE GENERATOR VALVE LH. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2005 displayed? (Current malfunction)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK TUMBLE GENERATOR VALVE LH.

1. Remove the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly.
2. Check the tumble generator valve.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

| | |
|---|---|
| Yes | Clean the tumble generator valve. |
| No | Replace the tumble generator valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve.<br>**Note:**<br>**The tumble generator valve cannot be disassembled.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P2004. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2004 TGV CONTROL STUCK OPEN BANK 1.**

## DTC P2006 TGV CONTROL STUCK CLOSED BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK TUMBLE GENERATOR VALVE RH. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2006 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK TUMBLE GENERATOR VALVE RH.

1. Remove the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly.
2. Check the tumble generator valve.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

| | |
|---|---|
| Yes | Clean the tumble generator valve. |
| No | Replace the tumble generator valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve.<br>**Note:**<br>**The tumble generator valve cannot be disassembled.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the malfunction of tumble generator valve motor function.
Judge close fixing malfunction when the opening degree is small even after finishing the tumble generator valve open driving.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Tumble generator valve "open" signal output time | 1.8 s or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Tumble generator valve opening angle | Less than 39.5 deg |

**Time needed for diagnosis:** 3000 ms

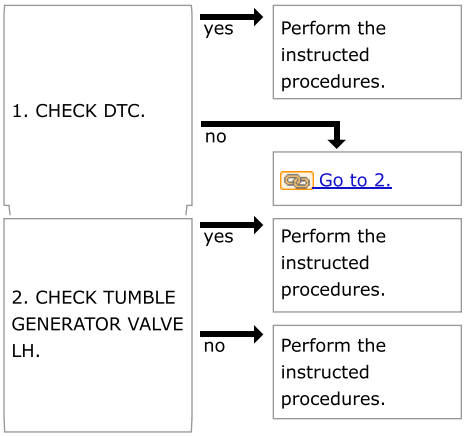
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2007 TGV CONTROL STUCK CLOSED BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2007 displayed? (Current malfunction)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

#### 2. CHECK TUMBLE GENERATOR VALVE LH.

1. Remove the intake manifold assembly. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold Assembly.
2. Check the tumble generator valve.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

| | |
|---|---|
| Yes | Clean the tumble generator valve. |
| No | Replace the tumble generator valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve.<br>**Note:**<br>**The tumble generator valve cannot be disassembled.** |

## GENERAL DESCRIPTION

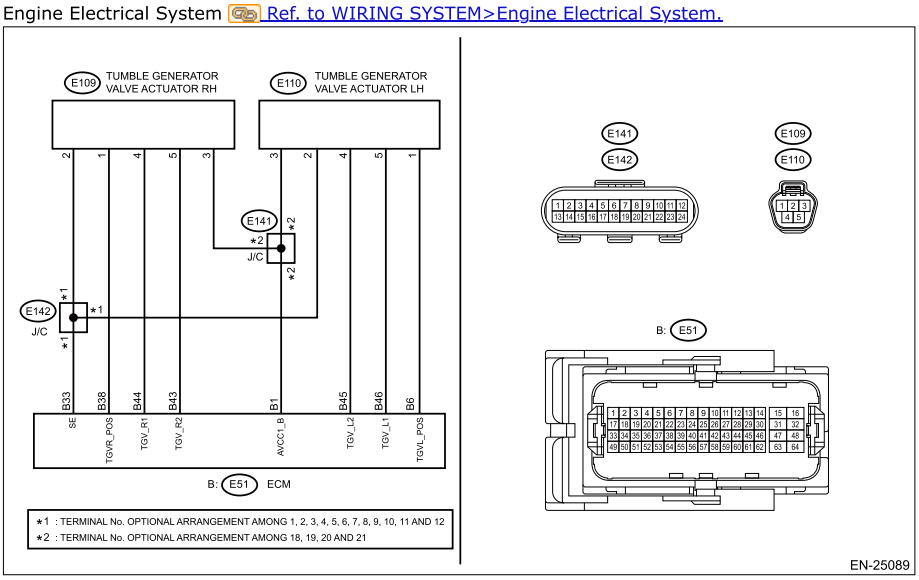
**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P2006. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2006 TGV CONTROL STUCK CLOSED BANK 1.**

## DTC P2009 TGV CONTROL CIRCUIT LOW BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 43 (+) — Engine ground (−):
   (E51) No. 44 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator RH connector. |
| No | Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator. |

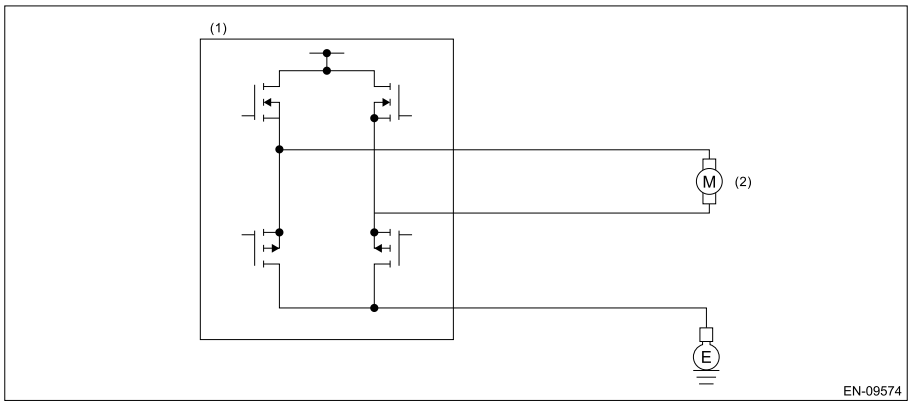
**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the short circuit of tumble generator valve motor.
Judge as NG when the overcurrent signal is sent from IC after tumble generator valve driving IC diagnosis.

### COMPONENT DESCRIPTION




(1) Engine control module (ECM) (2) Tumble generator valve

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Tumble generator valve driving signal | Open or Closed |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

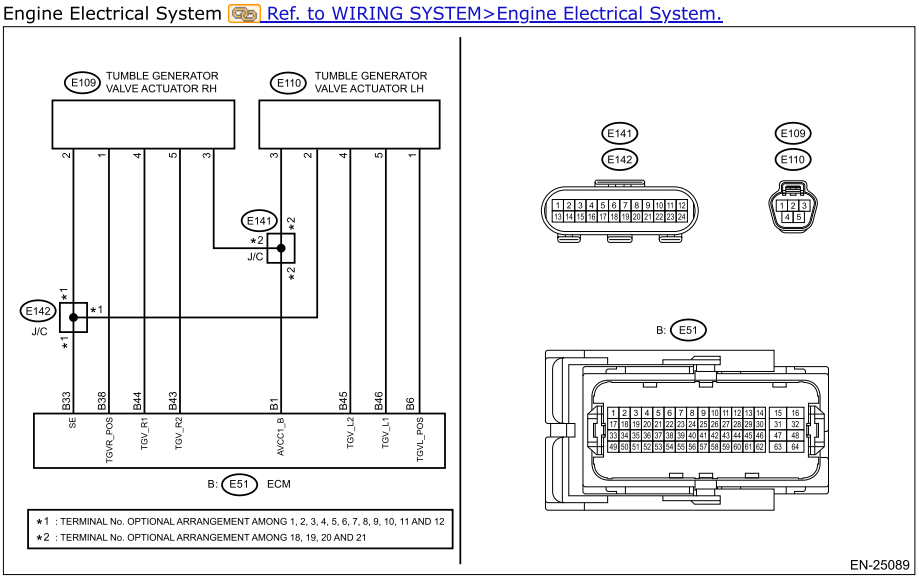
| Malfunction Criteria | Threshold Value |
|---|---|
| Overcurrent signal from tumble generator valve drive IC | ON |

**Time needed for diagnosis:** 320 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2012 TGV CONTROL CIRCUIT LOW BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (E51) No. 45 (+) — Engine ground (−):
   (E51) No. 46 (+) — Engine ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator LH connector. |
| No | Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator. |

**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

**Note:**

**For the detection standard, refer to DTC P2009. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2009 TGV CONTROL CIRCUIT LOW BANK 1.**

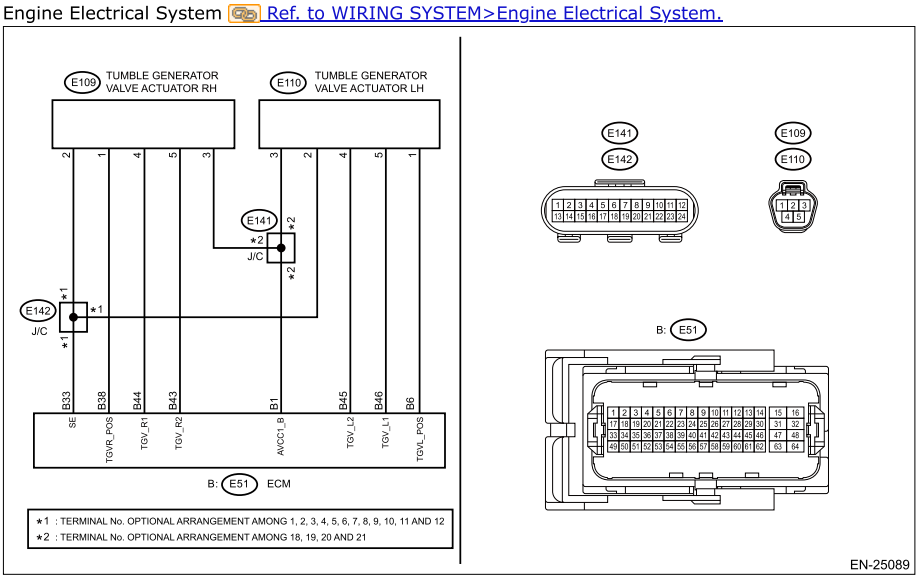
## DTC P2016 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

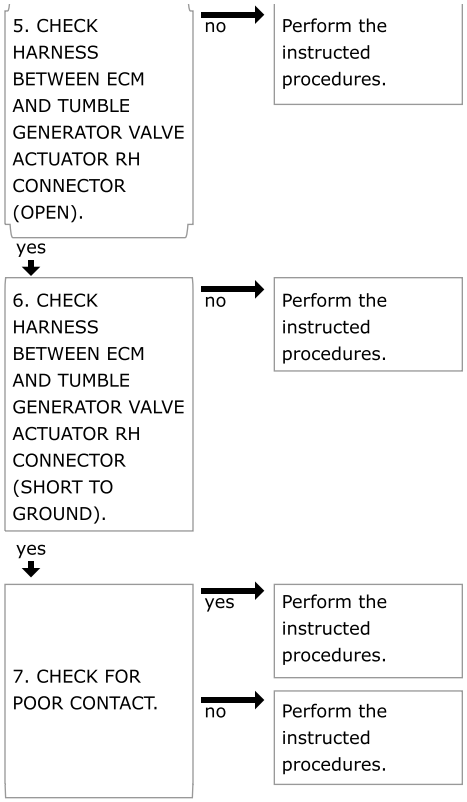
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 4. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR RH. | no → | Perform the instructed procedures. |
| | yes ↓ | |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [TGV Position Sensor R].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value in [TGV Position Sensor R] less than 0.2 [V]?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR RH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between tumble generator valve actuator RH connector and engine ground.
   **Connector & terminal**
   (E109) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit in harness between ECM connector and tumble generator valve actuator RH connector
- Poor contact of ECM connector
- Poor contact of J/C

### 5. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and tumble generator valve actuator RH connector.
   **Connector & terminal**
   (E51) No. 38 — (E109) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit in harness between ECM connector and tumble generator valve actuator RH connector.

### 6. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(E51) No. 38 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator RH connector.

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and tumble generator valve actuator RH connector.

Is there poor contact of ECM or the tumble generator valve actuator RH connector?

Yes — Repair the poor contact of ECM or tumble generator valve actuator RH connector.

No — Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator.

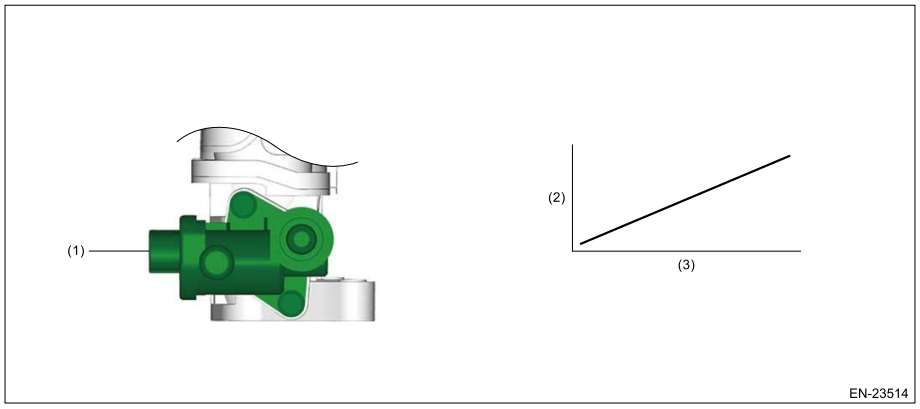
**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Tumble generator valve (2) Voltage (V) (3) Tumble generator valve opening angle (°)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.121 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

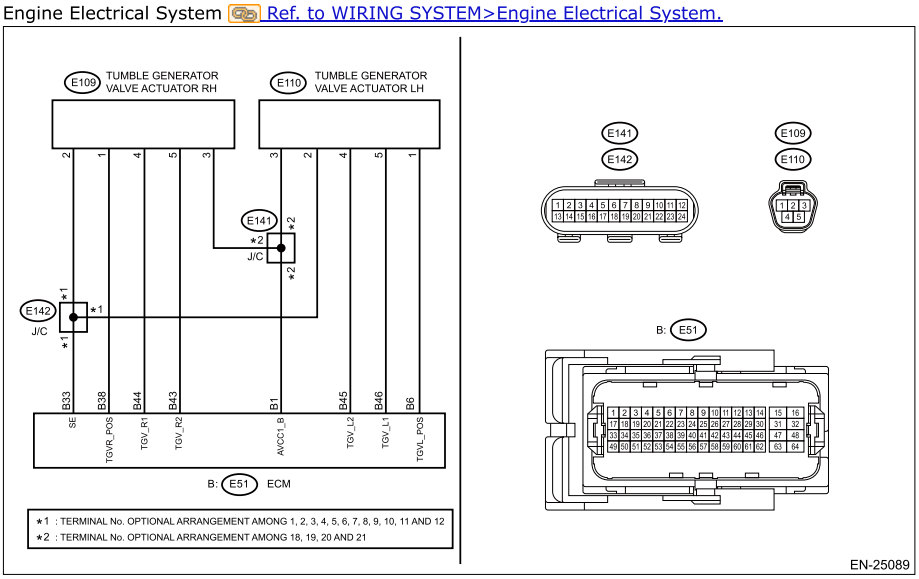
## DTC P2017 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

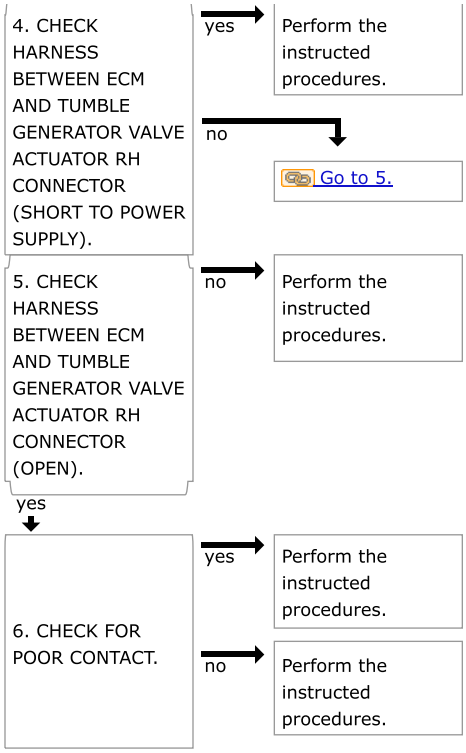
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK DATA MONITOR. | no | Perform the instructed procedures. |
| | yes | |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [TGV Position Sensor R].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [TGV Position Sensor R] 5 [V] or more?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator RH.
3. Start the engine.
4. Using the Subaru Select Monitor, read the value in [TGV Position Sensor R].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [TGV Position Sensor R] 5 [V] or more?

Yes — Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator RH connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between tumble generator valve actuator RH connector and engine ground.
   **Connector & terminal**
   (E109) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and tumble generator valve actuator RH connector
- Poor contact of ECM connector
- Poor contact of J/C

### 6. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator RH connector.

Is there poor contact of the tumble generator valve actuator RH connector?

Yes — Repair the poor contact of tumble generator valve actuator RH connector.

No — Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator.

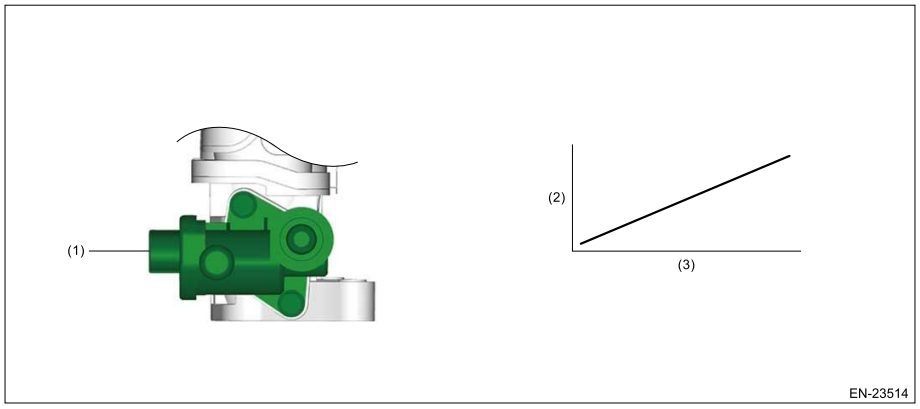
**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Tumble generator valve (2) Voltage (V) (3) Tumble generator valve opening angle (°)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.867 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

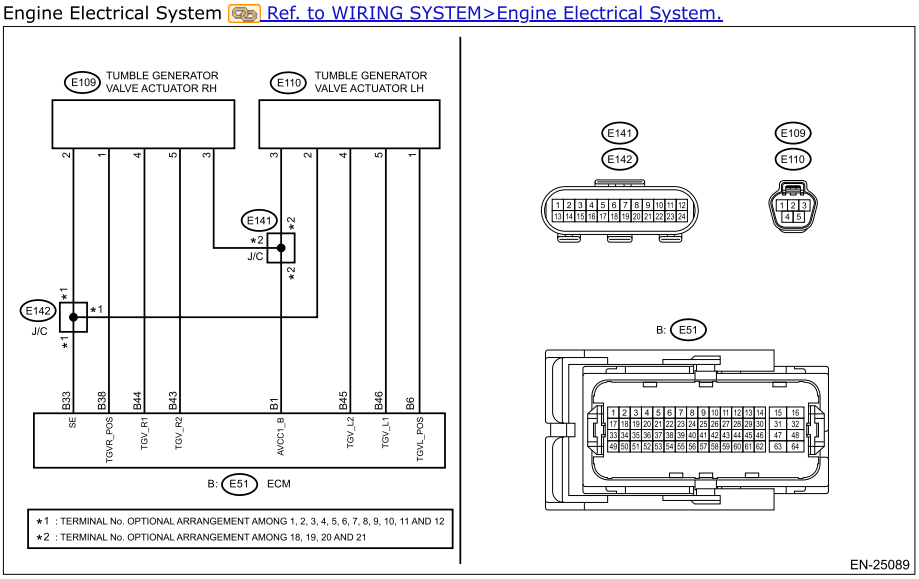
## DTC P2021 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

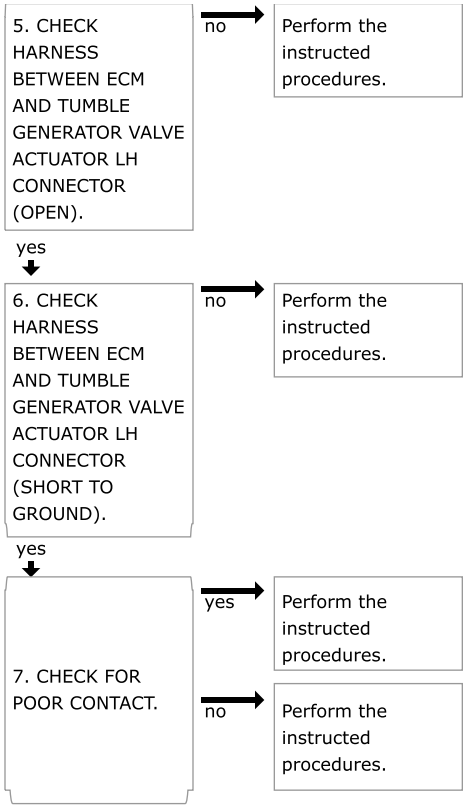
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 4. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR LH. | no → | Perform the instructed procedures. |
| | yes ↓ | |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [TGV Position Sensor L].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value in [TGV Position Sensor L] less than 0.2 [V]?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR LH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between tumble generator valve actuator LH connector and engine ground.
   **Connector & terminal**
   (E110) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit in harness between ECM connector and tumble generator valve actuator LH connector
- Poor contact of ECM connector
- Poor contact of J/C

### 5. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and tumble generator valve actuator LH connector.
   **Connector & terminal**
   (E51) No. 6 — (E110) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit in harness between ECM connector and tumble generator valve actuator LH connector.

### 6. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(E51) No. 6 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator LH connector.

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and tumble generator valve actuator LH connector.

Is there poor contact of ECM or the tumble generator valve actuator LH connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM or tumble generator valve actuator LH connector. |
| No | Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator. |

**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

**Note:**
**For the detection standard, refer to DTC P2016. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2016 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1.**

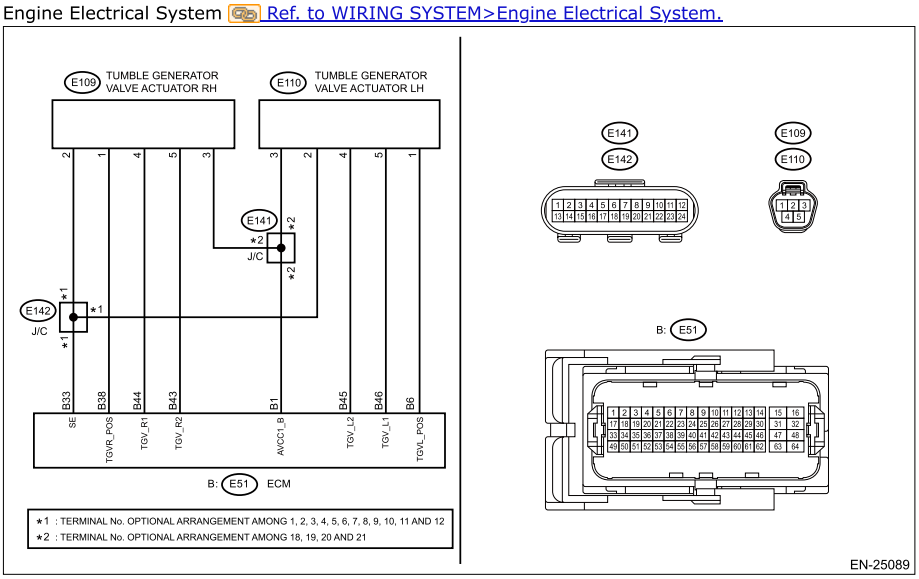
## DTC P2022 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Engine stall
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

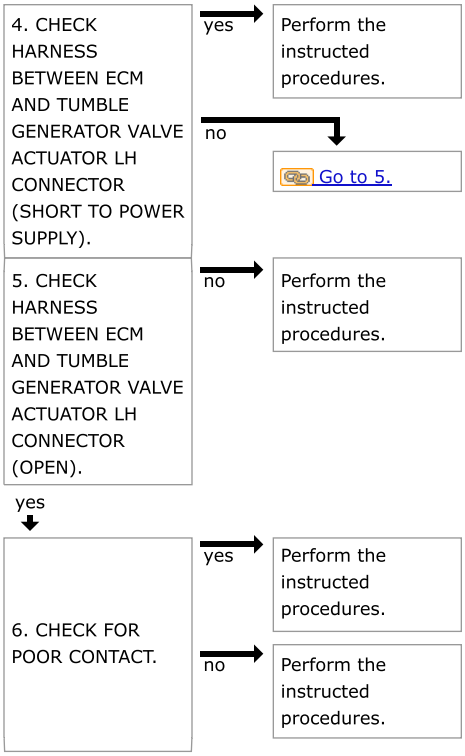



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |

yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [TGV Position Sensor L].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [TGV Position Sensor L] 5 [V] or more?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator LH.
3. Start the engine.
4. Using the Subaru Select Monitor, read the value in [TGV Position Sensor L].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [TGV Position Sensor L] 5 [V] or more?

Yes — Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator LH connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between tumble generator valve actuator LH connector and engine ground.
   **Connector & terminal**
   (E110) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and tumble generator valve actuator LH connector
- Poor contact of ECM connector
- Poor contact of J/C

### 6. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator LH connector.

Is there poor contact of the tumble generator valve actuator LH connector?

| | |
|---|---|
| Yes | Repair the poor contact of tumble generator valve actuator LH connector. |
| No | Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Tumble Generator Valve Actuator. |

**Note:**
**The tumble generator valve actuator cannot be disassembled.**

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

**Note:**
**For the detection standard, refer to DTC P2017. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2017 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1.**

## DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1

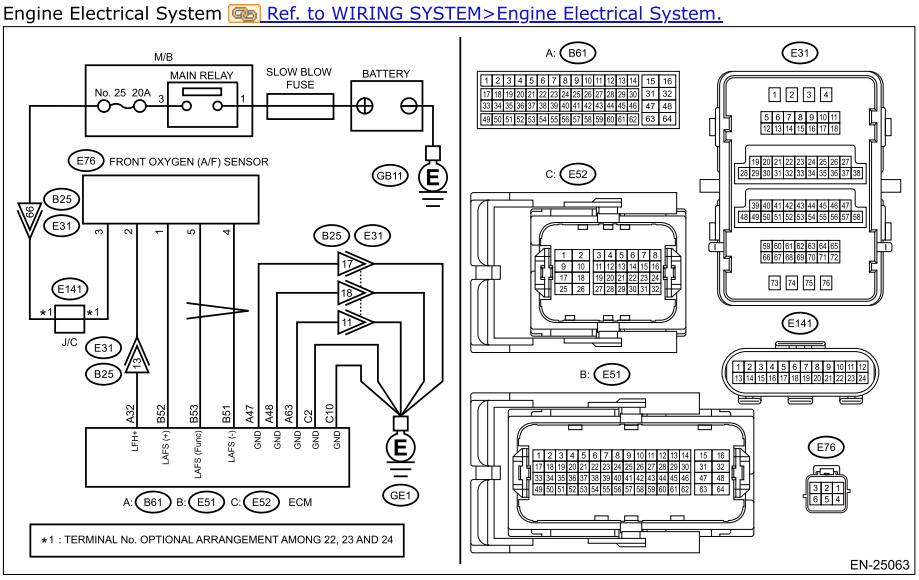
### 1. —

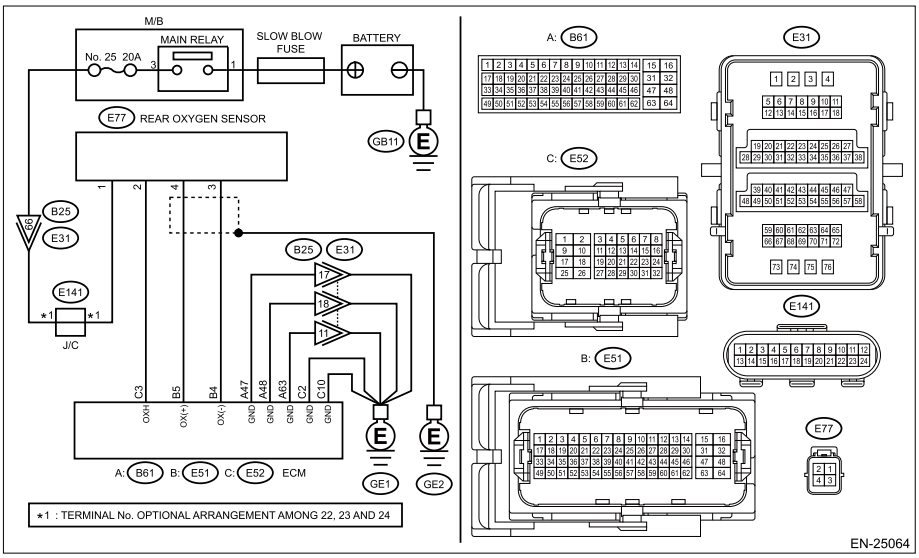
**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



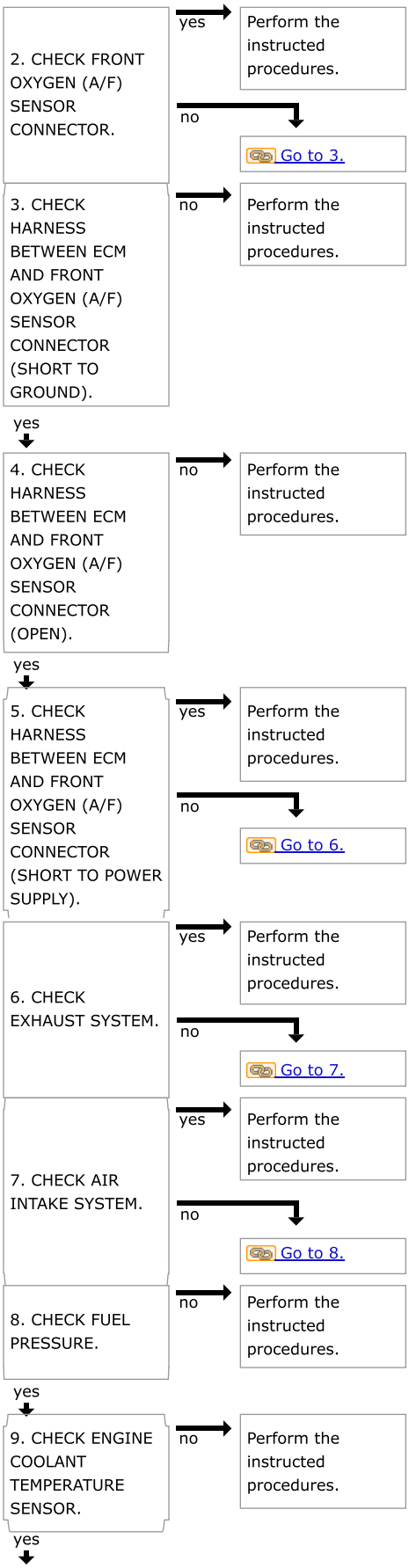

**Caution:**

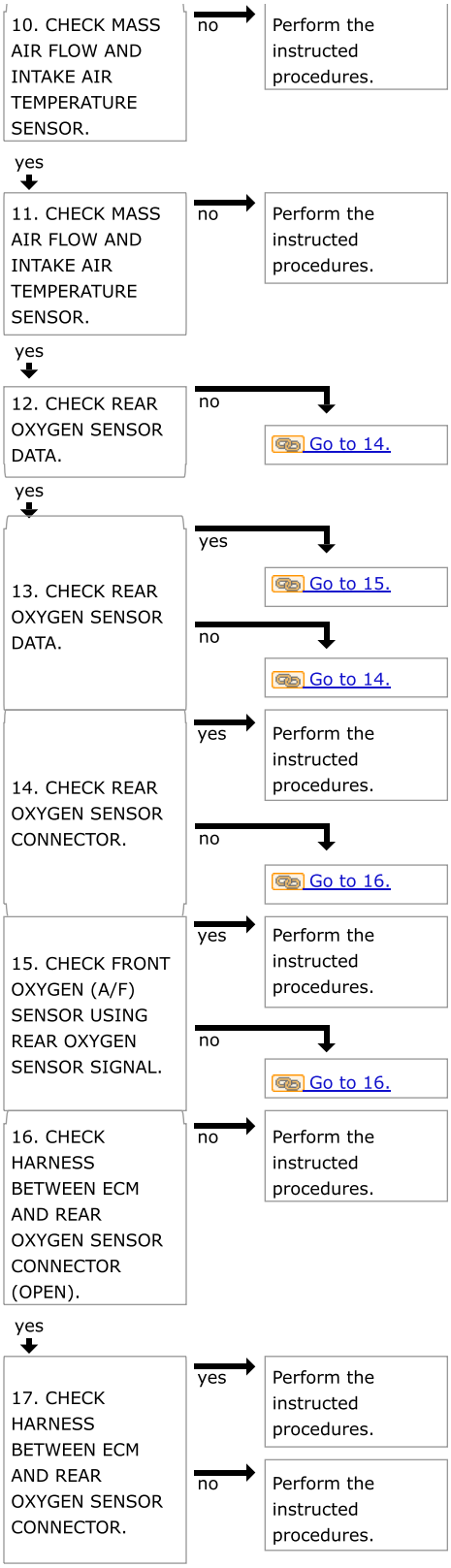
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |


2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Go to 3.
3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
5. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
yes
Perform the instructed procedures.
no
Go to 6.
6. CHECK EXHAUST SYSTEM.
yes
Perform the instructed procedures.
no
Go to 7.
7. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 8.
8. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
9. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes


10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
11. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
12. CHECK REAR OXYGEN SENSOR DATA.
no
Go to 14.
yes
13. CHECK REAR OXYGEN SENSOR DATA.
yes
Go to 15.
no
Go to 14.
14. CHECK REAR OXYGEN SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Go to 16.
15. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.
yes
Perform the instructed procedures.
no
Go to 16.
16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
17. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2096 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

   **Connector & terminal**

   (E51) No. 52 — (E76) No. 1:
   (E51) No. 51 — (E76) No. 4:
   (E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 5.

No — Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

### 5. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.
   **Connector & terminal**
   (E76) No. 1 (+) — Engine ground (−):
   (E76) No. 4 (+) — Engine ground (−):
   (E76) No. 5 (+) — Engine ground (−):

Is the voltage 8 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Go to 6. |

### 6. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

| | |
|---|---|
| Yes | Repair the exhaust system. |
| No | Go to 7. |

### 7. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 8. |

### 8. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 9. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 9. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 75[°C] (167°F) or more?

Yes — Go to 10.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

### 10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 2 — 5 [g/s] (0.26 — 0.66 lb/min)?

Yes — Go to 11.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 11. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Subtract ambient temperature from [IAT Sensor #11]. Is the obtained value −10 — 50 [°C] (−18 — 90 °F)?

Yes — Go to 12.

No — Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

### 12. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.49 [V] or more?

Yes — Go to 13.

No — Go to 14.

### 13. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3000 rpm.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.25 [V] or more?

Yes — Go to 15.

No — Go to 14.

### 14. CHECK REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the rear oxygen sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 16.

### 15. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until the engine coolant temperature exceeds 75°C (167°F) and leave it at idling for 5 minutes or more.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] kept at 0.25 [V] or less for 5 minutes or more?

Yes — Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor.

No — Go to 16.

### 16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 4 — (E77) No. 3:
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 17. |
| No | Repair the open circuit of harness between ECM connector and rear oxygen sensor connector. |

### 17. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 4 (+) — Engine ground (−):

Is the voltage 0.2 — 0.5 V?

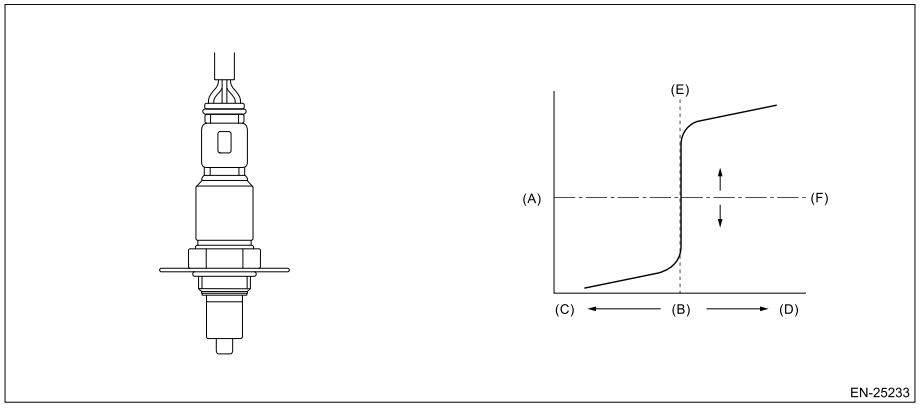
| | |
|---|---|
| Yes | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and rear oxygen sensor connector<br>• Poor contact of ECM connector |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Control the sub feedback learning and judge as NG when the learning value is in the lean zone.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Sub feedback | In operation |
| Increased fuel amount | Not in operation |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously during sub feedback operation.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sub feedback learning value | −0.054 or less |

**Time needed for diagnosis:** 1000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1

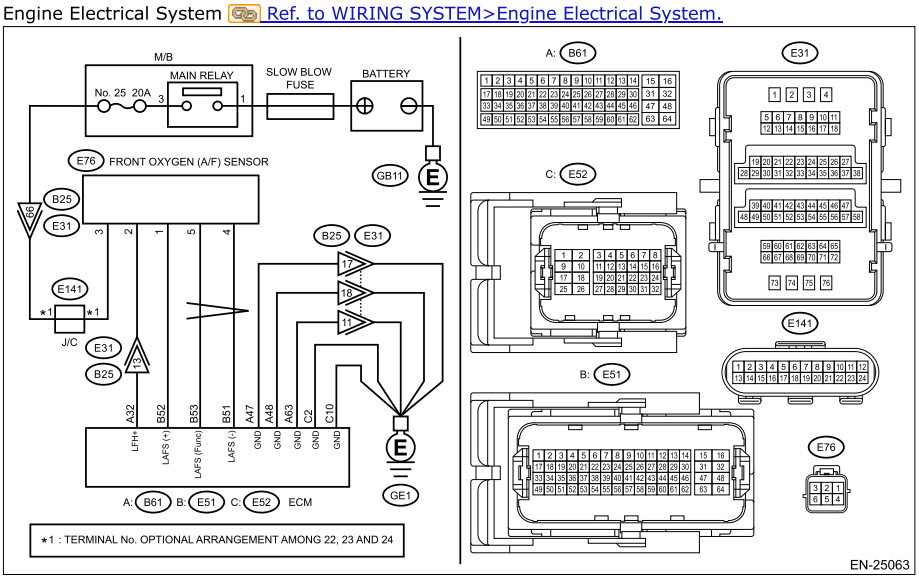
### 1. —

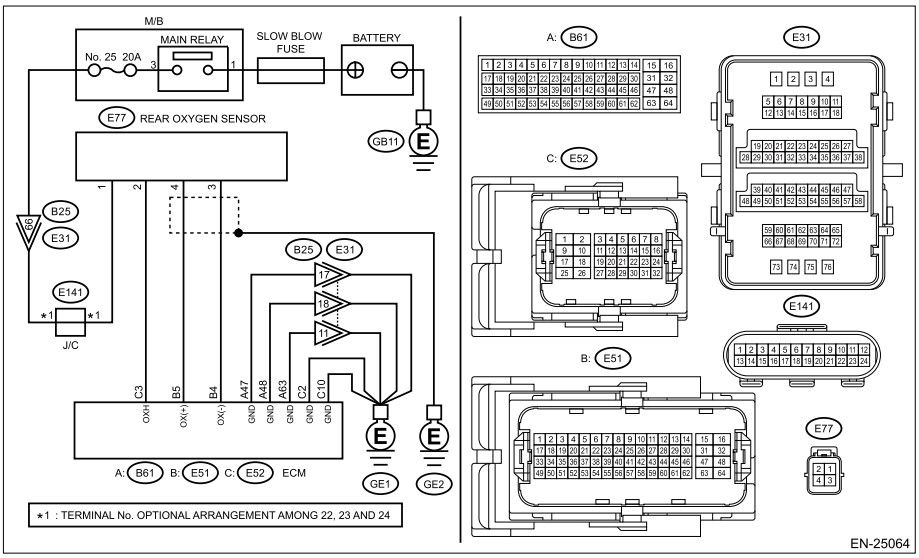
**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



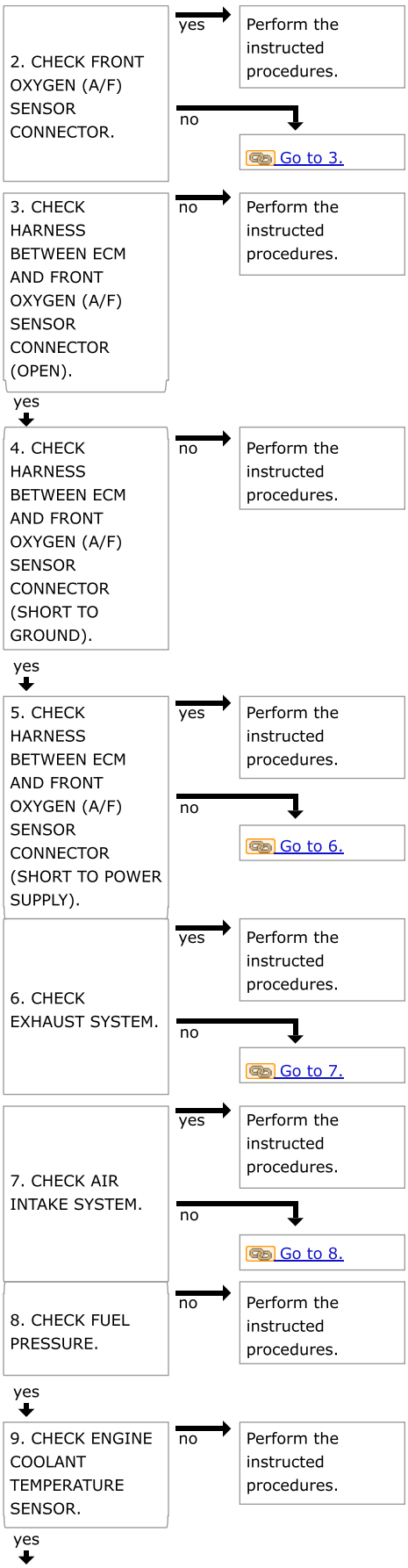

**Caution:**

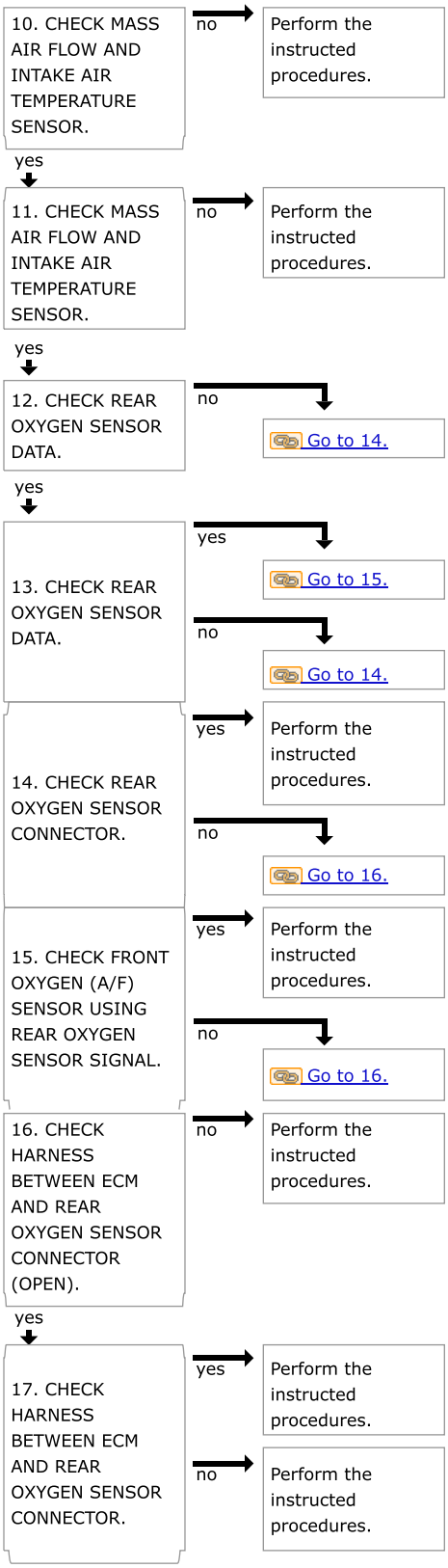
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |


2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Go to 3.
3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes
5. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).
yes
Perform the instructed procedures.
no
Go to 6.
6. CHECK EXHAUST SYSTEM.
yes
Perform the instructed procedures.
no
Go to 7.
7. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 8.
8. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
9. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes


10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
11. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
12. CHECK REAR OXYGEN SENSOR DATA.
no
Go to 14.
yes
13. CHECK REAR OXYGEN SENSOR DATA.
yes
Go to 15.
no
Go to 14.
14. CHECK REAR OXYGEN SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Go to 16.
15. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.
yes
Perform the instructed procedures.
no
Go to 16.
16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
17. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2097 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 3.

### 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 5.

No — Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

### 5. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.
   **Connector & terminal**
   (E76) No. 1 (+) — Engine ground (−):
   (E76) No. 4 (+) — Engine ground (−):
   (E76) No. 5 (+) — Engine ground (−):

Is the voltage 8 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Go to 6. |

### 6. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

| | |
|---|---|
| Yes | Repair the exhaust system. |
| No | Go to 7. |

### 7. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 8. |

### 8. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 9. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 9. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 75[°C] (167°F) or more?

| | |
|---|---|
| Yes | Go to 10. |
| No | Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor. |

### 10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 2 — 5 [g/s] (0.26 — 0.66 lb/min)?

| | |
|---|---|
| Yes | Go to 11. |
| No | Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor. |

### 11. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Subtract ambient temperature from [IAT Sensor #11]. Is the obtained value −10 — 50 [°C] (−18 — 90 °F)?

| | |
|---|---|
| Yes | Go to 12. |
| No | Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION. |

### 12. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.49 [V] or more?

Yes — Go to 13.

No — Go to 14.

### 13. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3000 rpm.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.25 [V] or less?

Yes — Go to 15.

No — Go to 14.

### 14. CHECK REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the rear oxygen sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 16.

### 15. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until the engine coolant temperature exceeds 75°C (167°F) and leave it at idling for 5 minutes or more.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the voltage of [Oxygen sensor #12] kept at 0.8 [V] or more for 5 minutes or more?

Yes — Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor.

No — Go to 16.

### 16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 4 — (E77) No. 3:
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 17. |
| No | Repair the open circuit of harness between ECM connector and rear oxygen sensor connector. |

### 17. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 4 (+) — Engine ground (−):

Is the voltage 0.2 — 0.5 V?

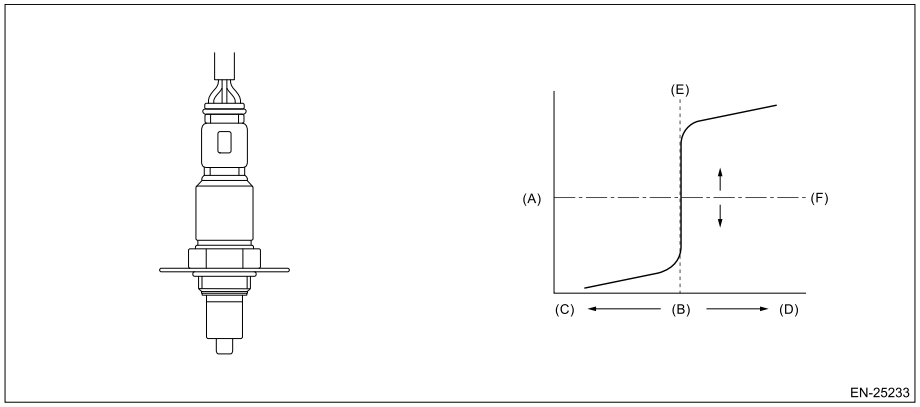
| | |
|---|---|
| Yes | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and rear oxygen sensor connector<br>• Poor contact of ECM connector |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Sub feedback learning is being performed. When the learning value goes to the rich side, judge as NG.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Sub feedback | In operation |
| Increased fuel amount | Not in operation |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously during sub feedback operation.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sub feedback learning value | 0.060 or more |

**Time needed for diagnosis:** 1000 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

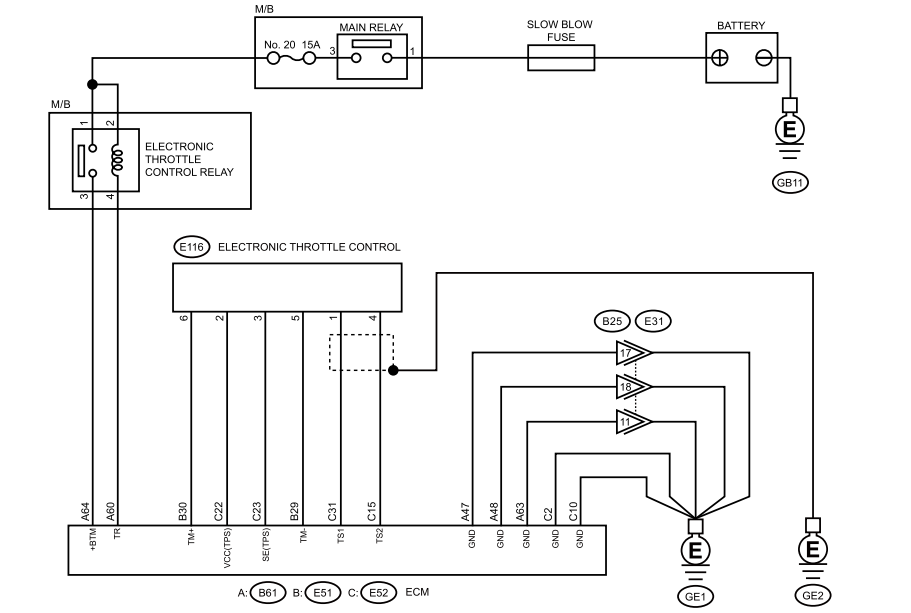
## DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE

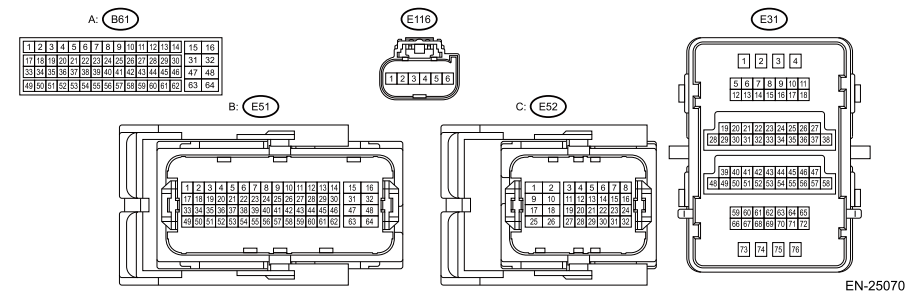
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine stall

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY. | no → | Perform the instructed procedures. |

yes

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY).

yes → Perform the instructed procedures.

no → Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (OPEN).

no → Perform the instructed procedures.

yes

6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

7. CHECK SHORT CIRCUIT INSIDE ECM (SHORT TO GROUND).

no → Perform the instructed procedures.

yes

8. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

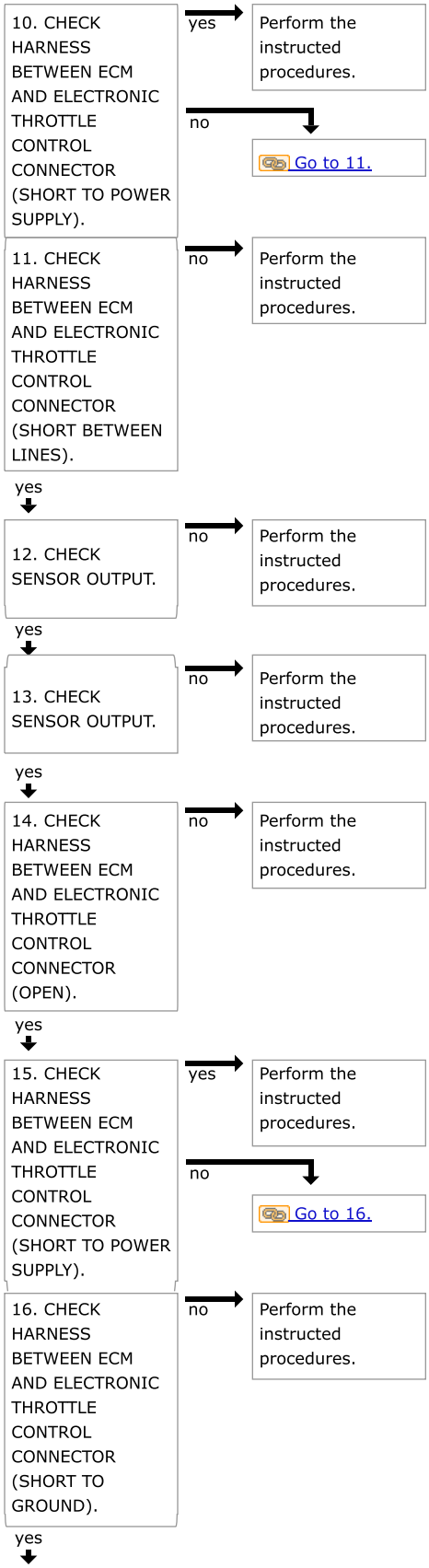
no → Perform the instructed procedures.

yes

9. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

no → Perform the instructed procedures.

yes


10. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).
yes
Perform the instructed procedures.
no
Go to 11.
11. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).
no
Perform the instructed procedures.
yes
12. CHECK SENSOR OUTPUT.
no
Perform the instructed procedures.
yes
13. CHECK SENSOR OUTPUT.
no
Perform the instructed procedures.
yes
14. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
15. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).
yes
Perform the instructed procedures.
no
Go to 16.
16. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).
no
Perform the instructed procedures.
yes

17. CHECK HARNESS FOR ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).
→ no → Perform the instructed procedures.

yes ↓

18. CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT (OPEN).
→ no → Perform the instructed procedures.

yes ↓

19. CHECK ELECTRONIC THROTTLE CONTROL.
→ no → Perform the instructed procedures.

yes ↓

20. CHECK ELECTRONIC THROTTLE CONTROL.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Connect the battery to terminals No. 2 and No. 4 of electronic throttle control relay.
4. Measure the resistance between electronic throttle control relay terminals.

**Terminals**

No. 1 — No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Electronic Throttle Control Relay. |

### 2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 1 (+) — Engine ground (−):

No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B (fuse No. 20) and M/B (electronic throttle control relay) terminal<br>• Blown out of fuse |

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY).

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 4 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and M/B (electronic throttle control relay) terminal. |
| No | Go to 4. |

### 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Measure the resistance between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 3 — Engine ground:

No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in the harness between ECM connector and M/B (electronic throttle control relay) terminal. |

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (OPEN).

Measure the resistance between ECM connector and M/B (electronic throttle control relay) terminal.

**Connector & terminal**

(B61) No. 64 — No. 3:

(B61) No. 60 — No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and M/B (electronic throttle control relay) terminal. |

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from electronic throttle control.
3. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 15 — Engine ground:

(E52) No. 22 — Engine ground:

(E52) No. 31 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. |

### 7. CHECK SHORT CIRCUIT INSIDE ECM (SHORT TO GROUND).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 1 — Engine ground:
   (E116) No. 4 — Engine ground:

Is the resistance 220 kΩ or more?

Yes — Go to 8.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 8. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 31 — (E116) No. 1:
   (E52) No. 23 — (E116) No. 3:
   (E52) No. 15 — (E116) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

### 9. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 10.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of ECM connector

### 10. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 1 (+) — Engine ground (−):
   (E116) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 11.

### 11. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.

**Connector & terminal**

(E52) No. 22 — (E52) No. 15:
(E52) No. 22 — (E52) No. 31:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 12. |
| No | Repair the short circuit between lines in harness between ECM connector and electronic throttle control connector. |

### 12. CHECK SENSOR OUTPUT.

1. Connect all connectors.
2. Start the engine and warm up completely.
3. Stop the engine, and then turn the ignition switch to ON (engine OFF).
4. Using the Subaru Select Monitor, read the value in [Main-Throttle Sensor].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Main-Throttle Sensor] 0.6 — 0.65 [V]?

| | |
|---|---|
| Yes | Go to 13. |
| No | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

### 13. CHECK SENSOR OUTPUT.

Using the Subaru Select Monitor, read the value in [Sub-Throttle Sensor].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Sub-Throttle Sensor] 0.6 — 0.65 [V]?

| | |
|---|---|
| Yes | Go to 14. |
| No | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

### 14. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and electronic throttle control connector.

**Connector & terminal**

(E51) No. 29 — (E116) No. 5:

(E51) No. 30 — (E116) No. 6:

Is the resistance less than 1 Ω?

Yes — Go to 15.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

### 15. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 5 (+) — Engine ground (−):

(E116) No. 6 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 16.

### 16. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between electronic throttle control connector and engine ground.

**Connector & terminal**

(E116) No. 5 — Engine ground:

(E116) No. 6 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 17.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 17. CHECK HARNESS FOR ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

Measure the resistance between electronic throttle control connectors.

**Connector & terminal**

(E116) No. 5 — (E116) No. 6:

Is the resistance 1 MΩ or more?

Yes — Go to 18.

No — Repair the short circuit between lines in harness between ECM connector and electronic throttle control connector.

### 18. CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT (OPEN).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Go to 19. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and engine ground<br>• Poor contact of coupling connector |

### 19. CHECK ELECTRONIC THROTTLE CONTROL.

Measure the resistance between electronic throttle control terminals.

**Terminals**

No. 5 — No. 6:

Is the resistance 50 Ω or less?

| | |
|---|---|
| Yes | Go to 20. |
| No | Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

### 20. CHECK ELECTRONIC THROTTLE CONTROL.

1. Move the throttle valve to the fully opened and fully closed positions with fingers.
2. Check that the valve returns to the specified position when releasing fingers.

Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position

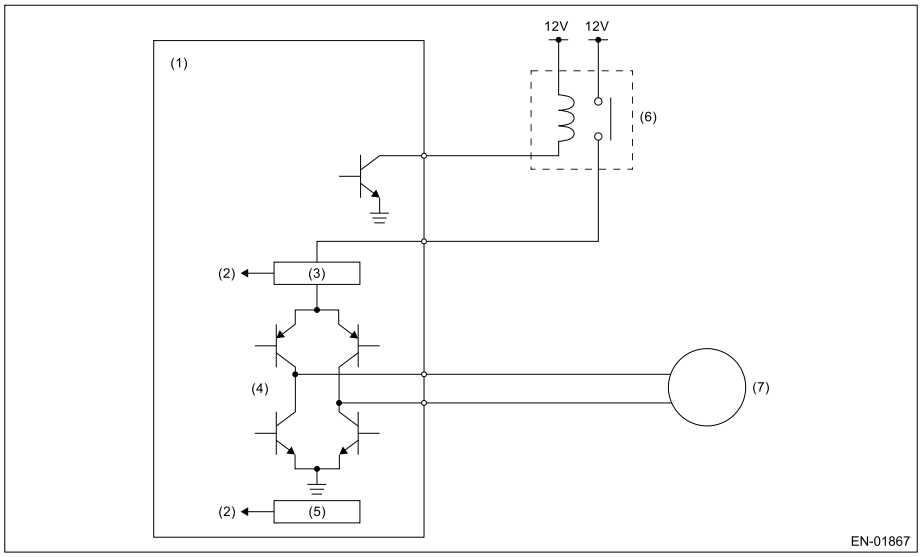
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

In the diagnosis with ignition switch ON, judge as NG when the opening angle with the throttle driven to close direction is out of the specified range.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Detecting circuit
(3) Overcurrent detection circuit
(4) Drive circuit
(5) Temperature detection circuit
(6) Electronic throttle control relay
(7) Motor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis when the ignition switch is turned from OFF to ON.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle position during throttle minimum stop position learning | 36.6 % or more |

**Time needed for diagnosis:** 190 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

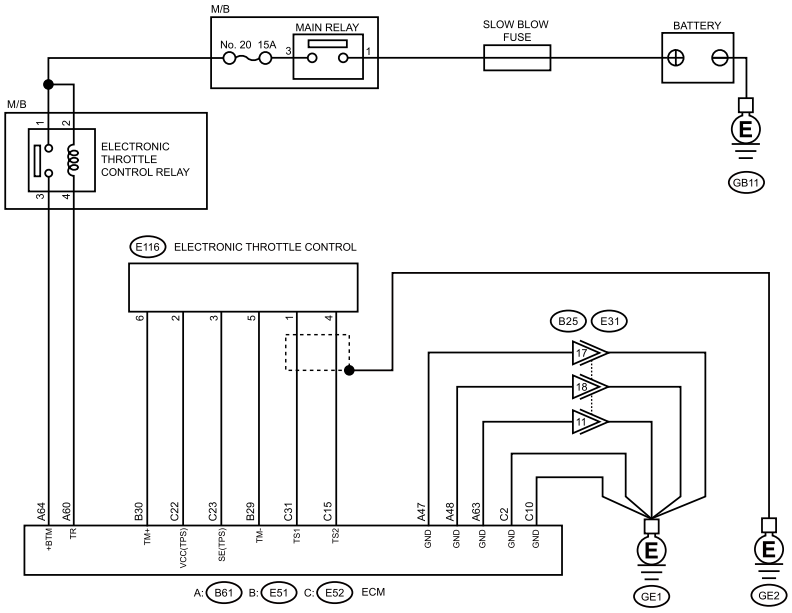
## DTC P2102 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW

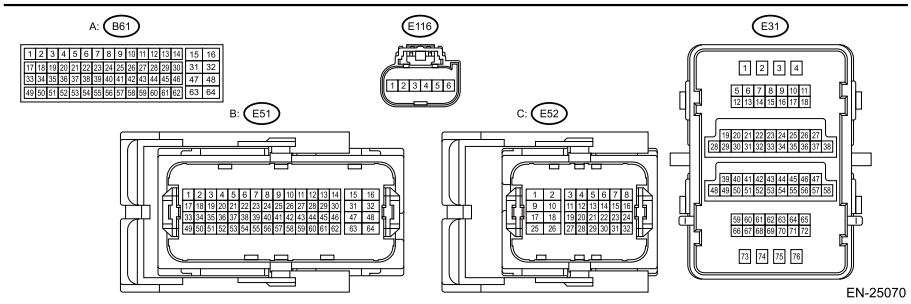
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance
- Engine stall

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

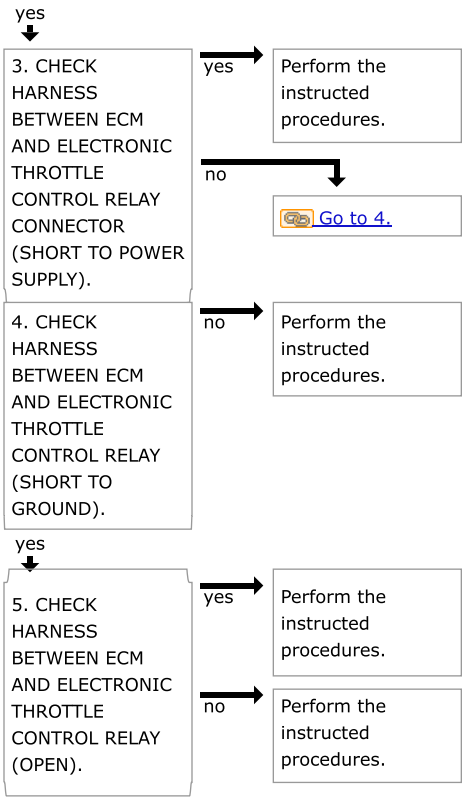



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY. | no → | Perform the instructed procedures. |




### 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Connect the battery to terminals No. 2 and No. 4 of electronic throttle control relay.
4. Measure the resistance between electronic throttle control relay terminals.

**Terminals**

No. 1 — No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Electronic Throttle Control Relay. |

### 2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 1 (+) — Engine ground (−):

No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit or short circuit to ground in harness between M/B (fuse No. 20) and M/B (electronic throttle control relay) terminal<br>• Blown out of fuse |

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR (SHORT TO POWER SUPPLY).

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 4 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and M/B (electronic throttle control relay) terminal. |
| No | Go to 4. |

### 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Measure the resistance between M/B (electronic throttle control relay) terminal and engine ground.

**Terminals**

No. 3 — Engine ground:

No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in the harness between ECM connector and M/B (electronic throttle control relay) terminal. |

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (OPEN).

Measure the resistance between ECM connector and M/B (electronic throttle control relay) terminal.

**Connector & terminal**

(B61) No. 64 — No. 3:

(B61) No. 60 — No. 4:

Is the resistance less than 1 Ω?

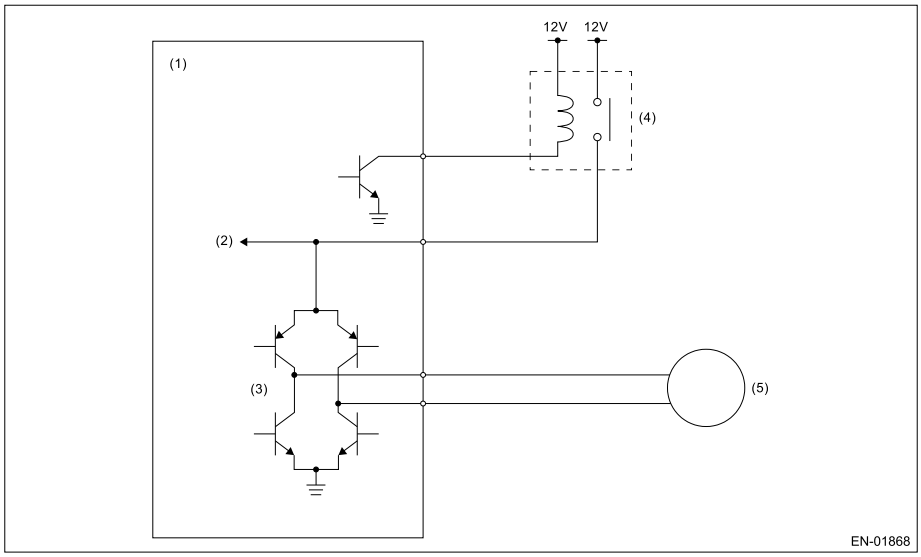
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the open circuit in harness between ECM connector and electronic throttle control relay connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the electronic throttle control power is not supplied even when ECM sets the electric control throttle relay to ON, or when the monitored electronic throttle control relay does not switch to OFF even when ECM sets the electronic throttle control relay to OFF.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| <For electronic throttle control power supply> | |
| Battery voltage | 6 V or more |
| Electronic throttle control relay output | ON |
| <For electronic throttle control relay monitor> | |
| Battery voltage | 10.9 V or more |
| Electronic throttle control relay output | OFF |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| <For electronic throttle control power supply> | |
| Electronic throttle control power voltage | Less than 6 V |
| <For electronic throttle control relay monitor> | |
| Electronic throttle control relay monitor voltage | 1.5 V or less |

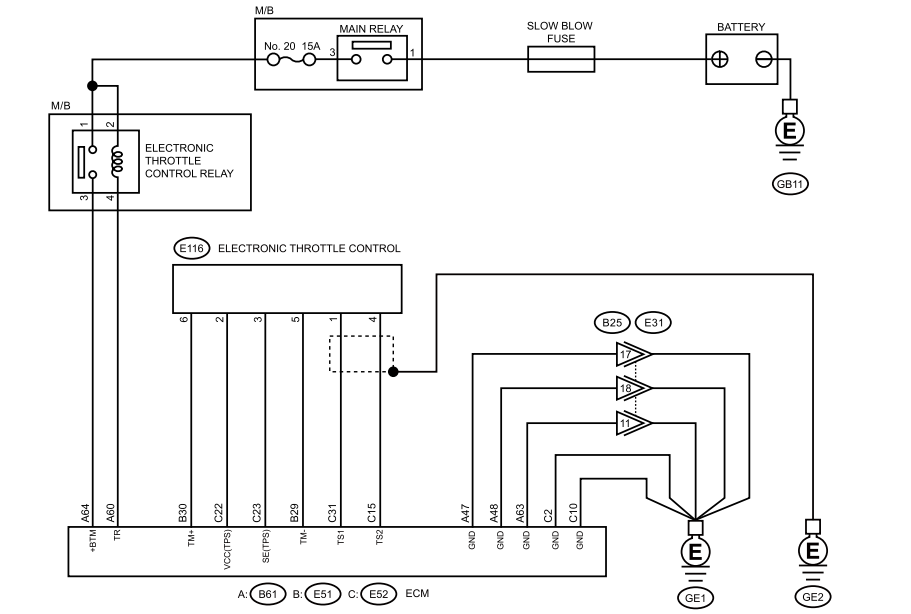
**Time needed for diagnosis:** 510 ms

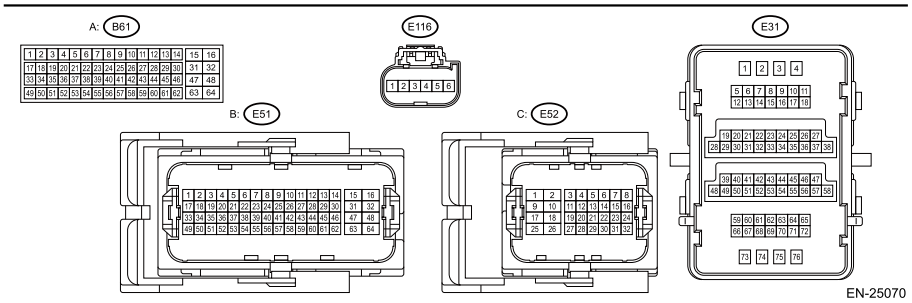
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2103 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no ↓ | Go to 3. |

| | | |
|---|---|---|
| 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Measure the resistance between electronic throttle control relay terminals.
   **Terminals**
   No. 1 — No. 3:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Electronic Throttle Control Relay. |

### 2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between M/B (electronic throttle control relay) terminal and engine ground.
   **Terminals**
   No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and M/B (electronic throttle control relay). |
| No | Go to 3. |

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 60 — Engine ground:

Is the resistance 1 MΩ or more?

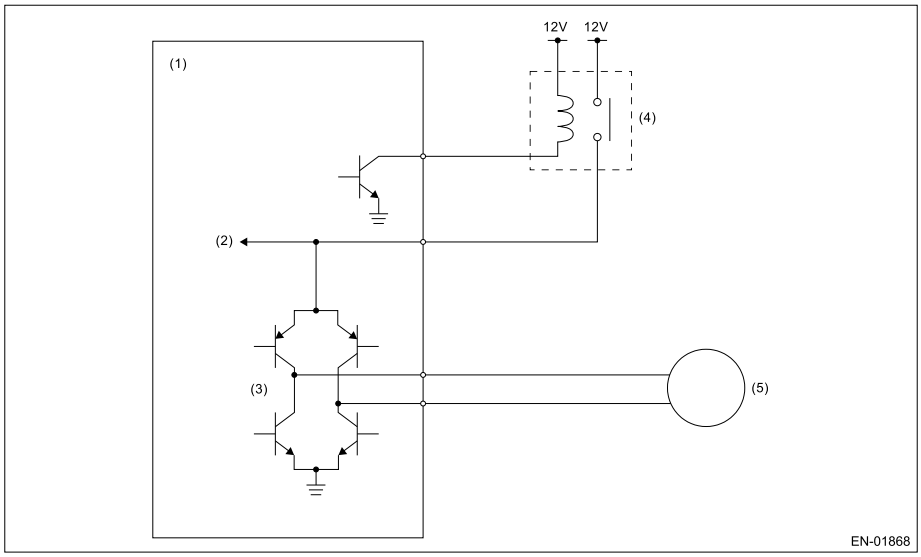
| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the short circuit to ground in the harness between ECM connector and M/B (electronic throttle control relay). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the monitored electronic throttle control relay does not switch to ON even when ECM sets the electric control throttle relay to ON.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Electronic throttle control relay output | ON |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Electronic throttle control relay monitor voltage | 6 V or more |

**Time needed for diagnosis:** 1500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

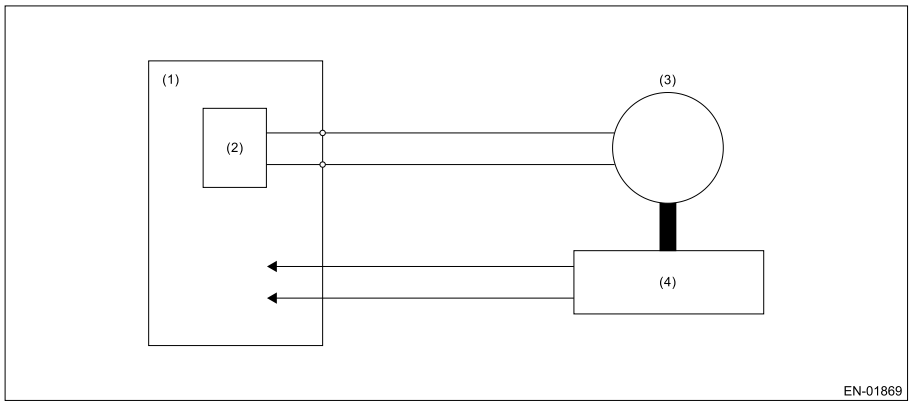
## DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE

**Note:**
**For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when full close point learning cannot conducted or abnormal value is detected.

### 2. COMPONENT DESCRIPTION




(1) Engine control module (ECM) (3) Motor (4) Throttle position sensor
(2) Drive circuit

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| None | |

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis at full closed point learning.

### 5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle position when the ignition switch is ON − Throttle minimum stop position | Less than 2.6% (sensor 1)<br>Less than 2.6% (sensor 2) |

**Time needed for diagnosis:** 200 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P2119 THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE

**Note:**
**For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.**

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the throttle is open stuck, or when the difference between actual throttle opening angle and estimated opening angle is out of range. Judge as NG when any one of the six items for diagnosis is applied.
**Throttle open stuck:**
- Throttle position is out of range
- Intake air amount is out of range

**When the difference between actual throttle opening angle and estimated opening angle is out of range:**
- All time monitoring
- Actual opening angle change amount is small
- Actual opening angle change amount is large
- Actual opening angle does not change

### 2. EXECUTION CONDITION

**Diagnosis 1: Throttle position is out of range**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |
| Micro-computer (CPU failure) (P0606) | Under detection |

**Diagnosis 2: Intake air amount is out of range**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |
| Micro-computer (CPU failure) (P0606) | Under detection |

**Diagnosis 3: All time monitoring**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**Diagnosis 4: Actual opening angle change amount small**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |
| Actual opening angle change amount | More than 0.89%/msec |

**Diagnosis 5: Actual opening angle change amount large**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |
| Actual opening angle change amount | More than 2.22%/msec |

**Diagnosis 6: Actual opening angle not change**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | More than 6 V |
| Continuous time when actual opening angle changing amount is 0%/msec | 5000 ms or more |

## 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 4. DIAGNOSTIC METHOD

Judge as NG if the criteria below are met.
Judgment value

**Diagnosis 1: Throttle position is out of range**

| Malfunction Criteria | Threshold Value |
|---|---|
| Throttle position | 23.2 % or more |

**Diagnosis 2: Intake air amount is out of range**

| Malfunction Criteria | Threshold Value |
|---|---|
| Amount of intake air | More than 28.4 g/s (1.0017 oz/s) |

**Diagnosis 3: All time monitoring**

| Malfunction Criteria | Threshold Value |
|---|---|
| Difference between actual throttle opening angle and estimated opening angle | 4.4% or more |

**Diagnosis 4: Actual opening angle change amount small**

| Malfunction Criteria | Threshold Value |
|---|---|
| Difference between actual throttle opening angle and estimated opening angle | 1.8% or more |

**Diagnosis 5: Actual opening angle change amount large**

| Malfunction Criteria | Threshold Value |
|---|---|
| Difference between actual throttle opening angle and estimated opening angle | 4.4% or more |

**Diagnosis 6: Actual opening angle not change**

| Malfunction Criteria | Threshold Value |
|---|---|
| Difference between actual throttle opening angle and target throttle | 1.8% or more |

| Malfunction Criteria | Threshold Value |
| --- | --- |
| opening angle | |

**Time needed for diagnosis**

- Diagnosis 1, 2: 200 ms
- Diagnosis 3: 2000 ms
- Diagnosis 4, 6: 1000 ms
- Diagnosis 5: 500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

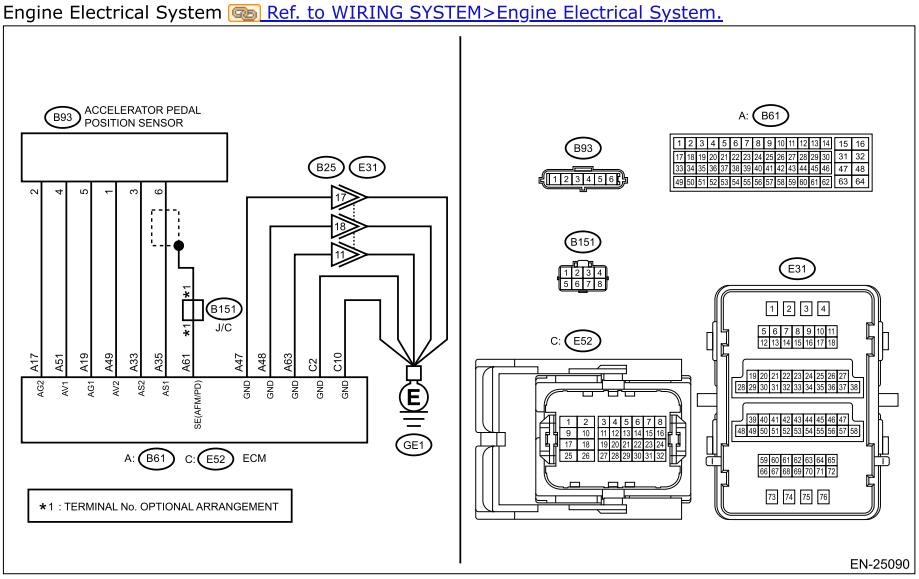
# DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

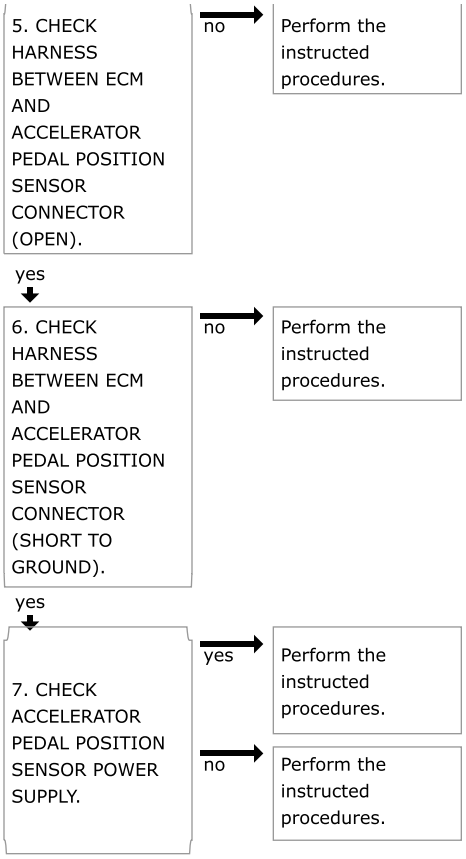
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK DTC. | no | Perform the instructed procedures. |
| | yes | |
| 4. CHECK FOR POOR CONTACT. | yes | Perform the instructed procedures. |
| | no | Go to 5. |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P2122 displayed? (Current code)

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

### 4. CHECK FOR POOR CONTACT.

1. Turn the ignition switch to OFF.
2. Check for poor contact of ECM and accelerator pedal position sensor connector.

Is there poor contact of ECM or accelerator pedal position sensor connector?

Yes — Repair the poor contact of ECM or accelerator pedal position sensor connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the accelerator pedal position sensor.
3. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.
   **Connector & terminal**
   (B61) No. 51 — (B93) No. 4:
   (B61) No. 35 — (B93) No. 6:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector.

### 6. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 51 — Engine ground:
(B61) No. 35 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.

### 7. CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 4 — Chassis ground:

Is the voltage 4.5 — 5.5 V?

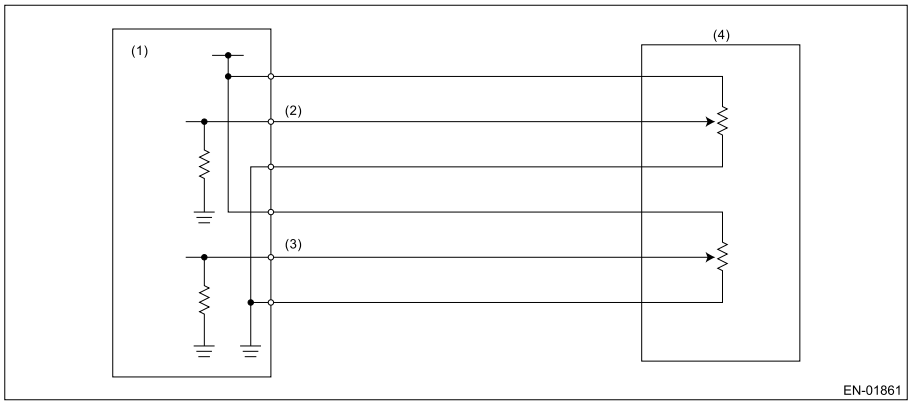
| | |
|---|---|
| Yes | Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 1 output voltage | Less than 0.415 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

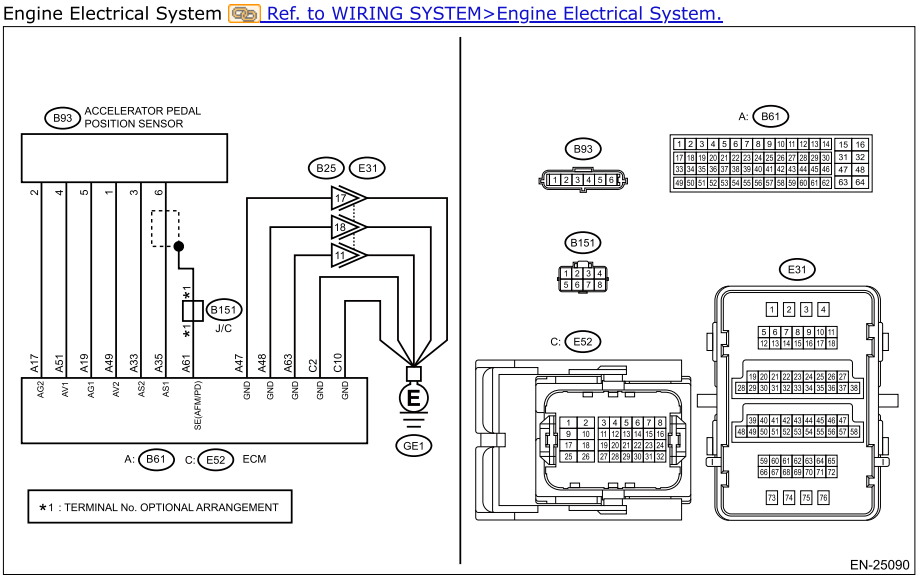
## DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

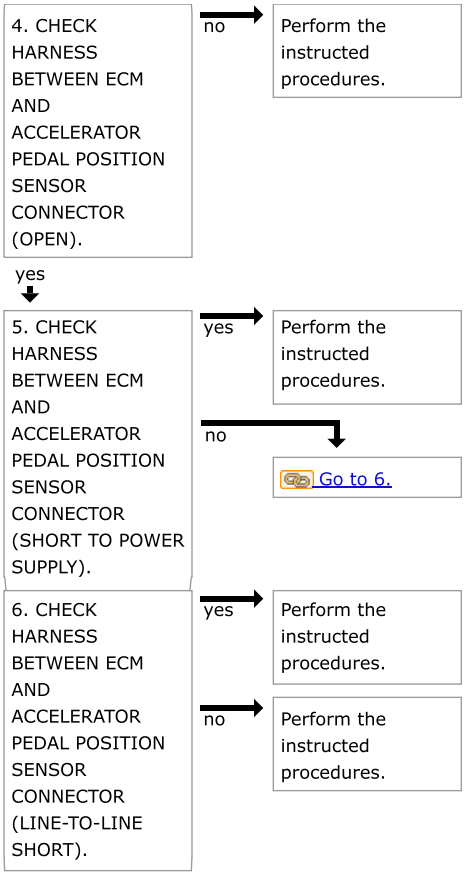



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN). | no | Perform the instructed procedures. |

yes




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B1 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B1. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B1 SENSOR POWER SUPPLY "A" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B2 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B2. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B2 SENSOR POWER SUPPLY "A" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.
   **Connector & terminal**
   (B61) No. 19 — (B93) No. 5:
   (B61) No. 35 — (B93) No. 6:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector. |

### 4. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 5 — Chassis ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and Chassis ground<br>• Poor contact of ECM connector |

### 5. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 6 (+) — Chassis ground (−):

Is the voltage 5 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector. |
| No | Go to 6. |

### 6. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (LINE-TO-LINE SHORT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (B61) No. 51 — (B61) No. 35:

Is the resistance 1 MΩ or more?

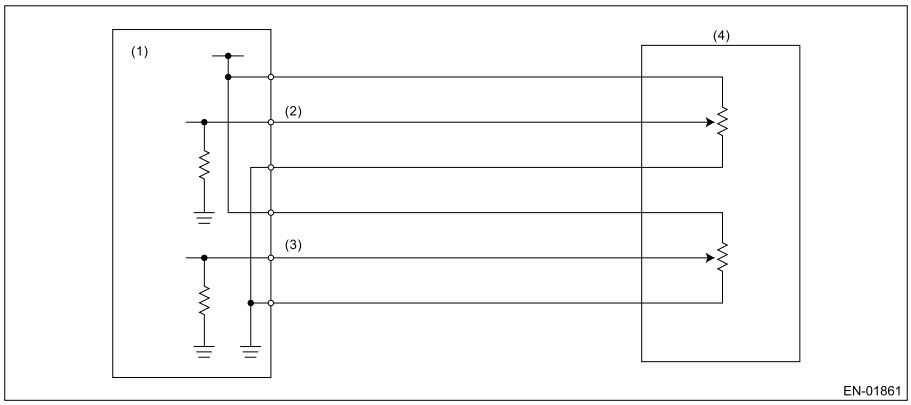
| | |
|---|---|
| Yes | Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal assembly if defective. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal. |
| No | Repair the short circuit between lines in harness between ECM connector and accelerator pedal position sensor connector. |

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

### COMPONENT DESCRIPTION




(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 1 output voltage | More than 4.755 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

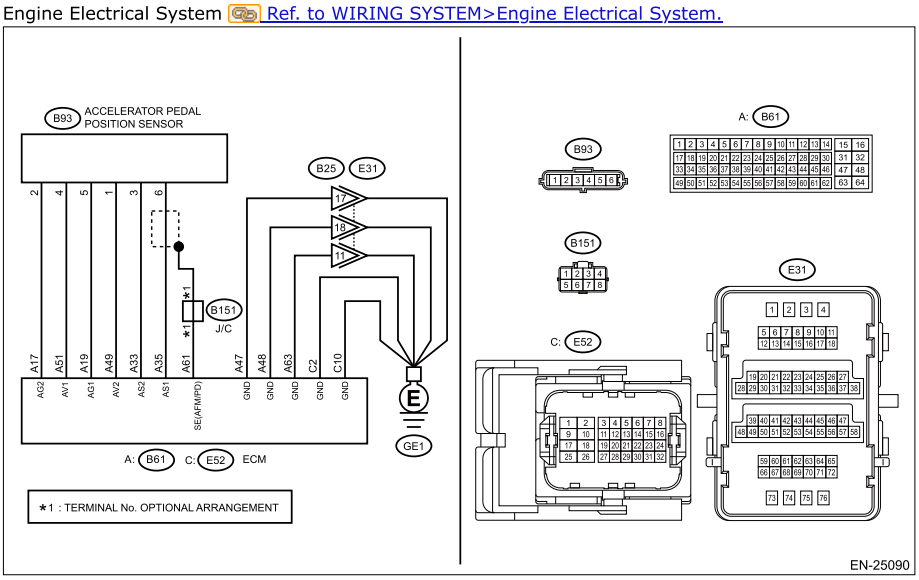
# DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

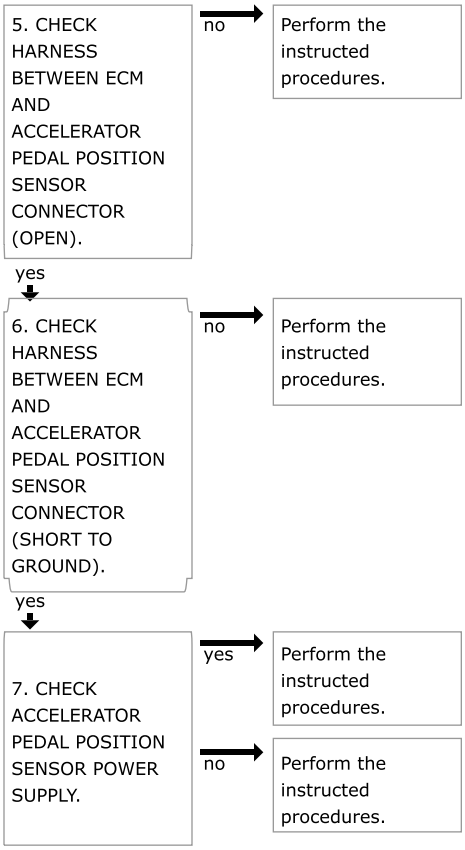
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DTC. | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 4. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Go to 5. |




**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

**2. CHECK DTC.**

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P2127 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

### 4. CHECK FOR POOR CONTACT.

1. Turn the ignition switch to OFF.
2. Check for poor contact of ECM connector and accelerator pedal position sensor connector.

Is there poor contact of ECM connector or accelerator pedal position sensor connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector or accelerator pedal position sensor connector. |
| No | Go to 5. |

### 5. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the accelerator pedal position sensor.
3. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.
   **Connector & terminal**
   (B61) No. 49 — (B93) No. 1:
   (B61) No. 33 — (B93) No. 3:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector. |

### 6. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 33 — Engine ground:
(B61) No. 49 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. |

### 7. CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 1 — Chassis ground:

Is the voltage 4.5 — 5.5 V?

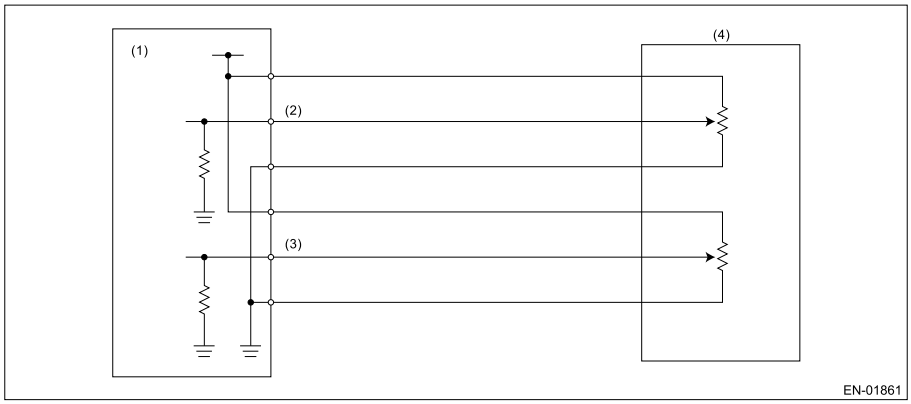
| | |
|---|---|
| Yes | Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 2 input voltage | Less than 0.338 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

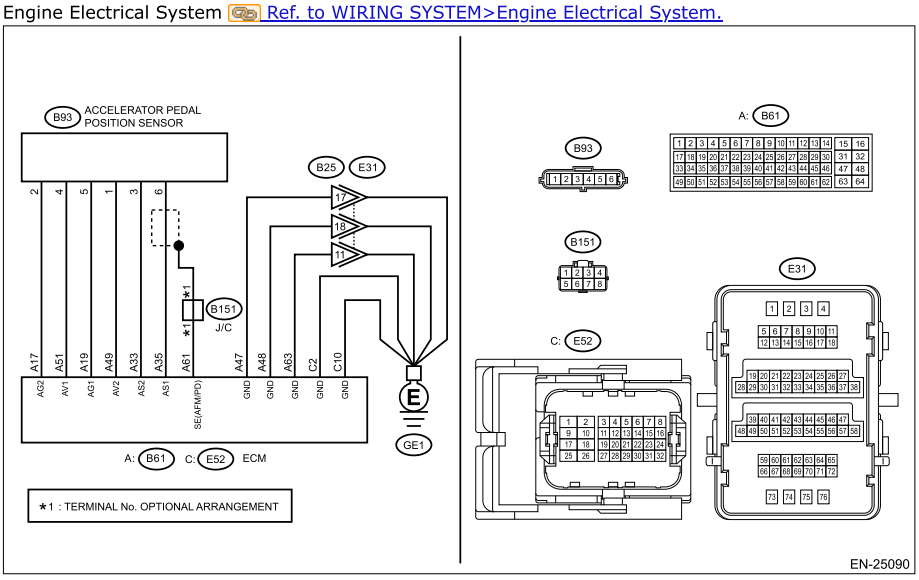
## DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.

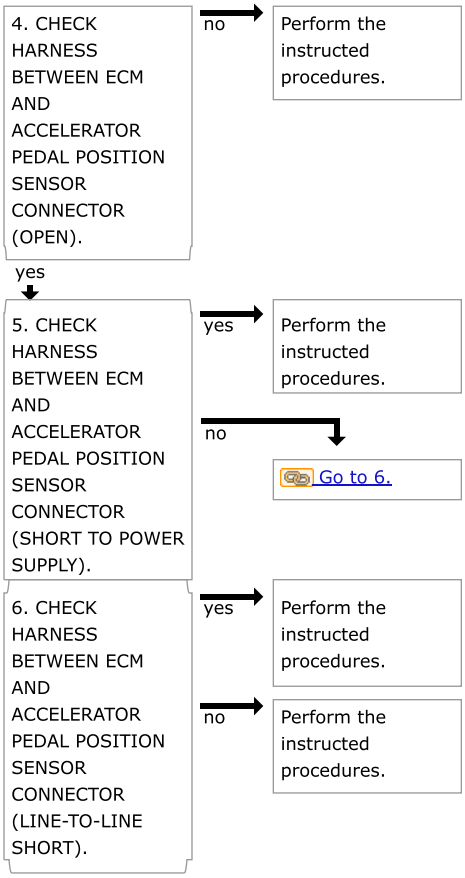



**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |

yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.
   **Connector & terminal**
   (B61) No. 17 — (B93) No. 2:
   (B61) No. 33 — (B93) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector.

### 4. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 2 — Chassis ground:

Is the resistance less than 1 Ω?

Yes — Go to 5.

No — Repair the following item.
- Open circuit in harness between ECM connector and Chassis ground
- Poor contact of ECM connector

### 5. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between accelerator pedal position sensor connector and chassis ground.
   **Connector & terminal**
   (B93) No. 3 (+) — Chassis ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

No — Go to 6.

### 6. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (LINE-TO-LINE SHORT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   **Connector & terminal**
   (B61) No. 49 — (B61) No. 33:

Is the resistance 1 MΩ or more?

Yes — Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal assembly if defective. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal.

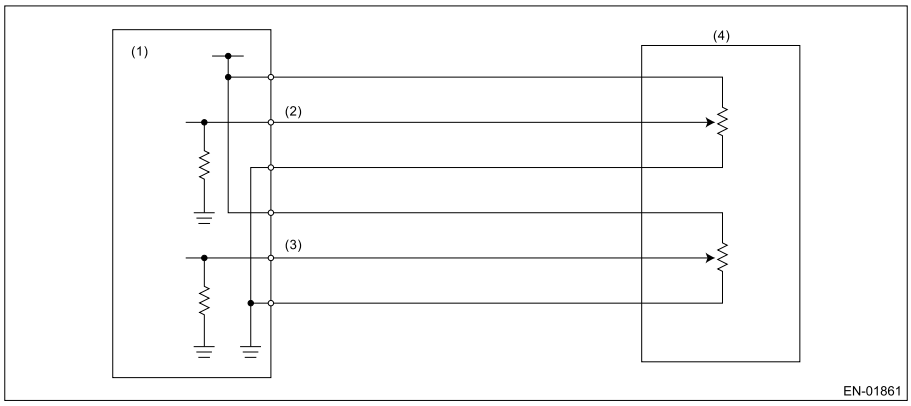
No — Repair the short circuit between lines in harness between ECM connector and accelerator pedal position sensor connector.

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect the short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

### COMPONENT DESCRIPTION




(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

### EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

### GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Sensor 2 input voltage | More than 4.755 V |

**Time needed for diagnosis:** 100 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

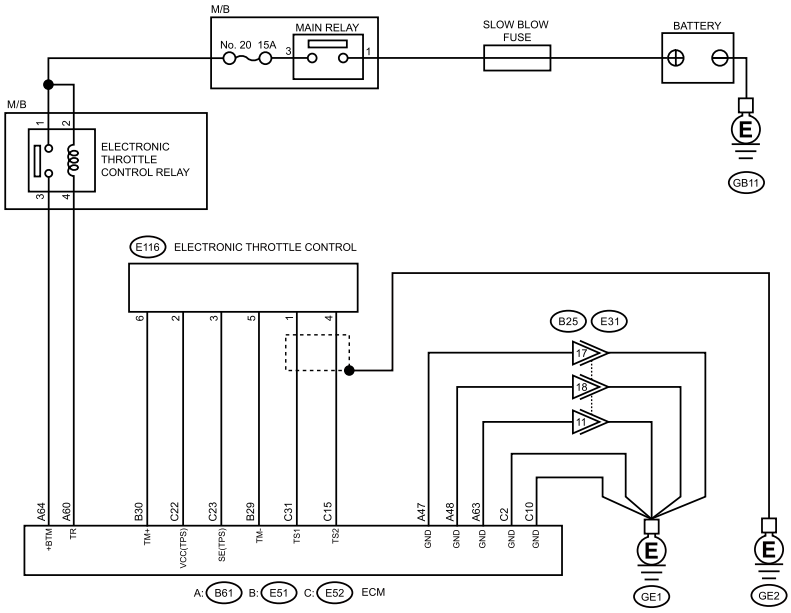
## DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION

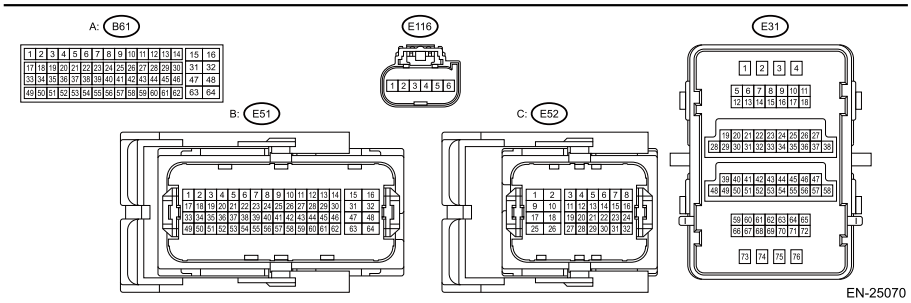
### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |

yes ↓

2. CHECK SHORT CIRCUIT INSIDE ECM (SHORT TO GROUND).
no → Perform the instructed procedures.
yes ↓

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).
no → Perform the instructed procedures.
yes ↓

5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).
yes → Perform the instructed procedures.
no → Go to 6.

6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).
yes → Perform the instructed procedures.
no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E52) No. 15 — Engine ground:
(E52) No. 22 — Engine ground:
(E52) No. 31 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 2.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

### 2. CHECK SHORT CIRCUIT INSIDE ECM (SHORT TO GROUND).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 1 — Engine ground:
   (E116) No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 3.

No — Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

### 3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   **Connector & terminal**
   (E52) No. 31 — (E116) No. 1:
   (E52) No. 23 — (E116) No. 3:
   (E52) No. 15 — (E116) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 4.

No — Repair the open circuit of harness between ECM connector and electronic throttle control connector.

### 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (OPEN).

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 5.

No — Repair the following item.
- Open circuit of harness between ECM connector and engine ground
- Poor contact of ECM connector

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   **Connector & terminal**
   (E116) No. 1 (+) — Engine ground (−):
   (E116) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes — Repair the short circuit to power supply in the harness between ECM connector and electronic throttle control connector.

No — Go to 6.

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR (SHORT BETWEEN LINES).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.

**Connector & terminal**

(E52) No. 22 — (E52) No. 15:
(E52) No. 22 — (E52) No. 31:

Is the resistance 1 MΩ or more?

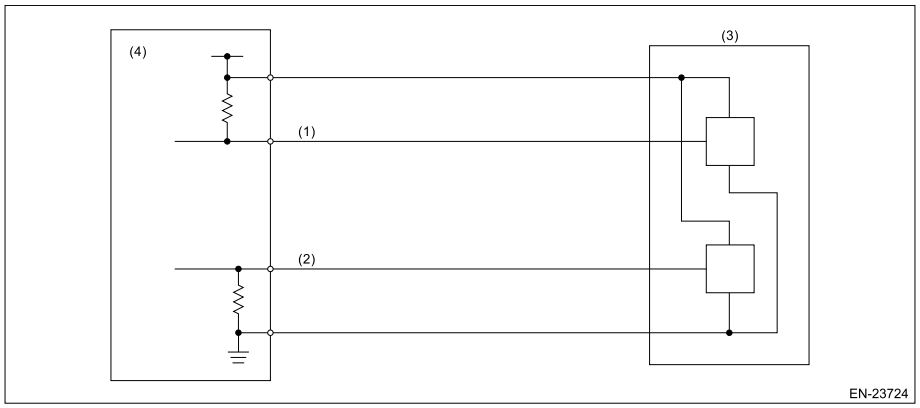
| | |
|---|---|
| Yes | Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Throttle Body. |
| No | Repair the short circuit between lines in harness between ECM connector and electronic throttle control connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

**COMPONENT DESCRIPTION**




(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \| Throttle position sensor 1 voltage − (5 V − throttle position sensor 2 voltage) \| | More than 0.79 V |

**Time needed for diagnosis:** 120 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

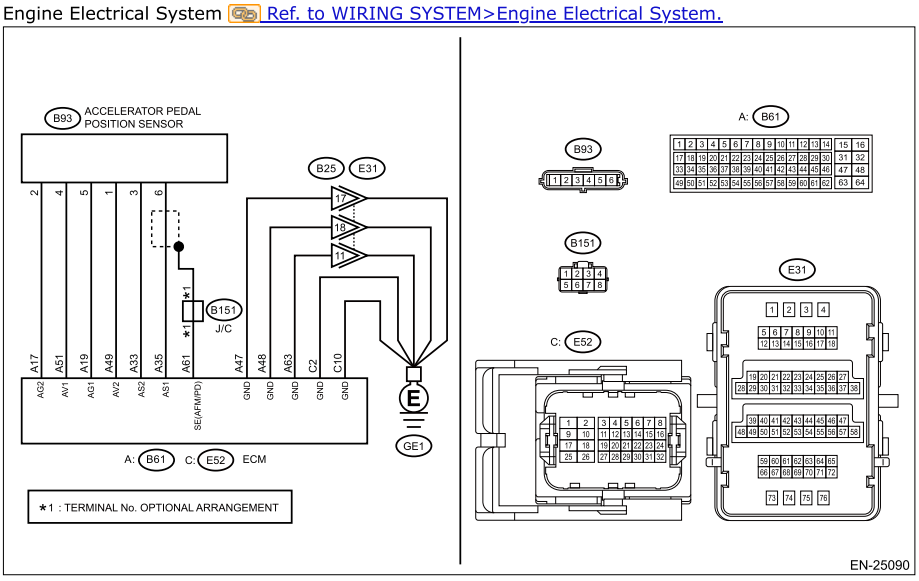
## DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**

- Improper idling
- Poor driving performance

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT. | yes | Go to 3. |
| | no | Go to 2. |
| 2. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

### 1. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   **Accelerator pedal position sensor main signal**
   (B61) No. 35 (+) — Engine ground (−):
   **Accelerator pedal position sensor sub signal**
   (B61) No. 33 (+) — Engine ground (−):

Is the difference in measured values for the accelerator pedal position sensor main signal and the accelerator pedal position sensor sub signal 0 V?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 2. |

### 2. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.

Measure the voltage between accelerator pedal position sensor connector and chassis ground.
**Connector & terminal**
(B93) No. 3 (+) — Chassis ground (−):
(B93) No. 6 (+) — Chassis ground (−):

Is the difference in measured values for the accelerator pedal position sensor main signal and the accelerator pedal position sensor sub signal 0 V?

| | |
|---|---|
| Yes | Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and accelerator pedal position sensor connector<br>• Short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector |

### 3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR (OPEN).

Measure the resistance of harness between the accelerator pedal position sensor connector and chassis ground.
**Connector & terminal**
(B93) No. 2 — Chassis ground:
(B93) No. 5 — Chassis ground:

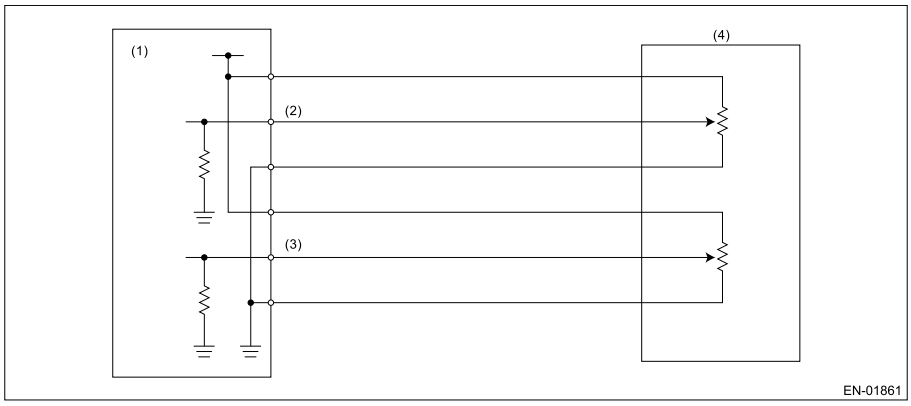
Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and accelerator pedal position sensor connector<br>• Open circuit of harness between ECM connector and engine ground |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Judge as NG when the signal level of accelerator pedal position sensor 1 is different from the accelerator pedal position sensor 2.

**COMPONENT DESCRIPTION**




(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 6 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

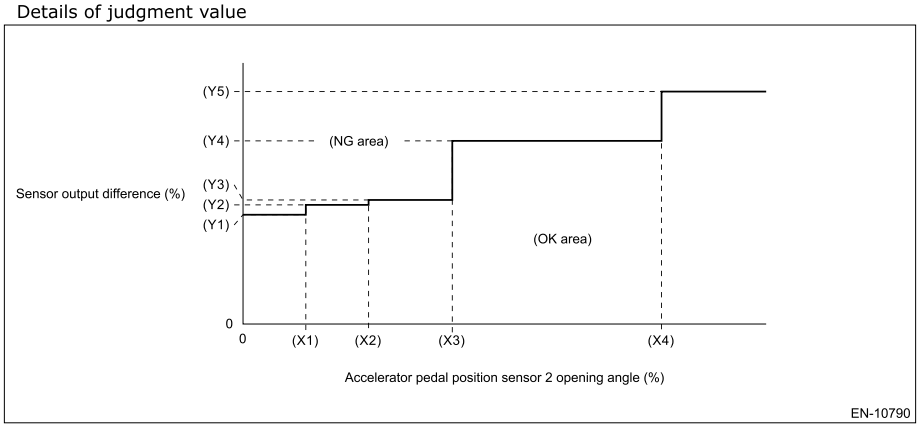
**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Signal difference between two sensors | Within NG range of Details of judgment value |

Details of judgment value



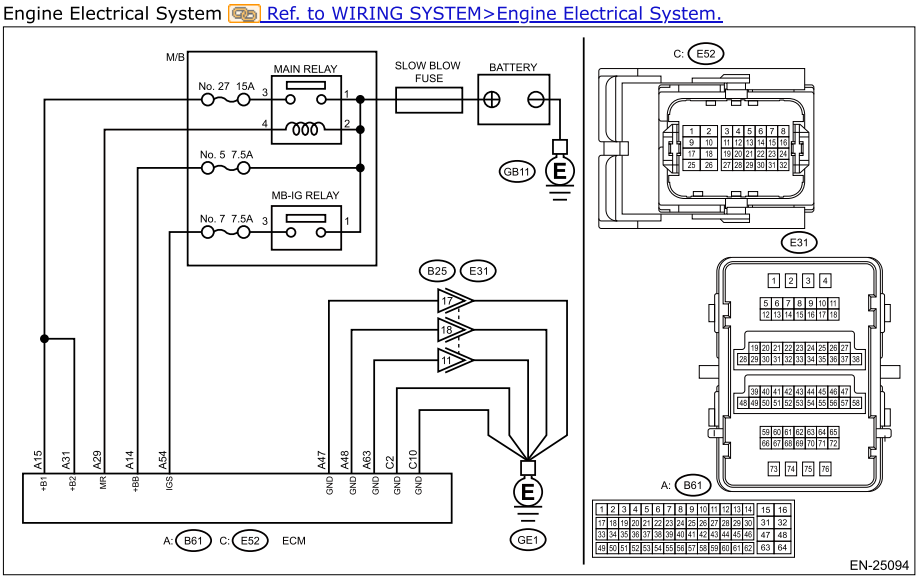

(X1) 1.82 %
(X2) 3.64 %
(X3) 6.06 %
(X4) 12.12 %
(Y1) 4.44 %
(Y2) 4.84 %
(Y3) 5.04 %
(Y4) 7.44 %
(Y5) 9.44 %

**Time needed for diagnosis:** 116 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2146 FUEL INJECTOR GROUP "A" SUPPLY VOLTAGE CIRCUIT/OPEN

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK INPUT VOLTAGE OF ECM. | no | Go to 3. |
| yes ↓ | | |
| 2. CHECK ECM CONNECTOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 3. CHECK FUSE NO. 27 (M/B). | no | Go to 5. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND M/B (SHORT TO GROUND). | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |
| 5. CHECK HARNESS BETWEEN ECM AND M/B (MAIN RELAY) (OPEN). | no | Perform the instructed procedures. |

yes

6. CHECK MAIN RELAY.

yes → Perform the instructed procedures.

no → Perform the instructed procedures.

### 1. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Go to 3.

### 2. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Connect the ECM connector correctly.

### 3. CHECK FUSE NO. 27 (M/B).

1. Turn the ignition switch to OFF.
2. Remove and check the fuse No. 27. Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.

Is the fuse blown out?

Yes — Go to 4.

No — Go to 5.

### 4. CHECK HARNESS BETWEEN ECM AND M/B (SHORT TO GROUND).

1. Disconnect the connector from ECM.
2. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 — Engine ground:
   (B61) No. 31 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the fuse.

No — Repair the short circuit to ground in harness between ECM connector and M/B.

### 5. CHECK HARNESS BETWEEN ECM AND M/B (MAIN RELAY) (OPEN).

1. Install the fuse No. 27.
2. Remove the main relay.
3. Measure the resistance of harness between ECM connector and M/B (main relay).
   **Connector & terminal**
   (B61) No. 15 — No. 3:
   (B61) No. 31 — No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Repair the open circuit of harness between ECM connector and M/B (main relay).
- Poor contact of fuse

### 6. CHECK MAIN RELAY.

Check the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Main Relay>INSPECTION.

Is the check result OK?

Yes — Repair the following item.
- Defective main relay
- Open circuit or short circuit to ground in main relay power supply circuit

No — Replace the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Main Relay.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open/short circuit of injector power supply circuit and injector booster circuit. (Diagnosis 1 and 2)
Judge as NG if voltage supplied to the injector booster circuit is abnormal. (Diagnosis 3)

**EXECUTION CONDITION**
**Diagnosis 1**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**Diagnosis 2**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage<br>Injector power supply voltage | 10.9 V or more<br>6 V or more<br>and<br>17.2 V or less |

**Diagnosis 3**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 9.44 V or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value (diagnosis 1)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Injector power supply voltage | Less than 6 V<br>Or,<br>More than 17.2 V |

**Judgment value (diagnosis 2)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Injector booster power supply voltage | Less than 5.98 V<br>Or,<br>More than 70.72 V |

**Judgment value (diagnosis 3)**

| Malfunction Criteria | Threshold Value |
|---|---|
| Input voltage of DC/DC converter | Less than 4.25 V |

**Time needed for diagnosis**

Diagnosis 1: 1000 ms
Diagnosis 2: 280 ms
Diagnosis 3: 50 times

**Map**

| Engine speed (rpm) | Time needed for 50 times of diagnosis (sec) |
|---|---|
| 500 | 3 |
| 2000 | 0.75 |
| 4000 | 0.375 |
| 6000 | 0.25 |

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2195 A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1

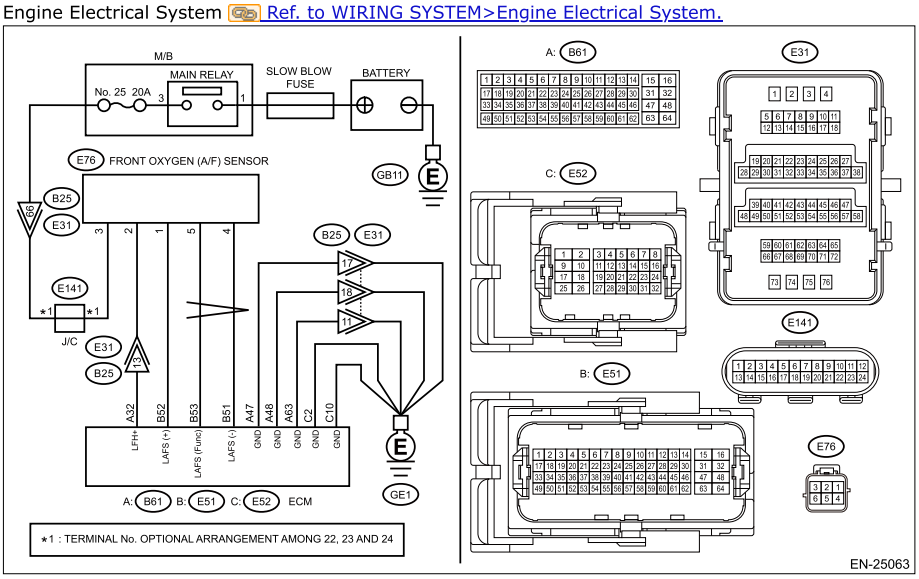
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

1. Disconnect the connector from ECM.
2. Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector. |

### 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 (+) — Engine ground (−):
(E51) No. 52 (+) — Engine ground (−):
(E51) No. 53 (+) — Engine ground (−):

Is the voltage 8 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Repair the poor contact of ECM connector. |

## GENERAL DESCRIPTION

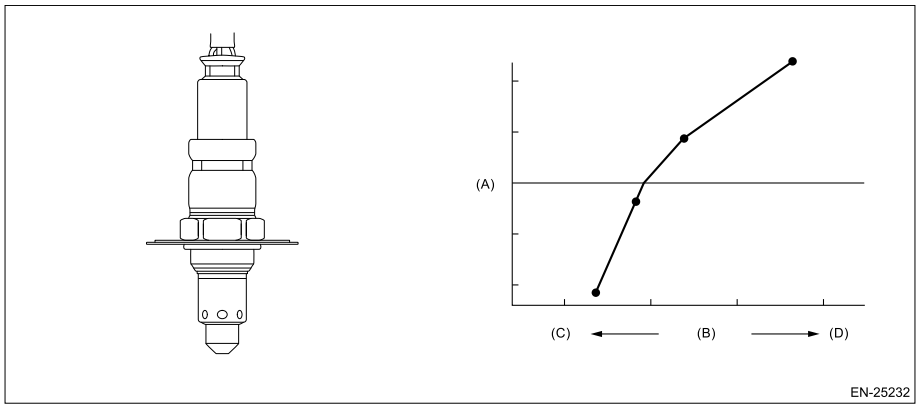
**OUTLINE OF DIAGNOSIS**

Detect that λ value remains lean.

Judge as NG when lambda value is determined as abnormal in accordance with driving conditions such as intake air amount and main feedback control, and front oxygen (A/F) sensor λ value and rear oxygen sensor voltage value.

| |
|---|
| λ value = Actual air fuel ratio/Theoretical air fuel ratio<br>λ > 1: Lean<br>λ < 1: Rich |

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Main feedback | In operation |
| Amount of intake air | 6 g/s (0.21 oz/s) or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously when the conditions are established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| λ value | More than 1.15 |
| Output voltage value of rear oxygen sensor | 0.55 V or more |

**Time needed for diagnosis:** 10 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P2196 A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1

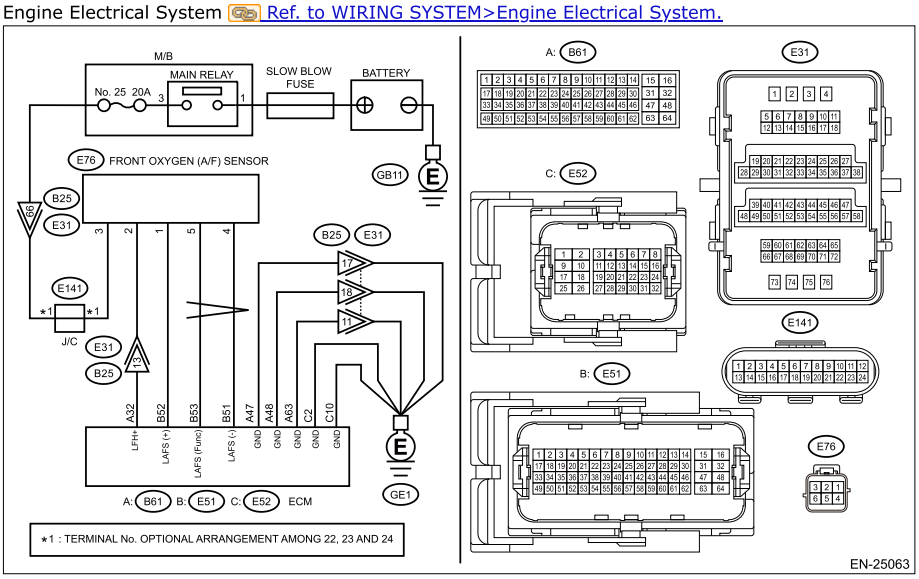
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector. |

### 3. CHECK FOR POOR CONTACT.

Check for poor contact of the front oxygen (A/F) sensor connector.

Is there poor contact of front oxygen (A/F) sensor connector?

| | |
|---|---|
| Yes | Repair the poor contact of front oxygen (A/F) sensor connector. |
| No | Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor. |

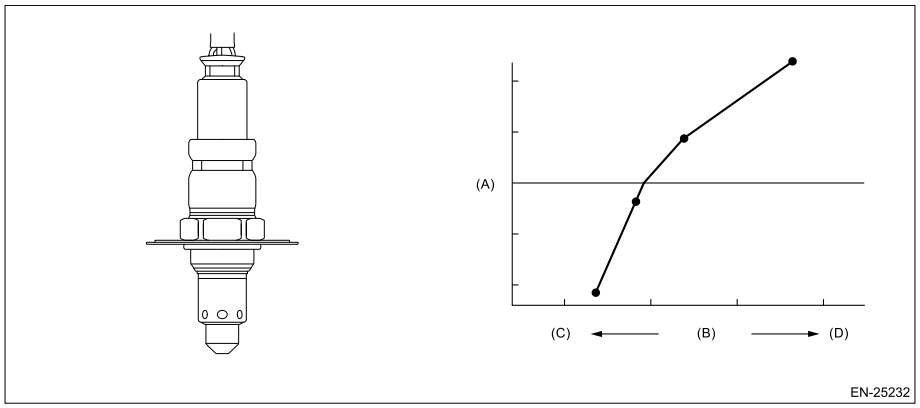
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect that λ value remains rich.
Judge as NG when lambda value is determined as abnormal in accordance with driving conditions such as intake air amount and main feedback control, and front oxygen (A/F) sensor λ value and rear oxygen sensor voltage value.

| |
|---|
| λ value = Actual air fuel ratio/Theoretical air fuel ratio<br>λ > 1: Lean<br>λ < 1: Rich |

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Main feedback | In operation |
| Amount of intake air | 6 g/s (0.21 oz/s) or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis continuously when the conditions are established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| λ value | Less than 0.85 |
| Output voltage value of rear oxygen sensor | 0.15 V or less |

**Time needed for diagnosis:** 10 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

### 1. —

**DTC detecting condition:**

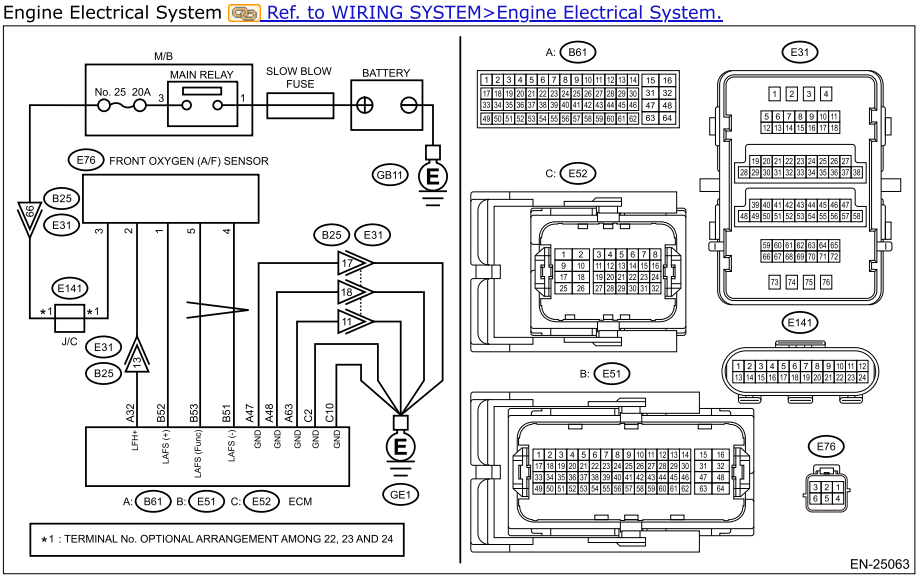
Detected when two consecutive driving cycles with fault occur.

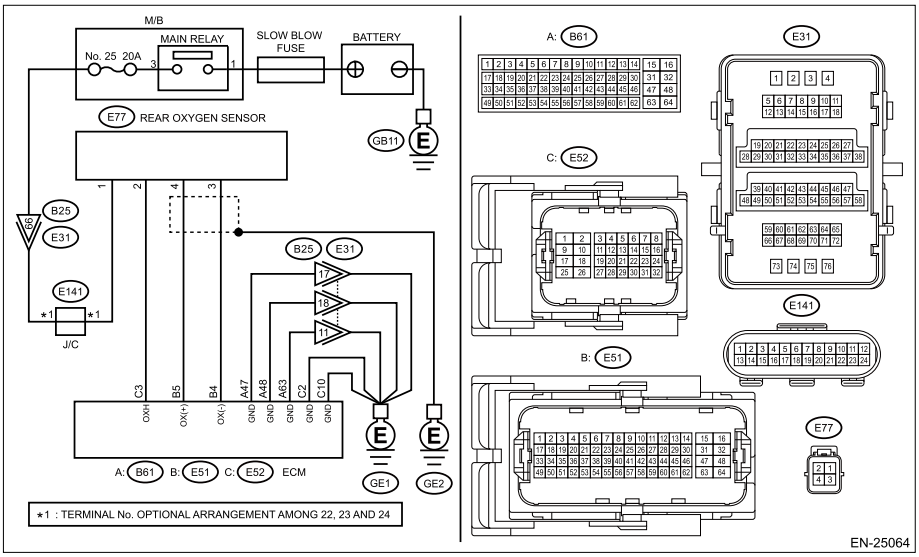
**Trouble symptom:**

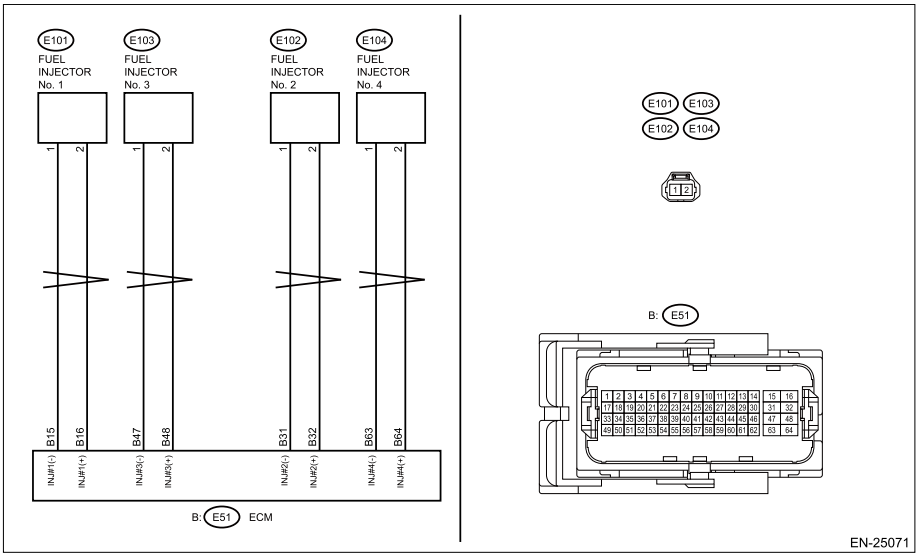
- Engine stall
- Improper idling

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.





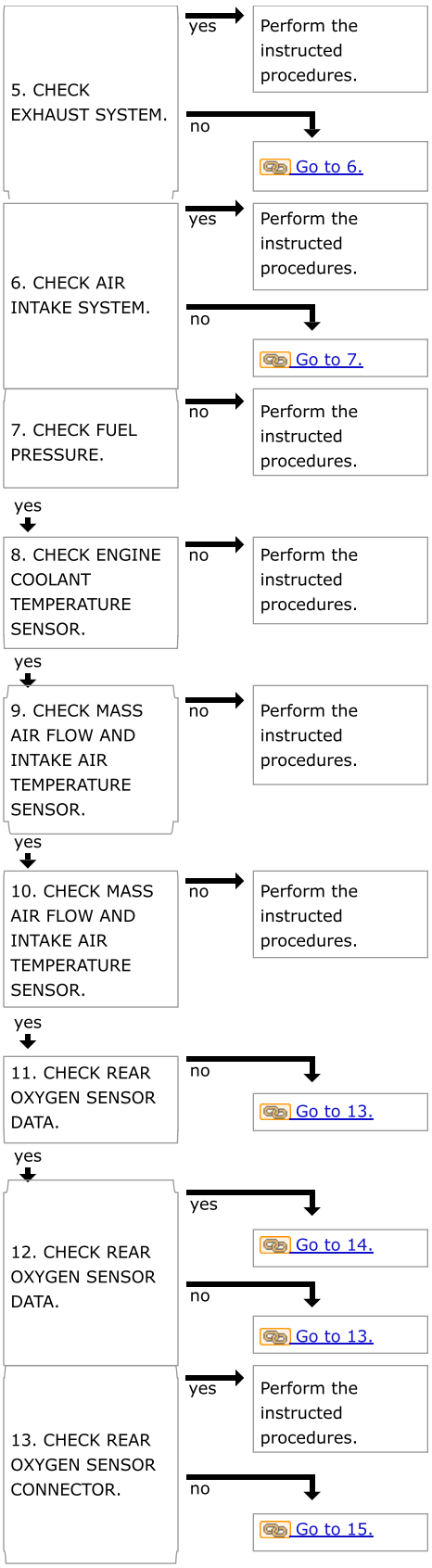

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Go to 5. |


5. CHECK EXHAUST SYSTEM.
yes
Perform the instructed procedures.
no
Go to 6.
6. CHECK AIR INTAKE SYSTEM.
yes
Perform the instructed procedures.
no
Go to 7.
7. CHECK FUEL PRESSURE.
no
Perform the instructed procedures.
yes
8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
9. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.
no
Perform the instructed procedures.
yes
11. CHECK REAR OXYGEN SENSOR DATA.
no
Go to 13.
yes
12. CHECK REAR OXYGEN SENSOR DATA.
yes
Go to 14.
no
Go to 13.
13. CHECK REAR OXYGEN SENSOR CONNECTOR.
yes
Perform the instructed procedures.
no
Go to 15.

14. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.
- yes → Perform the instructed procedures.
- no → Go to 15.

15. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.
- yes → Perform the instructed procedures.
- no → Go to 17.

17. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).
- no → Perform the instructed procedures.
- yes ↓

18. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).
- no → Perform the instructed procedures.
- yes ↓

19. CHECK FUEL INJECTOR.
- no → Perform the instructed procedures.
- yes ↓

20. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.
- yes → Perform the instructed procedures.
- no → Go to 21.

21. CHECK CRANKSHAFT POSITION SENSOR PLATE.
- yes → Perform the instructed procedures.
- no → Go to 22.

22. CHECK INSTALLATION CONDITION OF TIMING CHAIN.
- yes → Perform the instructed procedures.
- no → Go to 23.

23. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.
- no → Perform the instructed procedures.
- yes ↓

24. CHECK AIR INTAKE SYSTEM.
- yes → Perform the instructed procedures.
- no → Go to 25.

25. CHECK MISFIRE SYMPTOM.
- yes → Go to 28.
- no → Go to 26.

26. CHECK DTC.
- yes → Go to 29.
- no → Go to 27.

27. CHECK DTC.
- yes → Go to 30.
- no → Go to 31.

28. ONLY ONE CYLINDER.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

29. GROUP OF #1 AND #3 CYLINDERS.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

30. GROUP OF #2 AND #4 CYLINDERS.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

| | | |
|---|---|---|
| 31. NO SPECIFIC CYLINDER. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the front oxygen (A/F) sensor.
3. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

**Connector & terminal**

(E51) No. 52 — (E76) No. 1:
(E51) No. 51 — (E76) No. 4:
(E51) No. 53 — (E76) No. 5:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector. |

### 3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 51 — Engine ground:
(E51) No. 52 — Engine ground:
(E51) No. 53 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector. |

### 4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.

**Connector & terminal**

(E76) No. 1 (+) — Engine ground (−):
(E76) No. 4 (+) — Engine ground (−):
(E76) No. 5 (+) — Engine ground (−):

Is the voltage 8 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. |
| No | Go to 5. |

### 5. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

| | |
|---|---|
| Yes | Repair the exhaust system. |
| No | Go to 6. |

### 6. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

| | |
|---|---|
| Yes | Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description. |
| No | Go to 7. |

### 7. CHECK FUEL PRESSURE.

**Warning:**
**Place "NO OPEN FLAMES" signs near the working area.**

**Caution:**
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 8. |
| No | Check the fuel pump and fuel delivery line.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.<br>Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Delivery and Evaporation Lines>INSPECTION. |

### 8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the value in [Coolant Temp.].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Coolant Temp.] 75[°C] (167°F) or more?

Yes — Go to 9.

No — Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Coolant Temperature Sensor.

### 9. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Using the Subaru Select Monitor, read the value in [Mass Air Flow].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Mass Air Flow] 2 — 5 [g/s] (0.26 — 0.66 lb/min)?

Yes — Go to 10.

No — Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor.

### 10. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up until the engine coolant temperature exceeds 75°C (167°F).
2. For CVT models, set the select lever to "P" range or "N" range, and for MT models, place the shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Using the Subaru Select Monitor, read the value in [IAT Sensor #11].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Subtract ambient temperature from [IAT Sensor #11]. Is the obtained value −10 — 50 [°C] (−18 — 90 °F)?

Yes — Go to 11.

No — Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Mass Air Flow and Intake Air Temperature Sensor>INSPECTION.

### 11. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until the engine coolant temperature exceeds 75°C (167°F) and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.49 [V] or more?

Yes — Go to 12.

No — Go to 13.

### 12. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until the engine coolant temperature exceeds 75°C (167°F), and decrease the engine speed rapidly from 3,000 rpm.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] 0.25 [V] or less?

Yes — Go to 14.

No — Go to 13.

### 13. CHECK REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the rear oxygen sensor connector.

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 15.

### 14. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until the engine coolant temperature exceeds 75°C (167°F) and leave it at idling for 5 minutes or more.
2. Using the Subaru Select Monitor, read the value in [Oxygen sensor #12].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Oxygen sensor #12] kept at 0.25 [V] or less for 5 minutes or more?

Yes — Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Front Oxygen (A/F) Sensor.

No — Go to 15.

### 15. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 4 — (E77) No. 3:
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 16.

No — Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

### 16. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 4 (+) — Engine ground (−):

Is the voltage 0.2 — 0.5 V?

Yes — Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor.

No — Go to 17.

### 17. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.
   **Connector & terminal**
   #1 (E101) No. 1 — Engine ground:
   #1 (E101) No. 2 — Engine ground:
   #2 (E102) No. 1 — Engine ground:
   #2 (E102) No. 2 — Engine ground:
   #3 (E103) No. 1 — Engine ground:
   #3 (E103) No. 2 — Engine ground:
   #4 (E104) No. 1 — Engine ground:
   #4 (E104) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 18.

No — Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

### 18. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 19.

No — Repair the open circuit of the harness between the ECM connector and fuel injector connector.

### 19. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes — Go to 20.

No — Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector.

### 20. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR.

Check the installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes — Tighten the camshaft position sensor or crankshaft position sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Camshaft Position Sensor.
Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor.

No — Go to 21.

### 21. CHECK CRANKSHAFT POSITION SENSOR PLATE.

Check the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate>INSPECTION.

Is the crankshaft position sensor plate rusted or does it have broken teeth?

Yes — Replace the crankshaft position sensor plate. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Crankshaft Position Sensor Plate.

No — Go to 22.

## 22. CHECK INSTALLATION CONDITION OF TIMING CHAIN.

Turn the crankshaft using the Subaru ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

**Subaru ST 18252AA000 CRANKSHAFT SOCKET**

Is the timing chain dislocated from its proper position?

Yes — Correct the installation condition of timing chain. Ref. to MECHANICAL(H4DOTC)>Timing Chain Assembly.

No — Go to 23.

## 23. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
2. Start the engine, and drive the vehicle at 60 km/h (37.3 MPH) or more for 10 minutes or more.

**Warning:**
**Observe the traffic law on the public road and prioritize safety driving.**

**Note:**
**Refill the fuel before driving so that the fuel level meter indicates above "Lower" level.**

Does the malfunction indicator light illuminate or blink?

Yes — Go to 24.

No — Repair the following item.
- Poor contact of ignition coil connector
- Poor contact of fuel injector connector on faulty cylinders
- Poor contact of ECM connector

## 24. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Is there any fault in air intake system?

Yes — Repair the air intake system. Ref. to INTAKE (INDUCTION)(H4DOTC)>General Description.

**Note:**
**Check the following items.**
- **Air leak or air suction due to looseness of installation**
- **Cracking or drop-off of hose**

No — Go to 25.

## 25. CHECK MISFIRE SYMPTOM.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is there only one DTC displayed? (Current code)

Yes — Go to 28.

No — Go to 26.

### 26. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs P0301 and P0303 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 29. |
| No | Go to 27. |

### 27. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are DTCs P0302 and P0304 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 30. |
| No | Go to 31. |

### 28. ONLY ONE CYLINDER.

Check the following items for the relevant cylinder.
- Spark plug
- Ignition coil
- Fuel injector
- Compression pressure

Is there any fault in the relevant cylinder?

| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1. |

### 29. GROUP OF #1 AND #3 CYLINDERS.

Check the following items for the bank RH (cylinder #1, #3).
- Spark plug
- Ignition coil
- Fuel injector
- Compression pressure
- Skipping timing chain teeth

Are there any faults in #1 and #3 cylinders?

| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1. |

### 30. GROUP OF #2 AND #4 CYLINDERS.

Check the following items for the bank LH (cylinder #2, #4).
- Spark plug
- Ignition coil
- Fuel injector
- Compression pressure
- Skipping timing chain teeth

Are there any faults in #2 and #4 cylinders?

| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1. |

### 31. NO SPECIFIC CYLINDER.

1. Start the engine.
2. Check the idling.

Is the engine idle rough?

| | |
|---|---|
| Yes | Check for DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.** |

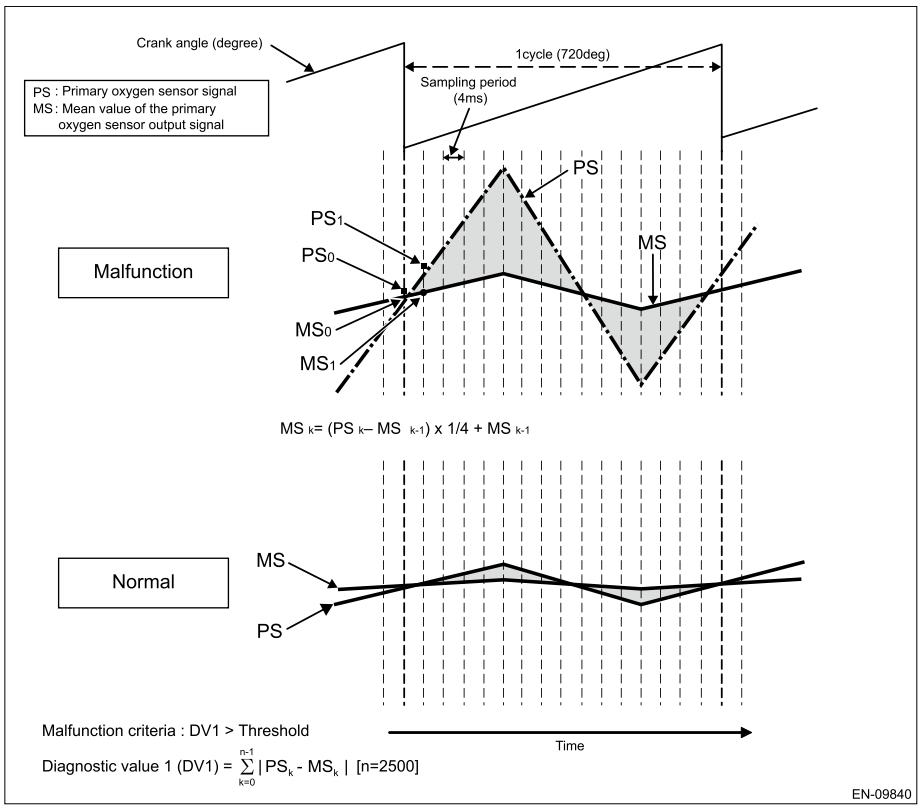
## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

This diagnostic monitor performs a functional check of the fuel system to determine an air-fuel ratio cylinder imbalance.
This diagnosis is composed of two monitors.
The outline of "monitor A1" is as follows. When an air-fuel ratio cylinder imbalance occurs, the primary oxygen sensor output signal will oscillate with increased amplitude. This monitor utilizes this behavior to make a diagnosis. The monitor integrates the difference between the amplification value and the mean value of the first oxygen sensor output signal and compares it to a threshold to make a judgment.
The outline of "monitor B1" is as follows. Similarly, when an imbalance occurs, the engine speed also fluctuates with increased amplitude. This monitor utilizes this behavior to make a diagnosis. For reference, it should be noted that this imbalance monitor method is actually similar to the current misfire diagnostic monitor, and the parameter "domg360" (units: degrees CA) is shared between the imbalance and misfire monitors. The imbalance monitor is performed during idle condition when the engine is warm. The monitor integrates the count of "domg360" which exceeds a threshold in 1000 revolution. When both the "monitor A1" value and the "monitor B1" value exceed a predetermined threshold, this monitor determines a malfunction and stores a fault code.

**<Monitor A1>**

When there is an air-fuel ratio cylinder imbalance malfunction, the primary oxygen sensor output fluctuates widely compared with a normal sensor, as shown by the chain line in Figure 1 below. This monitor makes a diagnosis based on this phenomenon. Each primary oxygen sensor signal (PS) and mean value of the primary oxygen sensor signal (MS) is calculated from the primary oxygen sensor signal. The absolute values of (PS - MS) are sampled every 4 ms as shown in the figure. Diagnostic value 1 (DV1) is obtained by integrating the absolute value of (PS - MS) for 2500 times. A malfunction is determined when DV1 exceeds the threshold. The judgment values are determined experimentally.
Figure 1. Compare malfunctioned primary oxygen sensor output with a normal sensor



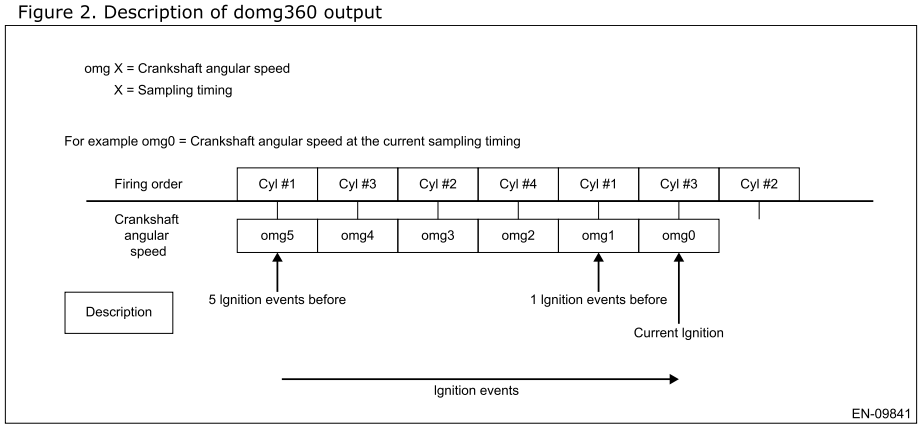

**<Monitor B1>**

**Method used:** Difference method of 360 degrees CA

**Monitor value:** domg360 = (omg 1 − omg 0) − (omg 3 − omg 2) = angular speed

Each crankshaft angular speed is defined as Figure 2 below.

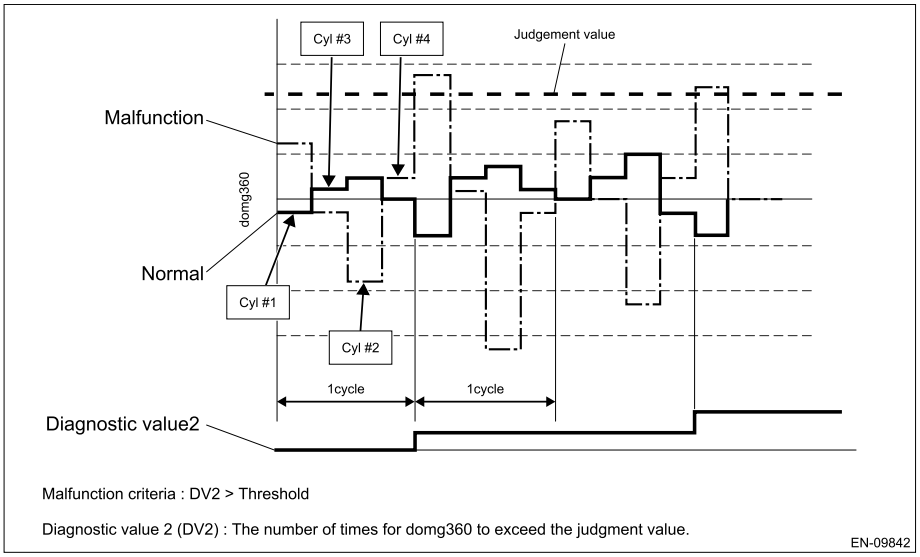
Figure 2. Description of domg360 output




This method uses the fact that the domg360 of lean conditioned cylinder caused by imbalance malfunction indicates big value, as shown by the chain line in Figure 3 below.

The number of times for domg360 to exceed the judgment value in 1000 revolutions (500 cycles) is calculated as diagnostic value 2 (DV2). A malfunction is determined when DV2 exceeds the threshold.

Figure 3. Compare malfunctioned domg360 output with a normal output




**EXECUTION CONDITION**

**Monitor A1: Primary oxygen sensor fluctuation**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Barometric pressure | 75.06 kPa (563.1 mmHg, 22.2 inHg) or more |
| Main feedback | In operation |
| Engine speed | More than 1500 rpm and Less than 4000 rpm |
| Charging efficiency | More than 70 air mass % |
| Time when not under catalyst neutralization control and not in slow changing condition | 500 ms or more |

**Monitor B1: Crankshaft speed fluctuation**

| Secondary parameters | Execution condition |
|---|---|
| Misfiring diagnosis monitoring | In operation |
| Accelerator pedal position | Not equal to 0% |
| Engine speed | More than 1500 rpm and Less than 4000 rpm |
| Charging efficiency | More than 70 air mass % |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

Judge as NG when Monitor A1 and Monitor B1 are both NG, and when either is OK, judge as OK.

Judgment value

Judge as NG when the following conditions are established.

**Monitor A1**

| Malfunction Criteria | Threshold Value |
|---|---|
| Diagnostic value 1 (DV1) | More than Map |

Threshold value 1 (TV1):

$$\sum_{k=0}^{n-1} Map_k \quad [n=2500]$$

EN-09888

**Map (Lean side)**

| | | Charging efficiency (air mass %) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **70** | **80** | **90** | **100** | **110** | **120** | **140** | **160** |
| Engine speed | 1500 | 0.013 | 0.014 | 0.017 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 |

| | | Charging efficiency (air mass %) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 70 | 80 | 90 | 100 | 110 | 120 | 140 | 160 |
| (rpm) | 2000 | 0.007 | 0.01 | 0.013 | 0.017 | 0.03 | 0.026 | 0.026 | 0.026 |
| | 2500 | 0.009 | 0.013 | 0.016 | 0.022 | 0.028 | 0.047 | 0.047 | 0.047 |
| | 3000 | 0.016 | 0.021 | 0.028 | 0.029 | 0.03 | 0.035 | 0.035 | 0.035 |
| | 3500 | 0.012 | 0.018 | 0.023 | 0.025 | 0.03 | 0.03 | 0.03 | 0.03 |
| | 4000 | 0.014 | 0.016 | 0.023 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 |

**Map (Rich side)**

| | | Charging efficiency (air mass %) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 70 | 80 | 90 | 100 | 110 | 120 | 140 | 160 |
| Engine speed (rpm) | 1500 | 0.022 | 0.02 | 0.028 | 0.028 | 0.028 | 0.028 | 0.028 | 0.028 |
| | 2000 | 0.011 | 0.022 | 0.028 | 0.039 | 0.036 | 0.033 | 0.033 | 0.033 |
| | 2500 | 0.018 | 0.025 | 0.038 | 0.046 | 0.056 | 0.058 | 0.058 | 0.058 |
| | 3000 | 0.025 | 0.043 | 0.052 | 0.057 | 0.066 | 0.067 | 0.067 | 0.067 |
| | 3500 | 0.031 | 0.035 | 0.041 | 0.051 | 0.056 | 0.056 | 0.056 | 0.056 |
| | 4000 | 0.032 | 0.037 | 0.045 | 0.059 | 0.059 | 0.059 | 0.059 | 0.059 |

**Monitor B1**

| Malfunction Criteria | Threshold Value |
|---|---|
| Diagnostic Value2 (DV2)<br>(Lean side)<br>(Rich side) | <br>More than 80 times<br>More than 40 times |

**Time needed for diagnosis**
**Monitor A1:** 4.8 s
**Monitor B1:** 1000 engine revs
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P2226 BAROMETRIC PRESSURE SENSOR “A“ CIRCUIT

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2226 displayed? (Current code)

Yes — Check the appropriate DTC using the “Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

**Note:**
**The barometric pressure sensor is built into the ECM.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect communication error between CPU and the barometric pressure sensor.
Judge as NG when communication error occurs.

**COMPONENT DESCRIPTION**
The barometric pressure sensor is built into the ECM.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Communication data between CPU and the barometric pressure sensor | Different from expected value |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P2227 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes | Perform the instructed procedures. |
| | no | Go to 2. |
| 2. CHECK DATA MONITOR. | yes | Perform the instructed procedures. |
| | no | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2227 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Go to 2. |

### 2. CHECK DATA MONITOR.

Using the Subaru Select Monitor, read the values of [Atmosphere Pressure] and [Mani. Absolute Pressure] to compare with actual atmospheric pressure.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the difference with the actual atmospheric pressure 8 [kPa] (60 mmHg, 2.4 inHg) or more?

Yes

Replace the part that showed larger deviation from the actual atmospheric pressure than the other.

- If deviations in value for [Atmosphere Pressure] is larger: Replace ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

  **Note:**
  **The barometric pressure sensor is built into the ECM.**
- If deviations in value for [Mani. Absolute Pressure] is larger: Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor.

No

Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the malfunction of barometric pressure sensor output property.
Judge as NG when the barometric pressure sensor output value is largely different from the intake manifold pressure at engine start.

**COMPONENT DESCRIPTION**

The barometric pressure sensor is built into the ECM.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Soaking time | 60 s or more |
| Elapsed time after ignition switch is turned to ON | Less than 60 s |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once at ignition switch ON.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|Barometric pressure − Intake manifold pressure at start\| | 12.12 kPa (90.9 mmHg, 3.6 inHg) or more |

**Time needed for diagnosis:** Less than 1 s
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P2228 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT LOW

### 1. —

**DTC detecting condition:**

Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2228 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). **Note:** **The barometric pressure sensor is built into the ECM.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open/short circuit of the barometric pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**
The barometric pressure sensor is built into the ECM.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Barometric pressure | Less than 52.825 kPa (396.3 mmHg, 15.6 inHg) |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P2229 BAROMETRIC PRESSURE SENSOR "A" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2229 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

**Note:**
**The barometric pressure sensor is built into the ECM.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open/short circuit of the barometric pressure sensor.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**
The barometric pressure sensor is built into the ECM.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Barometric pressure | More than 107.925 kPa (809.6 mmHg, 31.9 inHg) |

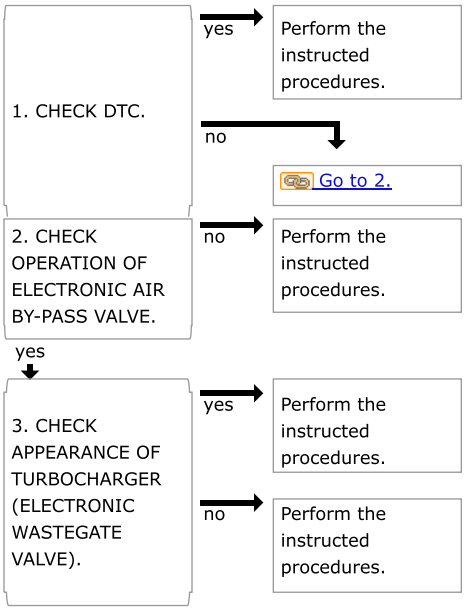
**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

# DTC P226B TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL

## 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Poor driving performance

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P226B displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK OPERATION OF ELECTRONIC AIR BY-PASS VALVE.

1. Using the Subaru Select Monitor, select [Electric Waste Gate Valve Control] of [Active Test].
   **Note:**
   - **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**
   - **Electronic wastegate valve actuator repeats open and closed every 3 seconds with [Electric Waste Gate Valve Control] selected.**
2. Check if operating sound (clatter) occurs in the electronic wastegate valve according to ON/OFF switching operation of [Electric Waste Gate Valve Control].

Is the check result OK?

Yes — Go to 3.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

### 3. CHECK APPEARANCE OF TURBOCHARGER (ELECTRONIC WASTEGATE VALVE).

1. Turn the ignition switch to OFF.
2. Remove the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.
3. Check the appearance of turbocharger to make sure that there is no foreign matter pinched in the electronic wastegate valve.

**Caution:**
**Do not remove the electronic air by-pass valve and electronic wastegate valve since they are non-disassembled parts.**

Is the check result OK?

| | |
|---|---|
| Yes | Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger. |
| No | Remove the foreign matters from the turbocharger. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Judge as NG when becoming high boost pressure.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Intake manifold pressure | Value of Map or more |

**Map**

| | | Atmospheric pressure (kPa (mmHg, inHg)) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 70 (525.1, 20.7) | 75 (562.6, 22.2) | 80 (600.2, 23.6) | 85 (637.7, 25.1) | 90 (675.2, 26.6) | 92.5 (693.9, 27.3) | 95 (712.7, 28.1) | 97.5 (731.4, 28.8) |
| Engine speed (rpm) | 2000 | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) |
| | 2400 | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) |
| | 2800 | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) |
| | 3200 | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) |
| | 3600 | 185.1 (1388.6, 54.7) | 189.3 (1420.1, 55.9) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) | 189.7 (1423.1, 56) |
| | 4000 | 168.4 (1263.3, 49.7) | 189.7 (1423.1, 56) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) | 191.7 (1438.1, 56.6) |
| | 4400 | 173.9 (1304.6, 51.4) | 188.7 (1415.6, 55.7) | 195.5 (1466.6, 57.7) | 196.7 (1475.6, 58.1) | 196.7 (1475.6, 58.1) | 196.7 (1475.6, 58.1) | 196.7 (1475.6, 58.1) | 196.7 (1475.6, 58.1) |
| | 4800 | 168.8 (1266.3, 49.9) | 179.1 (1343.6, 52.9) | 189.3 (1420.1, 55.9) | 201.7 (1513.1, 59.6) | 201.7 (1513.1, 59.6) | 201.7 (1513.1, 59.6) | 201.7 (1513.1, 59.6) | 201.7 (1513.1, 59.6) |
| | 5200 | 171 (1282.8, 50.5) | 182 (1365.3, 53.8) | 195.2 (1464.4, 57.7) | 206.1 (1546.1, 60.9) | 212.7 (1595.6, 62.8) | 212.7 (1595.6, 62.8) | 212.7 (1595.6, 62.8) | 212.7 (1595.6, 62.8) |
| | 5600 | 167.5 (1256.6, 49.5) | 180.7 (1355.6, 53.4) | 191.7 (1438.1, 56.6) | 200.5 (1504.1, 59.2) | 202.7 (1520.6, 59.9) | 207.1 (1553.6, 61.2) | 213.7 (1603.2, 63.1) | 213.7 (1603.2, 63.1) |

| | Atmospheric pressure (kPa (mmHg, inHg)) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **70 (525.1, 20.7)** | **75 (562.6, 22.2)** | **80 (600.2, 23.6)** | **85 (637.7, 25.1)** | **90 (675.2, 26.6)** | **92.5 (693.9, 27.3)** | **95 (712.7, 28.1)** | **97.5 (731.4, 28.8)** |
| | (kPa (mmHg, inHg)) | | | | | | | |

**Note:**
**Map shows the values when intake temperature is at 25°C (77°F)**

**Time needed for diagnosis:** 2000 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2

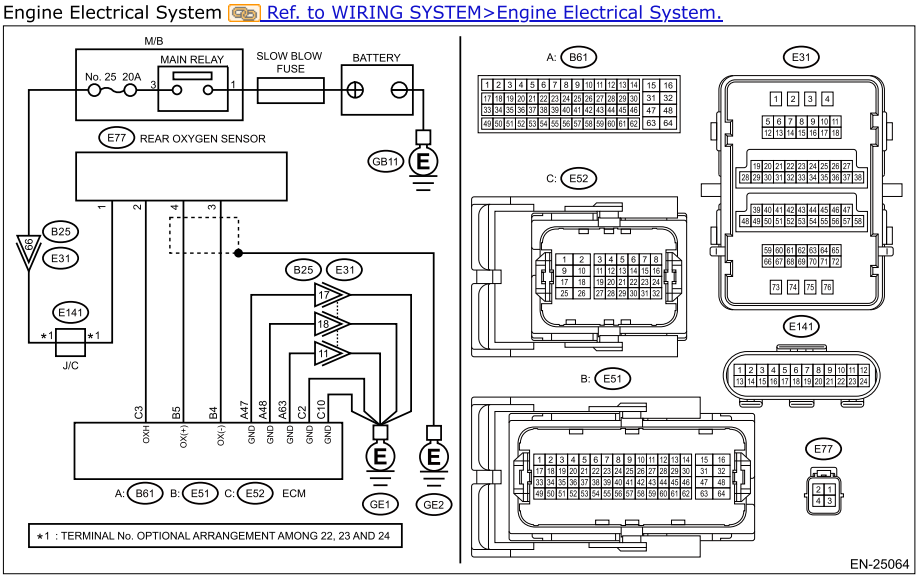
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK REAR OXYGEN SENSOR CONNECTOR. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |

| | | |
|---|---|---|
| 4. CHECK EXHAUST SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the rear oxygen sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the rear oxygen sensor.
3. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   **Connector & terminal**
   (E51) No. 4 — (E77) No. 3:
   (E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and rear oxygen sensor connector. |

### 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.
   **Connector & terminal**
   (E77) No. 3 (+) — Engine ground (−):

Is the voltage 2 V or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). |

### 4. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

**Note:**
**Check the following items.**
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Damage (crack, hole etc.) of front oxygen (A/F) sensor or rear oxygen sensor**

Is there any fault in exhaust system?

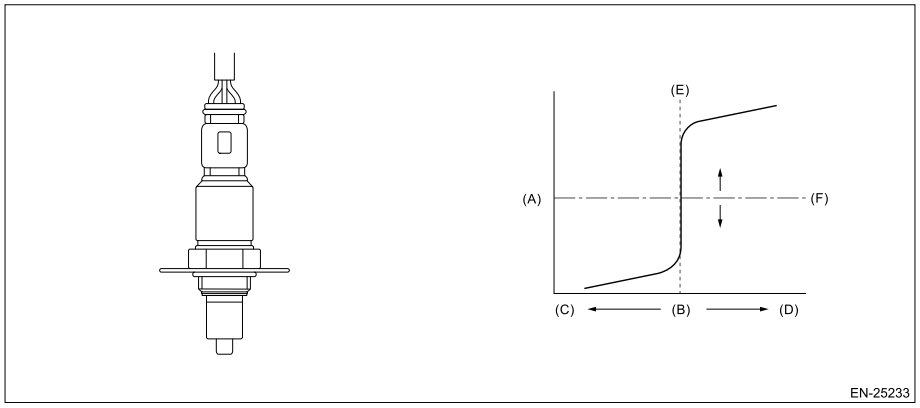
| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the stuck of rear oxygen sensor voltage in lean state.
When rear oxygen sensor voltage remains below the threshold value for predetermined time, diagnosis interrupts target air fuel ratio for control and raises output voltage.
Judge as NG detecting the stuck in lean state when rear oxygen sensor voltage remains below the threshold value even after the interrupt control.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Sub feedback | In operation |
| Amount of intake air | 10 g/s (0.35 oz/s) or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (932°F) or more |
| Enable conditions at interrupt control are as follows | |
| Continuous time when rear oxygen sensor output voltage is less than 0.55 V | 5000 ms or more |
| Air fuel ratio reduced from target air fuel ratio | 8% |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage of rear oxygen sensor | Less than 0.55 V |

**Time needed for diagnosis:** 13 s

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2

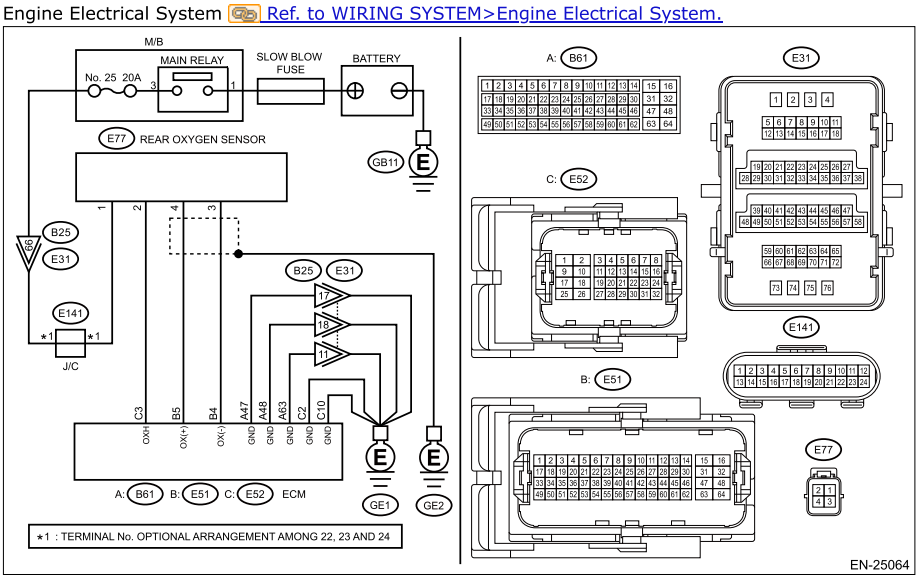
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK REAR OXYGEN SENSOR CONNECTOR.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND).
   - no → Perform the instructed procedures.
   - yes ↓

| | | |
|---|---|---|
| 4. CHECK EXHAUST SYSTEM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Check the rear oxygen sensor connector.

Has water entered the connector?

| | |
|---|---|
| Yes | Completely remove any water inside. |
| No | Go to 2. |

### 2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the connector from the rear oxygen sensor.
3. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.

**Connector & terminal**

(E51) No. 4 — (E77) No. 3:

(E51) No. 5 — (E77) No. 4:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the open circuit of harness between ECM connector and rear oxygen sensor connector. |

### 3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(E51) No. 5 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector. |

### 4. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

**Note:**
**Check the following items.**
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Damage (crack, hole etc.) of front oxygen (A/F) sensor or rear oxygen sensor**

Is there any fault in exhaust system?

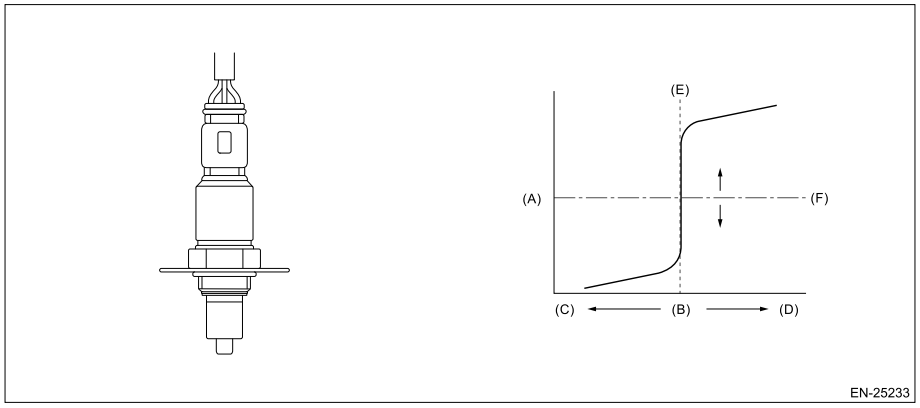
| | |
|---|---|
| Yes | Repair or replace faulty parts. |
| No | Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Rear Oxygen Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the stuck of rear oxygen sensor voltage in rich state.
Detect the stuck in rich state and judge as NG if rear oxygen sensor voltage remains above the threshold value for predetermined time.

**COMPONENT DESCRIPTION**




(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Time while the fuel shut-off function is in operation | 5000 ms or more |
| Estimated temperature of the rear oxygen sensor element | 450°C (842°F) or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis only once after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

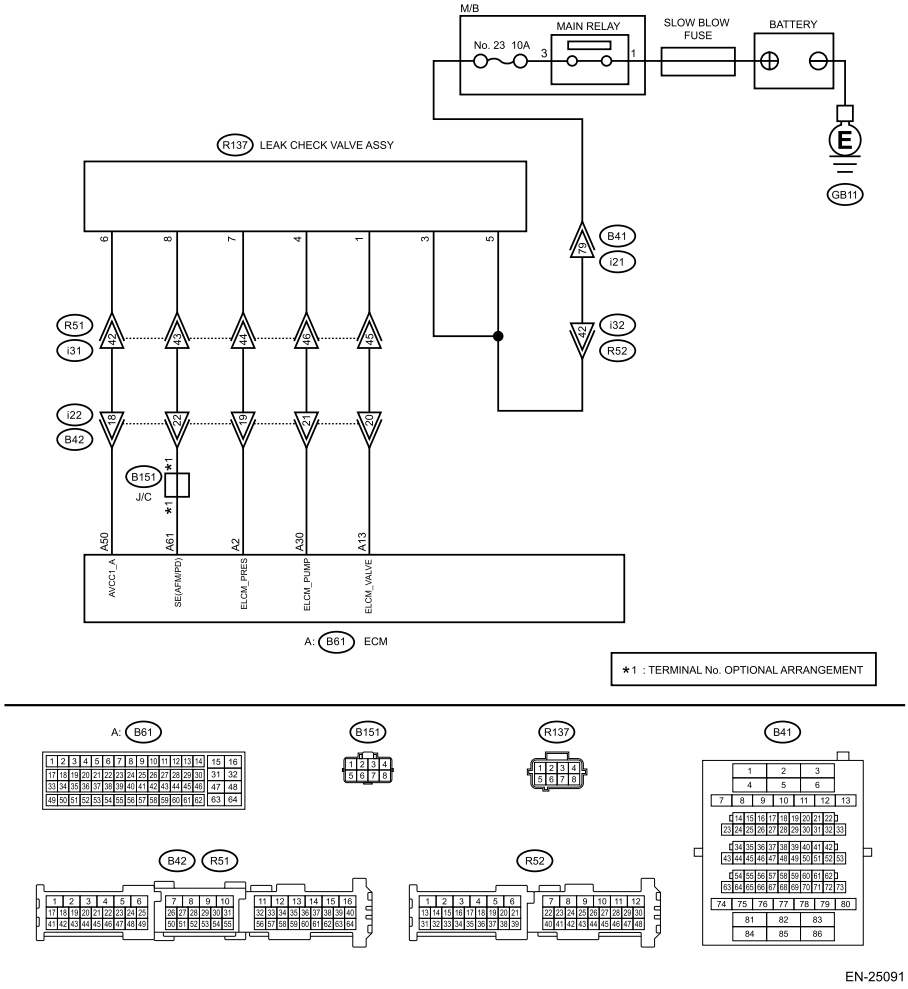
| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage of rear oxygen sensor | More than 0.15 V |

**Time needed for diagnosis:** 500 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P2401 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.
- no → Go to 3.
- yes →

2. CHECK FOR POOR CONTACT.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY. → no → Perform the instructed procedures.

yes ↓

4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND). → no → Perform the instructed procedures.

yes ↓

5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN). → no → Perform the instructed procedures.

yes ↓

6. CHECK LEAK CHECK VALVE ASSEMBLY.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 30 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Go to 3. |

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

### 3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

Measure the voltage between the leak check valve assembly connector and chassis ground.
**Connector & terminal**
(R137) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between M/B and the leak check valve assembly connector
- Poor contact of coupling connector
- Blown out of fuse

### 4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance between leak check valve assembly and chassis ground.
   **Connector & terminal**
   (R137) No. 4 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Go to 5.

No — Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

### 5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
**Connector & terminal**
(B61) No. 30 — (R137) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of coupling connector

### 6. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the vacuum pump of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Is the check result OK?

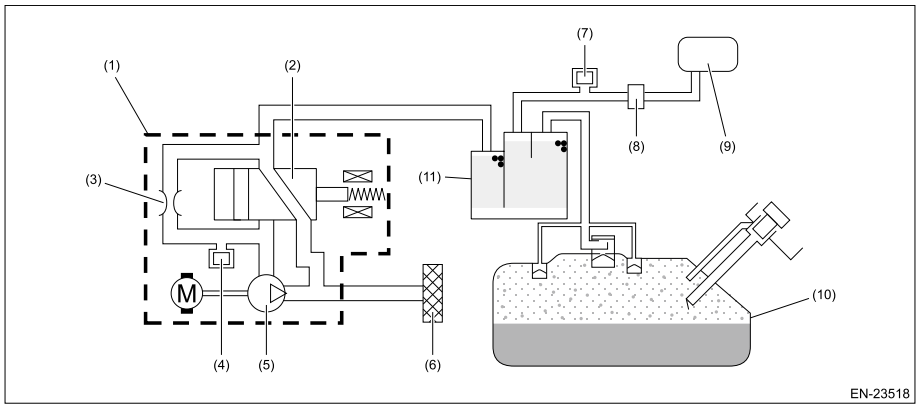
Yes — Repair the poor contact in the leak check valve assembly connector.

No — Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of the vacuum pump in leak check valve assembly.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Vacuum pump drive signal in the leak check valve assembly | OFF |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | 1.9 V or less |
| Or, | |
| Output voltage<br>Output current | More than 2.3 V<br>Less than 0.03 mA |

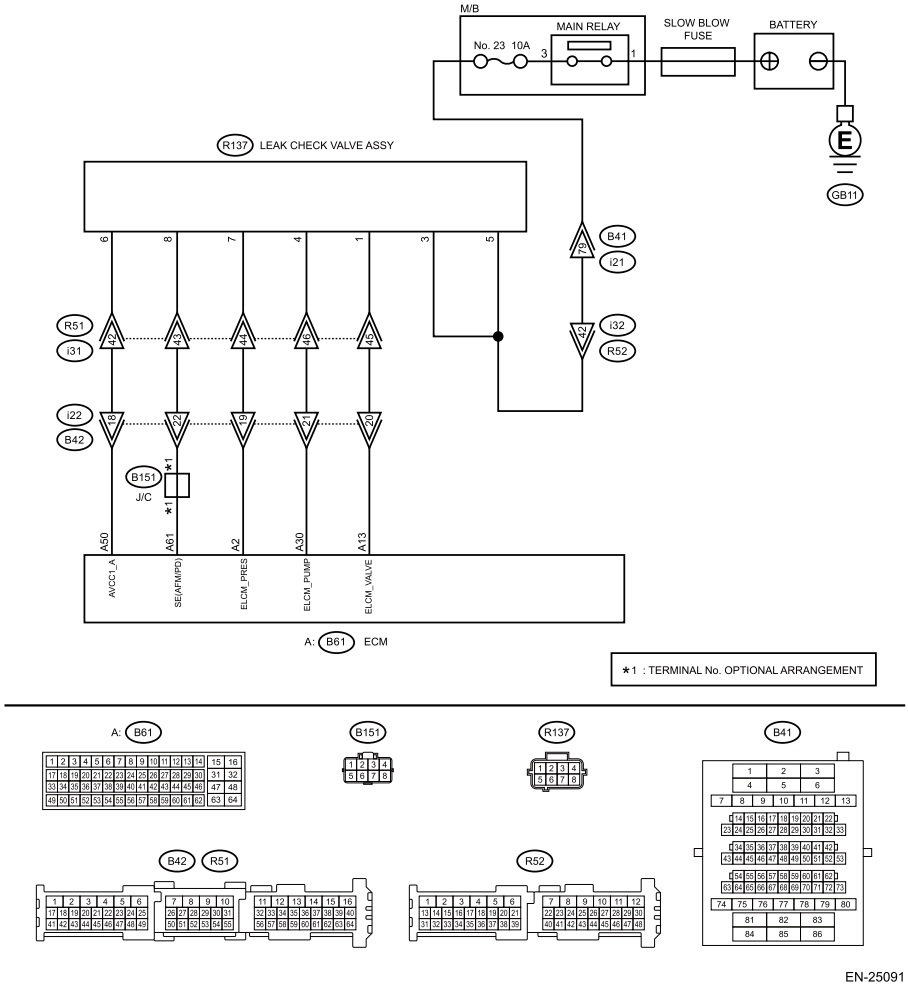
**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2402 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




EN-25091

**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO POWER SUPPLY). | yes | Perform the instructed procedures. |
| | no | Go to 2. |

| | | |
|---|---|---|
| 2. CHECK LEAK CHECK VALVE ASSEMBLY. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   **Connector & terminal**
   (R137) No. 4 (+) — Chassis ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector. |
| No | Go to 2. |

### 2. CHECK LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Check the vacuum pump of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Is the check result OK?

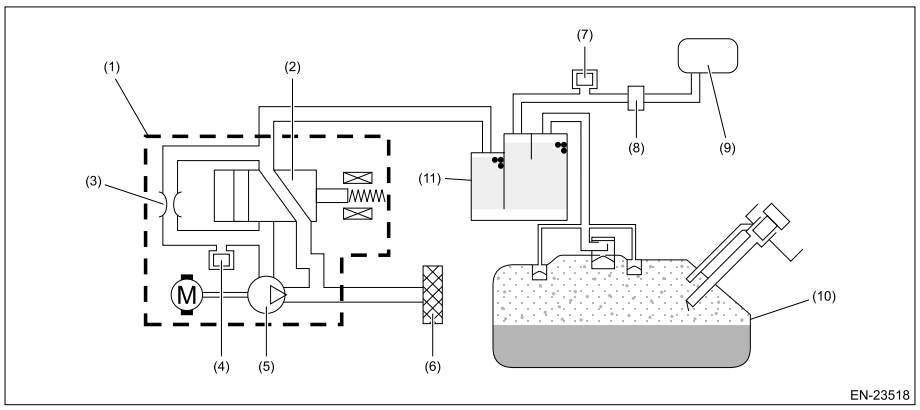
| | |
|---|---|
| Yes | Repair the poor contact in the leak check valve assembly connector. |
| No | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of the vacuum pump in leak check valve assembly.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Vacuum pump drive signal in the leak check valve assembly | ON |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output current | 5 A or more |

**Time needed for diagnosis:** 2250 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2404 EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE

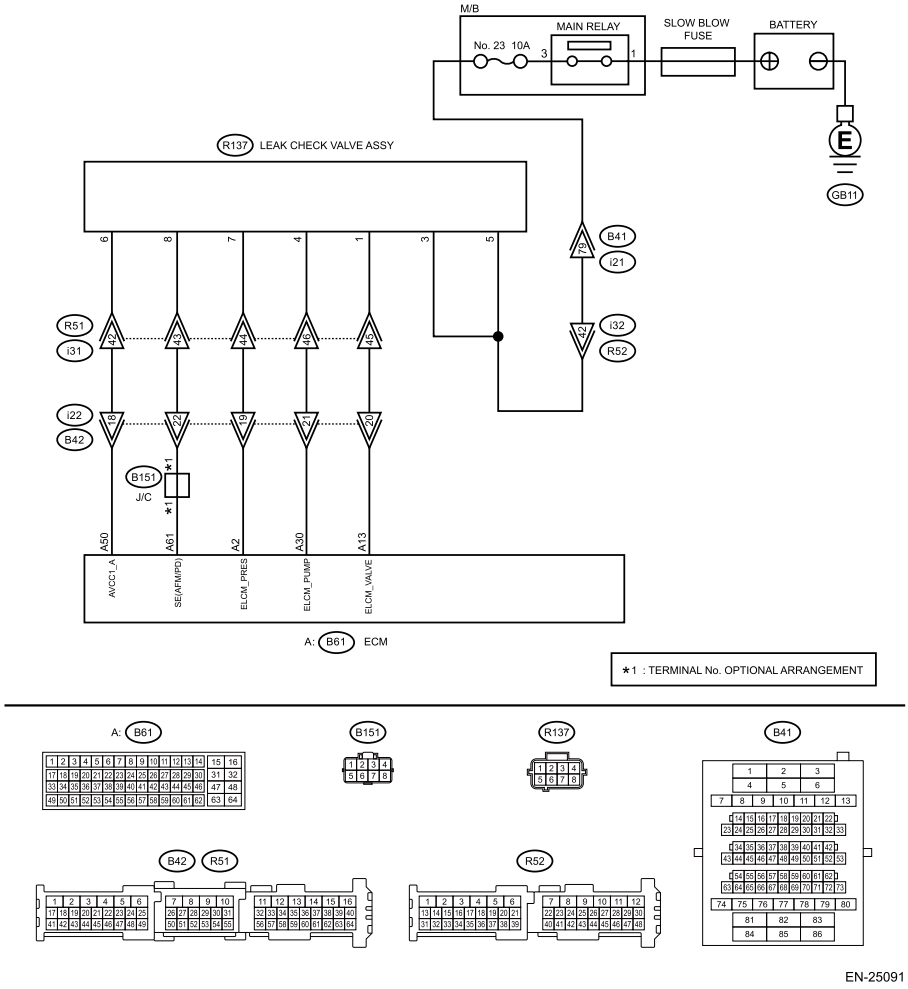
### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




EN-25091

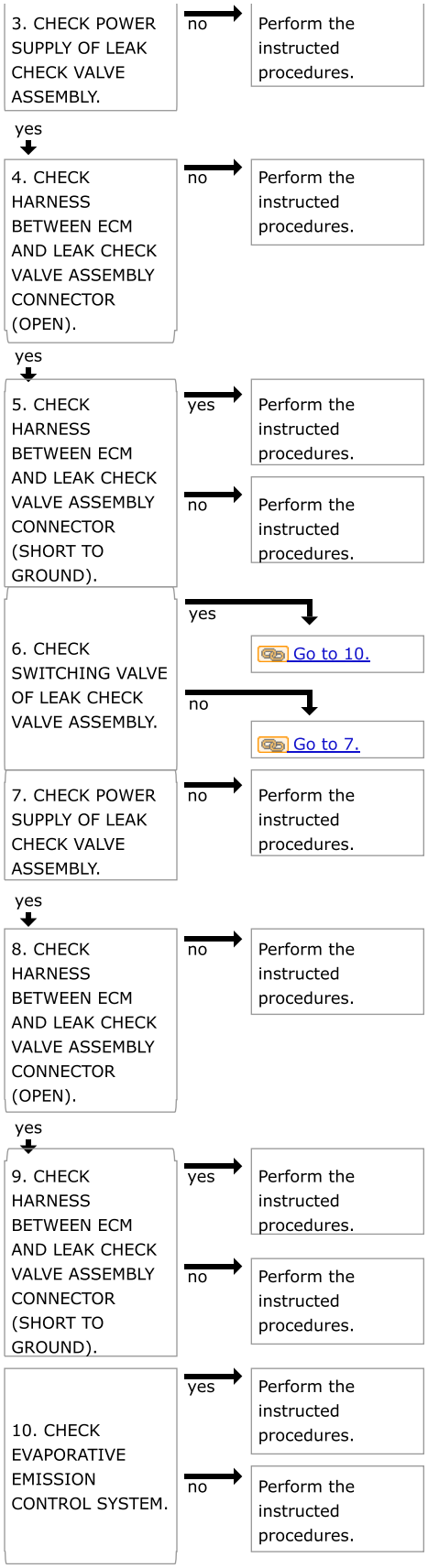
**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK VACUUM PUMP OF LEAK CHECK VALVE ASSEMBLY. | yes → | Go to 6. |
| | no → | Go to 3. |


3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.
no
Perform the instructed procedures.
yes
4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
6. CHECK SWITCHING VALVE OF LEAK CHECK VALVE ASSEMBLY.
yes
Go to 10.
no
Go to 7.
7. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.
no
Perform the instructed procedures.
yes
8. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).
no
Perform the instructed procedures.
yes
9. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
10. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2404 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK VACUUM PUMP OF LEAK CHECK VALVE ASSEMBLY.

Using the Subaru Select Monitor, select [ELCM pump] of [Active Test] and operate the vacuum pump of the leak check valve assembly.

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the vacuum pump of the leak check valve assembly operate?

Yes — Go to 6.

No — Go to 3.

### 3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   **Connector & terminal**
   (R137) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.
- Open circuit in harness between M/B and the leak check valve assembly connector
- Poor contact of coupling connector
- Blown out of fuse

### 4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
   **Connector & terminal**
   (B61) No. 30 — (R137) No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 5.

No — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of coupling connector

### 5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).

Measure the resistance of harness between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 30 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

No — Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

### 6. CHECK SWITCHING VALVE OF LEAK CHECK VALVE ASSEMBLY.

Using the Subaru Select Monitor, select [ELCM switching valve] of [Active Test] and operate the switching valve of the leak check valve assembly.

**Note:**
**For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the switching valve of the leak check valve assembly operate?

Yes — Go to 10.

No — Go to 7.

### 7. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   **Connector & terminal**
   (R137) No. 5 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 8.

No — Repair the following item.
- Open circuit in harness between M/B and the leak check valve assembly connector
- Poor contact of coupling connector
- Blown out of fuse

### 8. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
   **Connector & terminal**
   (B61) No. 13 — (R137) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of coupling connector

### 9. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).

Measure the resistance of harness between ECM connector and engine ground.
**Connector & terminal**
(B61) No. 13 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |
| No | Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector. |

### 10. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.

Perform the corresponding inspection mode. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Inspection Mode.

Is DTC P2404 displayed? (Current code)

| | |
|---|---|
| Yes | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

## GENERAL DESCRIPTION

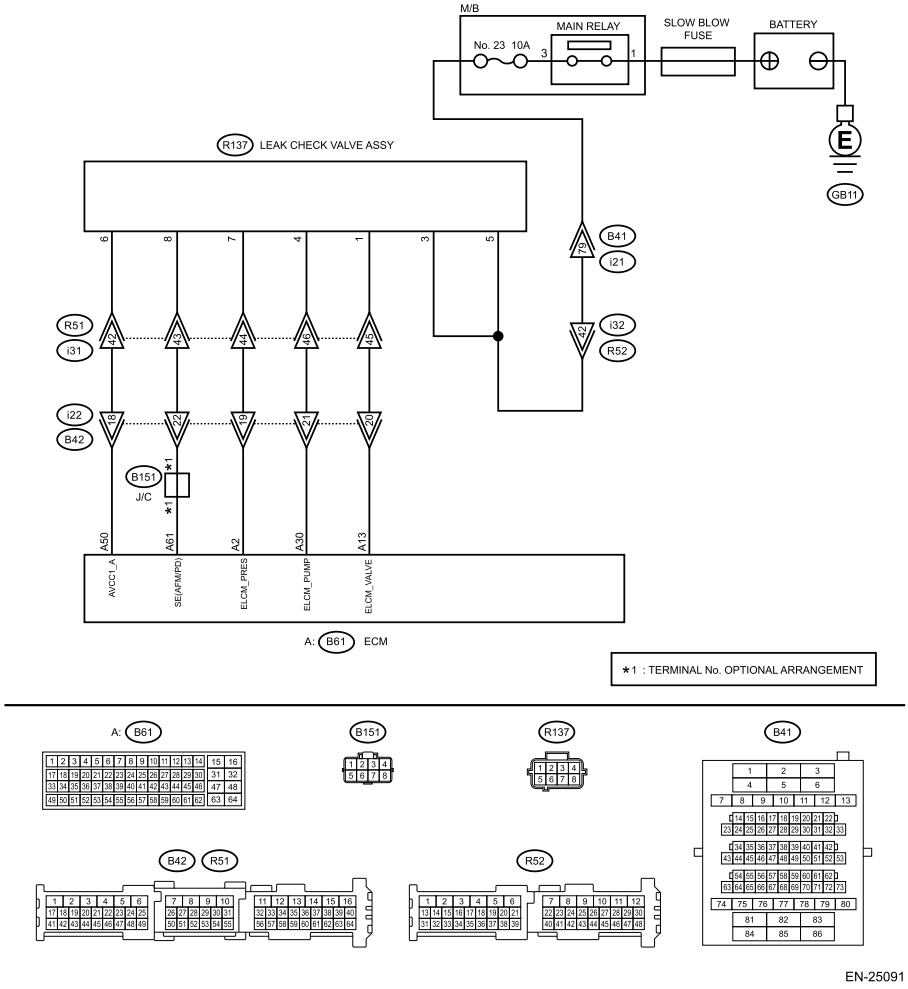
**OUTLINE OF DIAGNOSIS**

**Note:**
**For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).**

## DTC P2419 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.
   - no → Go to 3.
   - yes ↓
2. CHECK FOR POOR CONTACT.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY. → no → Perform the instructed procedures.

yes ↓

4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND). → no → Perform the instructed procedures.

yes ↓

5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN). → no → Perform the instructed procedures.

yes ↓

6. CHECK LEAK CHECK VALVE ASSEMBLY.
- yes → Perform the instructed procedures.
- no → Perform the instructed procedures.

### 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 13 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 2. |
| No | Go to 3. |

### 2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

### 3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

Measure the voltage between the leak check valve assembly connector and chassis ground.
**Connector & terminal**
(R137) No. 5 (+) — Chassis ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the following item.<br>• Open circuit in harness between M/B and the leak check valve assembly connector<br>• Poor contact of coupling connector<br>• Blown out of fuse |

### 4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance between leak check valve assembly and chassis ground.
   **Connector & terminal**
   (R137) No. 1 — Chassis ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector. |

### 5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).

Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
**Connector & terminal**
(B61) No. 13 — (R137) No. 1:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and the leak check valve assembly connector<br>• Poor contact of coupling connector |

### 6. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the switching valve of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

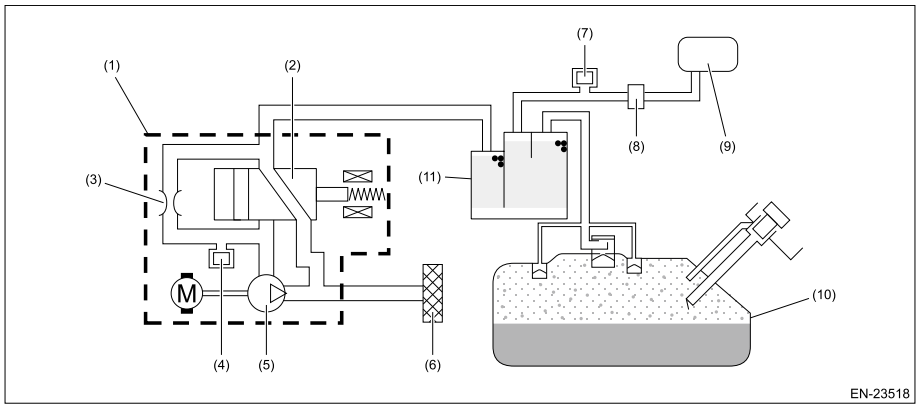
Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact in the leak check valve assembly connector. |
| No | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of the leak check valve assembly switching valve.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Switching valve drive signal in leak check valve assembly | OFF |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | 1.9 V or less |
| Or, | |
| Output voltage<br>Output current | More than 2.3 V<br>Less than 0.03 mA |

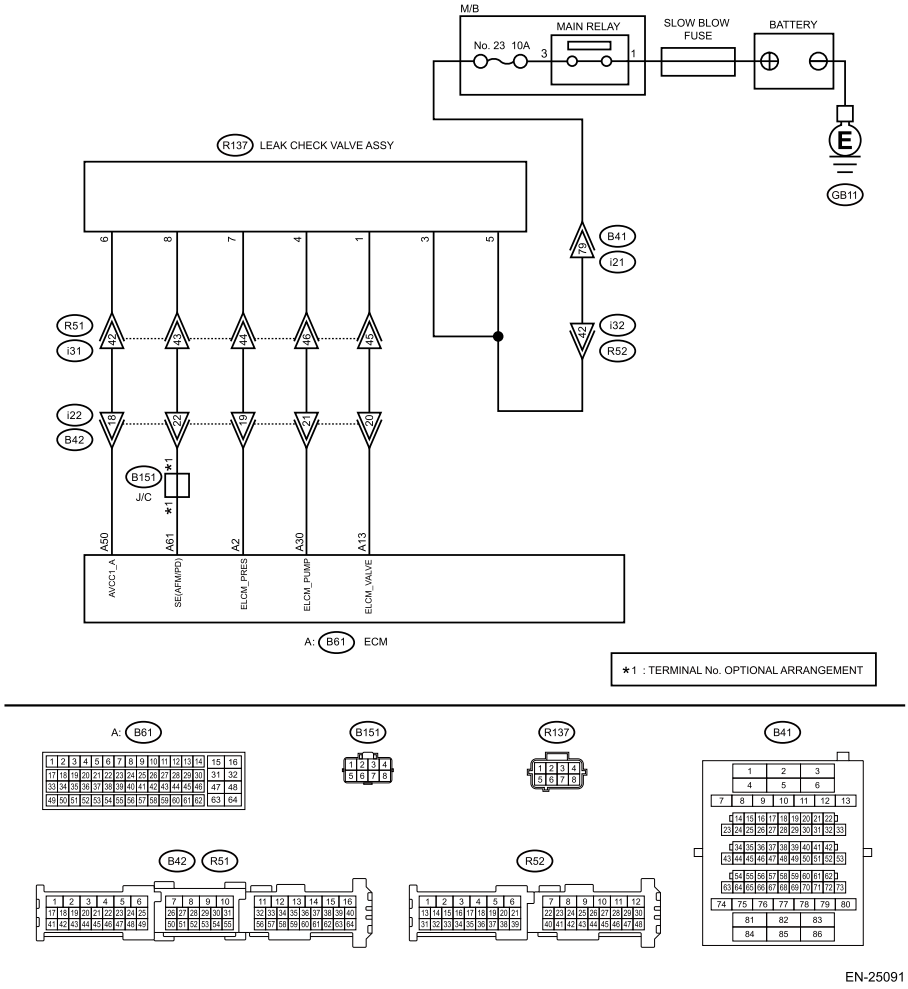
**Time needed for diagnosis:** 2500 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2420 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO POWER SUPPLY). | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |

| | | |
|---|---|---|
| 2. CHECK LEAK CHECK VALVE ASSEMBLY. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   **Connector & terminal**
   (R137) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector. |
| No | Go to 2. |

### 2. CHECK LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Check the switching valve of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Is the check result OK?

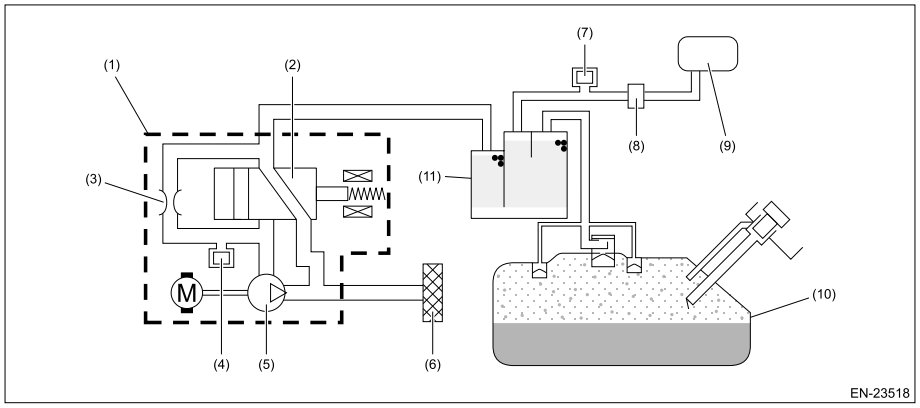
| | |
|---|---|
| Yes | Repair the poor contact in the leak check valve assembly connector. |
| No | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of the switching valve in leak check valve assembly.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Switching valve drive signal in leak check valve assembly | ON |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output current | 5 A or more |

**Time needed for diagnosis:** 2250 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P24B9 EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DATA MONITOR. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P24B9 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

#### 2. CHECK DATA MONITOR.

1. Turn the ignition switch to ON (engine OFF).
2. Using the Subaru Select Monitor, read the values of [Absolute Evap System Vapor Pressure] and [Mani. Absolute Pressure] to compare with actual atmospheric pressure.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the difference with the actual atmospheric pressure 7.3 [kPa] (54.8 mmHg, 2.2 inHg) or more?

Yes — Replace the part that showed larger deviation from the actual atmospheric pressure than the other.
- If deviations in value for [Absolute Evap System Vapor Pressure] is larger: Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.
- If deviations in value for [Mani. Absolute Pressure] is larger: Replace the manifold absolute pressure and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Manifold Absolute Pressure and Intake Air Temperature Sensor.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

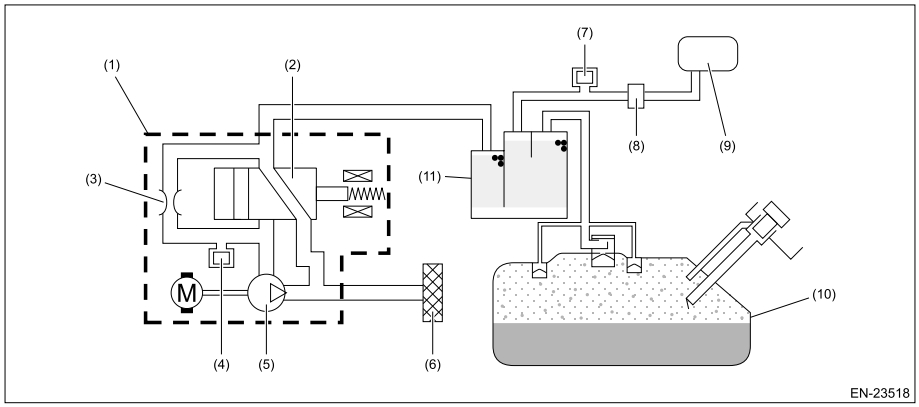
**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

### OUTLINE OF DIAGNOSIS

Detect output characteristics malfunction of the pressure sensor in the leak check valve assembly.
Judge as NG when the pressure sensor output value in the leak check valve assembly is largely different from the intake manifold pressure when the ignition switch is ON.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Elapsed time after ignition switch is turned to ON | 500 ms or more<br>and<br>Less than 60 s |
| Soaking time | 60 s or more |
| Vacuum pump in the leak check valve assembly | Not in operation |
| Switching valve in the leak check valve assembly | Open |
| Purge control | Not in operation |

**GENERAL DRIVING CYCLE**
Perform the diagnosis only once at ignition switch ON.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
**Judgment value**

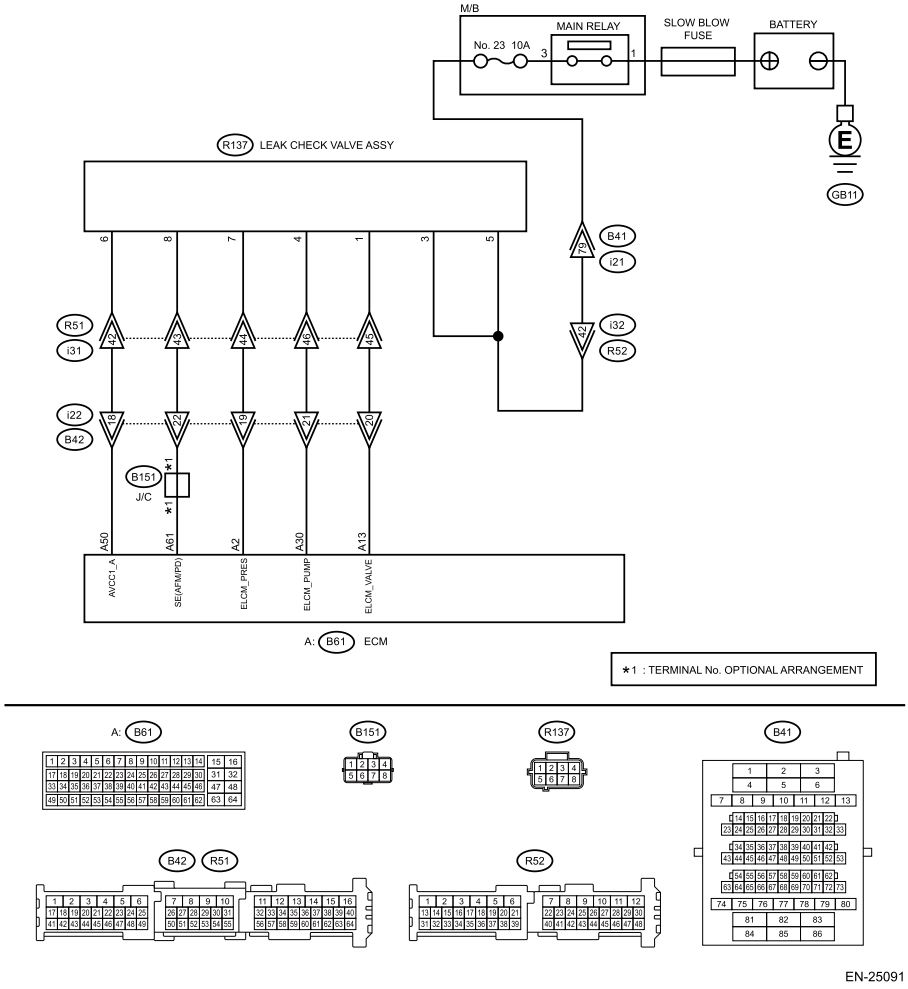
| Malfunction Criteria | Threshold Value |
|---|---|
| \|Pressure sensor output value in leak check valve assembly − Intake manifold pressure (absolute pressure) when ignition switch is ON\| | 14.6 kPa (109.5 mmHg, 4.3 inHg) or more |

**Time needed for diagnosis:** 320 ms
**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC P24BA EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |

3. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).
→ no → Perform the instructed procedures.

yes ↓

4. CHECK FOR POOR CONTACT.
→ yes → Perform the instructed procedures.
→ no → Perform the instructed procedures.

### 1. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [Absolute Evap System Vapor Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value in [Absolute Evap System Vapor Pressure] 34 [kPa] (255 mmHg, 10 inHg) or less?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   **Connector & terminal**
   (R137) No. 6 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of ECM connector
- Poor contact of coupling connector

### 3. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (SHORT TO GROUND).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between the ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

### 4. CHECK FOR POOR CONTACT.

Check for poor contact of leak check valve assembly connector.

Is there poor contact in the leak check valve assembly connector?

Yes — Repair the poor contact in the leak check valve assembly connector.

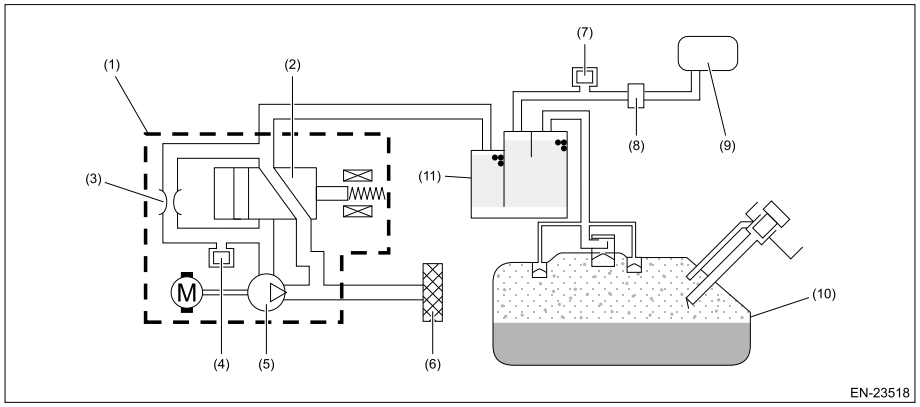
No — Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the short circuit of the pressure sensor in leak check valve assembly.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

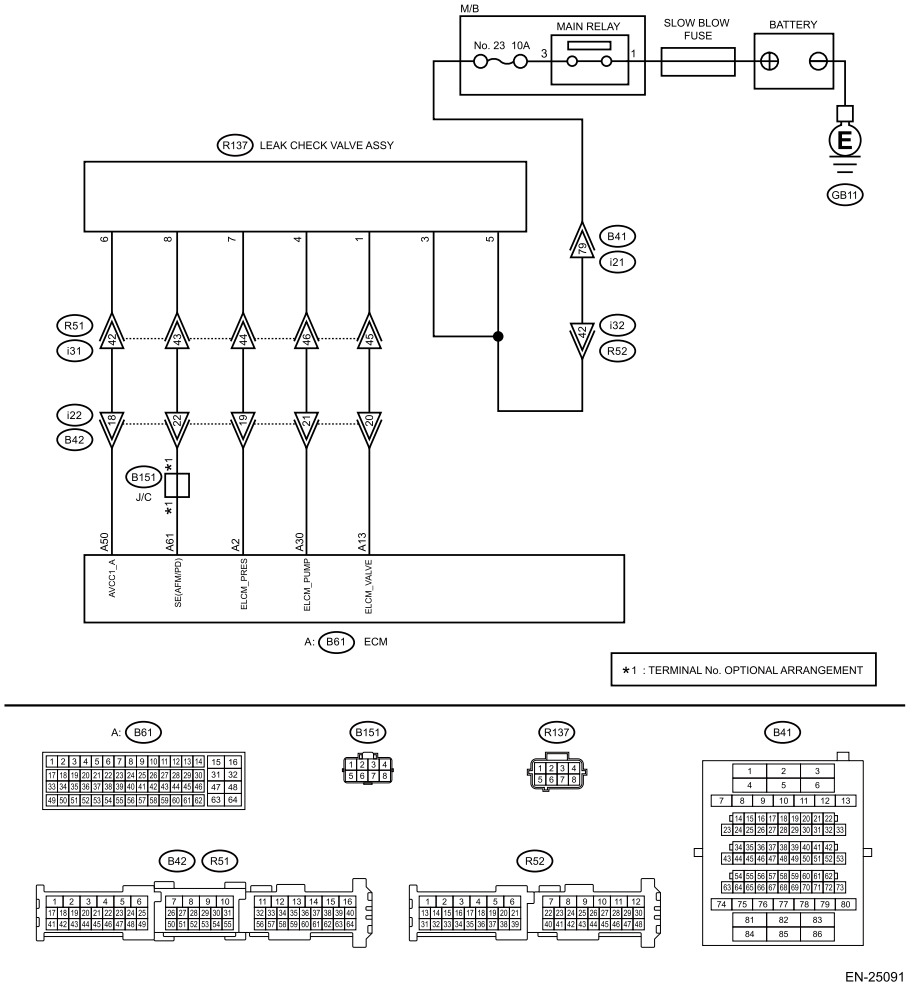
| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.922 V |

**Time needed for diagnosis:** 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P24BB EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.





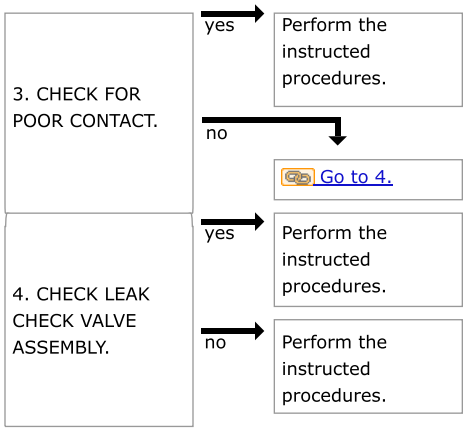


EN-25091

**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK DATA MONITOR.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value in [Absolute Evap System Vapor Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Absolute Evap System Vapor Pressure] 125 [kPa] (938 mmHg, 36.9 inHg) or more?

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.

**Connector & terminal**
(B61) No. 2 — (R137) No. 7:
(B61) No. 61 — (R137) No. 8:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.
- Open circuit in harness between ECM connector and the leak check valve assembly connector
- Poor contact of coupling connector
- Poor contact of J/C

### 3. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and the leak check valve assembly connector.

Is there poor contact in ECM and the leak check valve assembly connector?

Yes — Repair the poor contact of ECM and the leak check valve assembly connector.

No — Go to 4.

### 4. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the pressure sensor of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly>INSPECTION.

Is the check result OK?

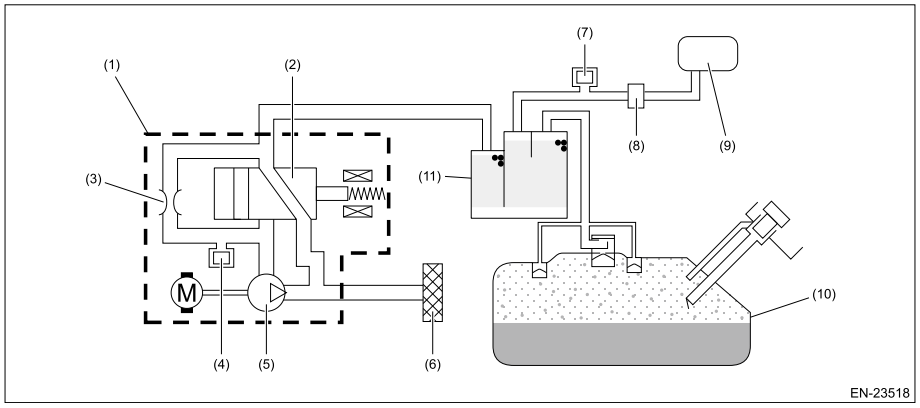
| | |
|---|---|
| Yes | Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector. |
| No | Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the pressure sensor in leak check valve assembly.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.239 V |

**Time needed for diagnosis:** 1 s
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

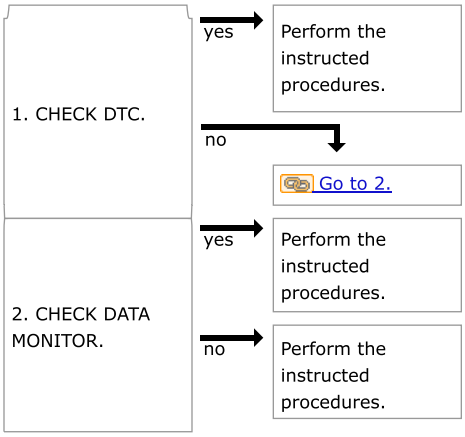
## DTC P24D6 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT RANGE/PERFORMANCE

### 1. —

**DTC detecting condition:**

Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P24D6 displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Go to 2.

### 2. CHECK DATA MONITOR.

1. Turn the ignition switch to ON (engine OFF).
2. Using the Subaru Select Monitor, read the values of [Absolute Evap System Vapor Pressure] and [Purge Line Pressure] to compare with actual atmospheric pressure.

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the difference with the actual atmospheric pressure 4.8 [kPa] (36 mmHg, 1.4 inHg) or more?

Yes — Replace the part that showed larger deviation from the actual atmospheric pressure than the other.
- If deviations in value for [Absolute Evap System Vapor Pressure] is larger: Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>Leak Check Valve Assembly.
- If deviations in value for [Purge Line Pressure] is larger: Replace the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

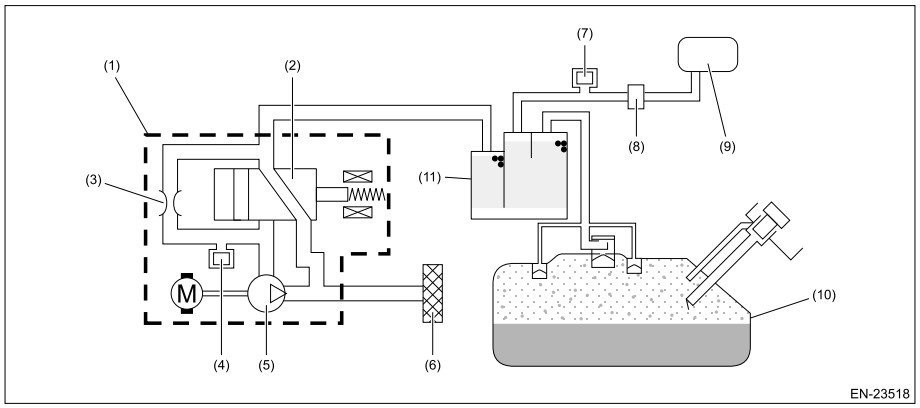
**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the output characteristics malfunction of CPC pressure sensor.
Judge as NG when the pressure sensor output value in the leak check valve assembly is largely different from the CPC pressure sensor output value.

**COMPONENT DESCRIPTION**




(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) CPC pressure sensor
(9) Intake manifold
(10) Fuel tank
(11) Canister

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Switching valve in leak check valve assembly | Open |
| and | |
| Purge control duty ratio | 0% |
| and | |
| Elapsed time | 3000 ms or more |
| Elapsed time after ignition switch is turned to ON | 500 ms or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis regardless of cold or warmed-up condition.

**DIAGNOSTIC METHOD**

Judge as NG when the difference of output values between pressure sensor in the leak check valve assembly and CPC pressure sensor is equal to or more than the predetermined value when compared.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Pressure sensor output value in leak check valve assembly − Purge line pressure)\| | More than 9.658 kPa (72.5 mmHg, 2.9 inHg) |

**Time needed for diagnosis:** 320 ms

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P24D7 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT LOW

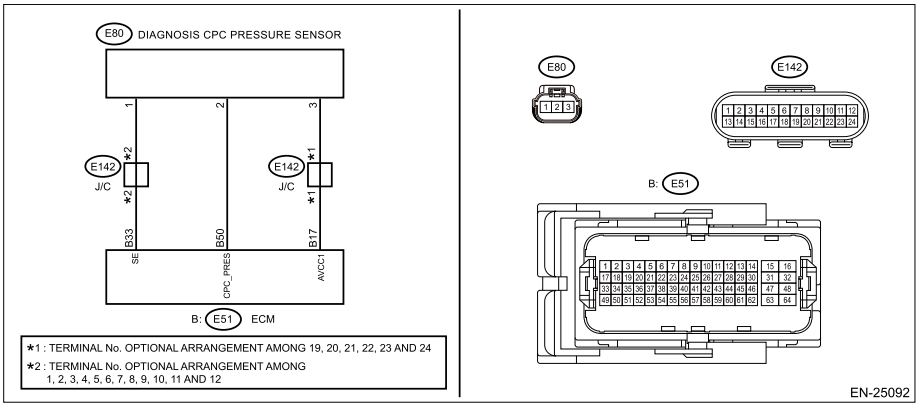
### 1. —

**DTC detecting condition:**

Immediately at fault recognition

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



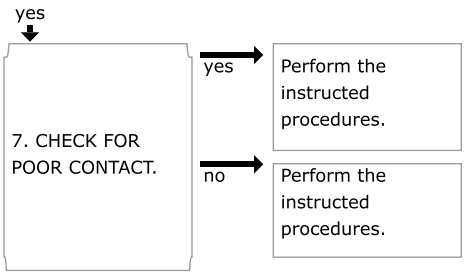

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK CPC PRESSURE SENSOR POWER SUPPLY. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 5. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 6. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Purge Line Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Purge Line Pressure] less than 38.63 [kPa] (290 mmHg, 11.4 inHg)?

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

### 4. CHECK CPC PRESSURE SENSOR POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from CPC pressure sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between CPC pressure sensor connector and engine ground.
   **Connector & terminal**
   (E80) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the following item.<br>• Open circuit in harness between ECM connector and CPC pressure sensor connector<br>• Poor contact of ECM connector<br>• Poor contact of J/C |

### 5. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and CPC pressure sensor connector.
   **Connector & terminal**
   (E51) No. 50 — (E80) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit in harness between ECM connector and CPC pressure sensor connector. |

### 6. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between CPC pressure sensor connector and engine ground.
**Connector & terminal**
(E80) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 7. |
| No | Repair the ground short circuit of harness between ECM connector and CPC pressure sensor connector. |

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and CPC pressure sensor connector.

Is there poor contact of the ECM or CPC pressure sensor connector?

| | |
|---|---|
| Yes | Repair the poor contact of the ECM or CPC pressure sensor connector. |
| No | Replace the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of the CPC pressure sensor.
Judge as NG if out of specification.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 1.762 V |

**Time needed for diagnosis:** 520 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P24D8 EVAP SYSTEM PRESSURE SENSOR/SWITCH "B" CIRCUIT HIGH

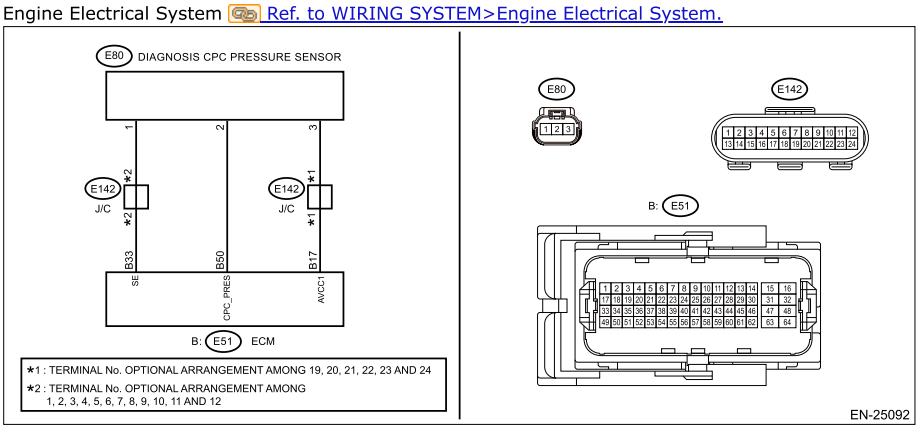
### 1. —

**DTC detecting condition:**

Immediately at fault recognition

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



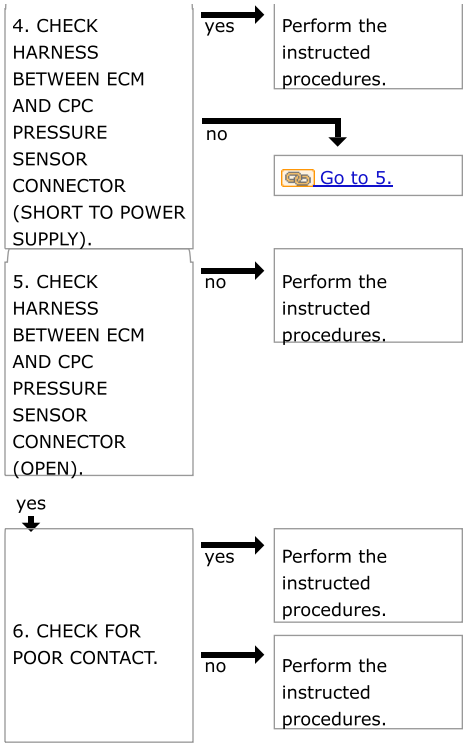

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 3.
3. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

Yes — Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW.

No — Go to 2.

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

Yes — Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH.

No — Go to 3.

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Purge Line Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Purge Line Pressure] 116.8 [kPa] (878 mmHg, 34.6 inHg) or more?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from CPC pressure sensor.
3. Start the engine.
4. Using the Subaru Select Monitor, read the value in [Purge Line Pressure].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Purge Line Pressure] 116.8 [kPa] (878 mmHg, 34.6 inHg) or more?

Yes — Repair the short circuit to power in the harness between ECM connector and CPC pressure sensor connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND CPC PRESSURE SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance in harness between CPC pressure sensor connector and engine ground.
   **Connector & terminal**
   (E80) No. 1 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and CPC pressure sensor connector
- Poor contact of ECM connector
- Poor contact of J/C

### 6. CHECK FOR POOR CONTACT.

Check for poor contact of CPC pressure sensor connector.

Is there poor contact of the CPC pressure sensor connector?

Yes — Repair the poor contact of the CPC pressure sensor connector.

No — Replace the CPC pressure sensor. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>CPC Pressure Sensor.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect the open or short circuit of the CPC pressure sensor.
Judge as NG if out of specification.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

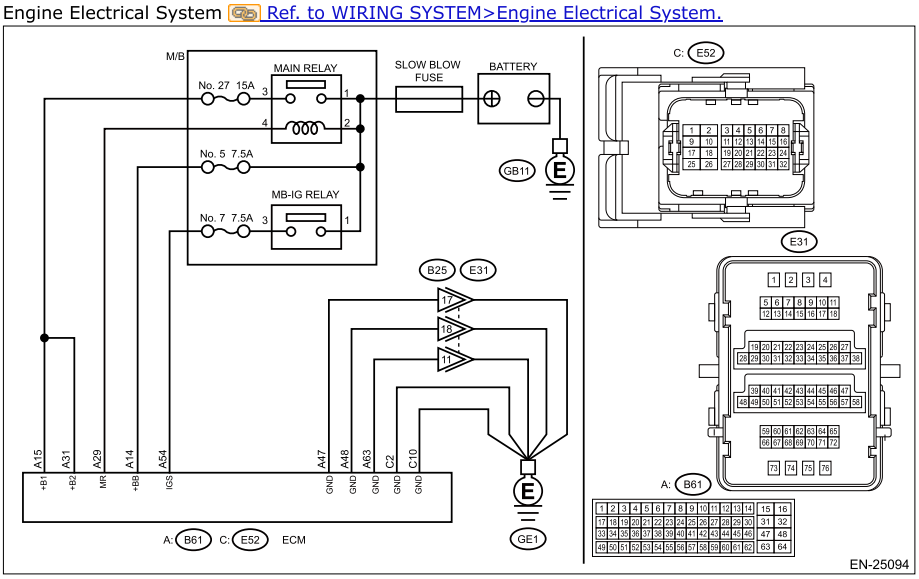
| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.119 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
Improper idling
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK ECM CONNECTOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK INPUT VOLTAGE OF ECM. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

| | |
|---|---|
| Yes | Go to 2. |
| No | Connect the ECM connector correctly. |

### 2. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground while wiggling the harness between ECM connector and M/B.
   **Connector & terminal**
   (B61) No. 54 (+) — Engine ground (−):

Is the voltage 8 V or more all the time?

Yes — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, the following items may be the cause of fault.**
- **Poor contact of ECM connector**
- **Poor contact of MB-IG relay**

No — Repair the following item.
- Blown out of fuse
- Open circuit or short circuit to ground in harness between M/B and ECM connector
- Faulty MB-IG relay
- Poor contact of MB-IG relay

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect instantaneous open in ignition switch input circuit to ECM.
Judge as NG if out of specification.

**COMPONENT DESCRIPTION**
ECM monitors the voltage of the ignition switch input circuit. Judge as ignition switch ON when the voltage is the specified value or more.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Engine speed | 475 rpm or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**
Judge as NG when the following conditions are established within the predetermined time.
**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Number of instantaneous opens in ignition switch input circuit | 5 times or more |

**Time needed for diagnosis:** 5000 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

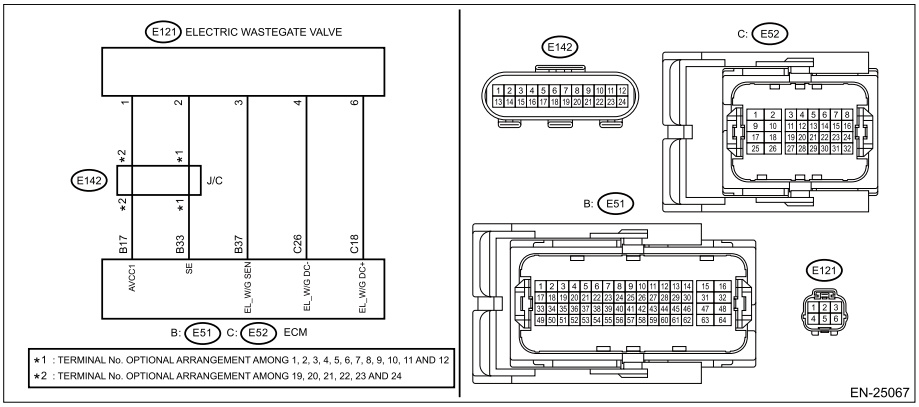


## DTC P2564 TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT LOW

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Trouble symptom:**
- Poor driving performance
- Poor acceleration

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 2. |
| 2. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Go to 3. |
| 3. CHECK DATA MONITOR. | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 4. CHECK ELECTRONIC WASTEGATE VALVE POWER SUPPLY. | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| | yes ↓ | |
| 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| | yes ↓ | |

| | | |
|---|---|---|
| 7. CHECK FOR POOR CONTACT. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Electric Waste Gate Valve Actual Position Value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value in [Electric Waste Gate Valve Actual Position Value] less than −3.5 [mm] (−0.14 in)?

| | |
|---|---|
| Yes | Go to 4. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK ELECTRONIC WASTEGATE VALVE POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from electronic wastegate valve.
3. Turn the ignition switch to ON.
4. Measure the voltage between electronic wastegate valve connector and engine ground.
   **Connector & terminal**
   (E121) No. 1 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes — Go to 5.

No — Repair the following item.
- Open circuit in harness between ECM connector and electronic wastegate valve connector
- Poor contact of ECM connector
- Poor contact of J/C

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and electronic wastegate valve connector.
   **Connector & terminal**
   (E51) No. 37 — (E121) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit in harness between ECM connector and electronic wastegate valve connector.

### 6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(E51) No. 37 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the ground short circuit of harness between ECM connector and electronic wastegate valve connector.

### 7. CHECK FOR POOR CONTACT.

Check for poor contact in ECM and electronic wastegate valve connector.

Is there poor contact in ECM or electronic wastegate valve connector?

Yes — Repair the poor contact of ECM or electronic wastegate valve connector.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of electronic wastegate valve.
Judge as NG if out of specification.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | Less than 0.455 V |

**Time needed for diagnosis:** 520 ms

**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC P2565 TURBOCHARGER BOOST CONTROL POSITION SENSOR "A" CIRCUIT HIGH

### 1. —

**DTC detecting condition:**

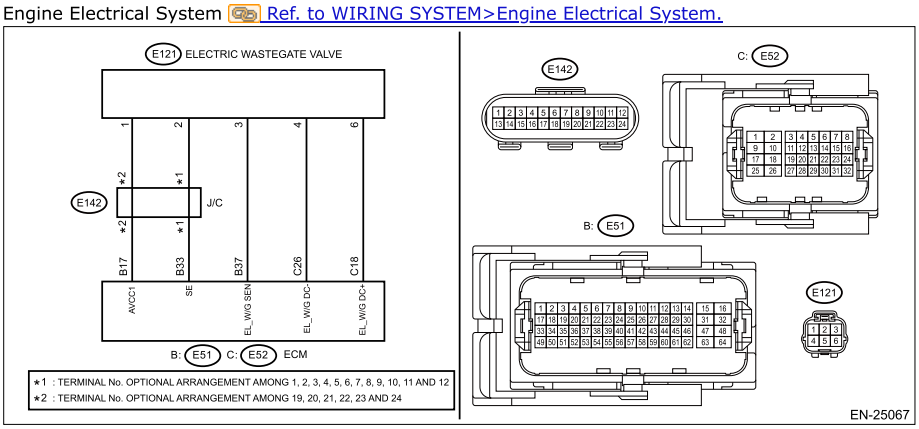
Immediately at fault recognition

**Trouble symptom:**

- Poor driving performance
- Poor acceleration

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.



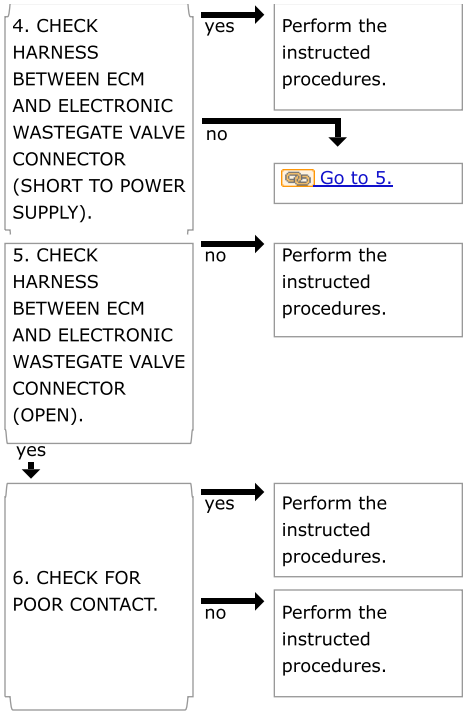

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**

**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 2.
2. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Go to 3.
3. CHECK DATA MONITOR.
   - no → Perform the instructed procedures.
   - yes ↓




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B4 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B4. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B4 SENSOR POWER SUPPLY "B" CIRCUIT LOW. |
| No | Go to 2. |

### 2. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC P06B5 displayed? (Current code)

| | |
|---|---|
| Yes | Check for DTC P06B5. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P06B5 SENSOR POWER SUPPLY "B" CIRCUIT HIGH. |
| No | Go to 3. |

### 3. CHECK DATA MONITOR.

1. Start the engine.
2. Using the Subaru Select Monitor, read the value in [Electric Waste Gate Valve Actual Position Value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Electric Waste Gate Valve Actual Position Value] 16 [mm] (0.63 in) or more?

Yes — Go to 4.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from electronic wastegate valve.
3. Start the engine.
4. Using the Subaru Select Monitor, read the value in [Electric Waste Gate Valve Actual Position Value].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is the value of [Electric Waste Gate Valve Actual Position Value] 16 [mm] (0.63 in) or more?

Yes — Repair the power supply short circuit of harness between ECM connector and electronic wastegate valve connector.

No — Go to 5.

### 5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC WASTEGATE VALVE CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between electronic wastegate valve connector and engine ground.
   **Connector & terminal**
   (E121) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between ECM connector and electronic wastegate valve connector
- Poor contact of ECM connector
- Poor contact of J/C

### 6. CHECK FOR POOR CONTACT.

Check for poor contact in electronic wastegate valve connector.

Is there poor contact in electronic wastegate valve connector?

Yes — Repair the poor contact of electronic wastegate valve connector.

No — Replace the turbocharger. Ref. to INTAKE (INDUCTION)(H4DOTC)>Turbocharger.

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect the open or short circuit of electronic wastegate valve.
Judge as NG if out of specification.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| None | |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Output voltage | More than 4.682 V |

**Time needed for diagnosis:** 520 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.



## DTC P2610 ECM/PCM ENGINE OFF TIMER PERFORMANCE

### 1. —

**DTC detecting condition:**
Detected when two consecutive driving cycles with fault occur.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

#### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC other than P2610 displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). **Note: The soak timer IC is built into the ECM.** |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
This diagnosis consists of the following eight cases. Judge as NG when in any one of the following cases, abnormality is detected.

| | |
|---|---|
| Monitor 1 | Detects communication error between CPU and wake-up timer. |
| Monitor 2 | Detects communication error between CPU and main relay off timer. |
| Monitor 3 | Confirms the wake-up timing accuracy using the main relay off timer and wake-up timer. Detects malfunction if difference is large. |
| Monitor 4 | Detects malfunction if the main relay off timer is not activated. |
| Monitor 5 | Detects malfunction if the main relay off timer cannot be initialized. |
| Monitor 6 | Detects communication error between CPU and wake-up timer. |
| Monitor 7 | Detects communication error between CPU and main relay off timer. |

| | |
|---|---|
| Monitor 8 | Confirms the wake-up timing accuracy using the main relay off timer and wake-up timer. Detects malfunction if difference is large. |

**COMPONENT DESCRIPTION**

The wake-up timer and the main relay off timer are built into the ECM.

**EXECUTION CONDITION**

**<Monitor 1, 2, 3>**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**<Monitor 4, 5, 6, 7, 8>**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| Wake-up experience flag | OFF |

**GENERAL DRIVING CYCLE**

**Monitor 1, 2, 3:**

Perform the diagnosis only once when wake-up operates after the ignition switch is OFF.

**Monitor 4, 5, 6, 7, 8:**

Perform the diagnosis only once when the following driving cycle starts after the ignition switch is OFF.

**DIAGNOSTIC METHOD**

**Judgment value <Monitor 1>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Wake-up timer response to the CPU request command | Error |

**Judgment value <Monitor 2>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Main relay off timer response to the CPU request command | Error |

**Judgment value <Monitor 3>**

| Malfunction Criteria | Threshold Value |
|---|---|
| \|(Main relay off timer) − (Wake-up request time)\| / Wake-up request time | More than 0.24 |

**Judgment value <Monitor 4>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Main relay off timer response to the CPU power ON command | No response |

**Judgment value <Monitor 5>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Main relay off timer | Initialization error |

**Judgment value <Monitor 6>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Wake-up timer response to the CPU request command | Error |

**Judgment value <Monitor 7>**

| Malfunction Criteria | Threshold Value |
|---|---|
| Main relay off timer response to the CPU power ON command | Error |

**Judgment value <Monitor 8>**

| Malfunction Criteria | Threshold Value |
|---|---|
| {(Main relay off timer) − (Wake-up request time)} / Wake-up request time | More than 0.24 |

**Time needed for diagnosis**

Monitor 1, 2, 6, and 7: 2 s
Monitor 3 and 8: Less than 1 s
Monitor 4: 1 second
Monitor 5: 100 times

**Malfunction indicator light illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF

**Note:**
**For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure has occurred.

### 2. COMPONENT DESCRIPTION

**(Common specifications)**

CAN Protocol 2.0B (active)
Frame Format: 11 Bit ID Frame (standard frame)
Conforms to ISO11898
Communication speed: 500 kbps

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

### 5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value**

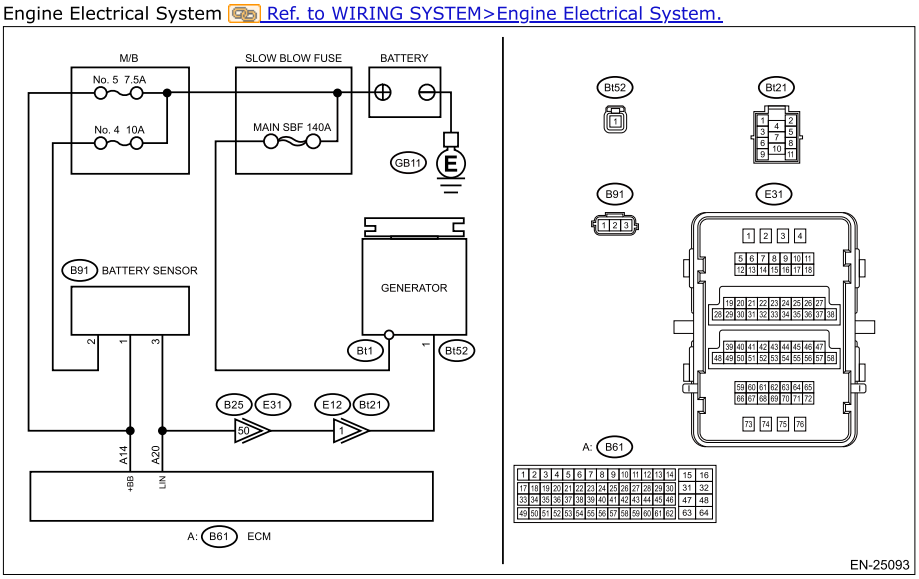
| Malfunction Criteria | Threshold Value |
|---|---|
| CAN bus condition | Bus off |

**Time needed for diagnosis:** 436 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

## DTC U0077 LIN COMMUNICATION BUS "ECM/PCM" OFF

### 1. —

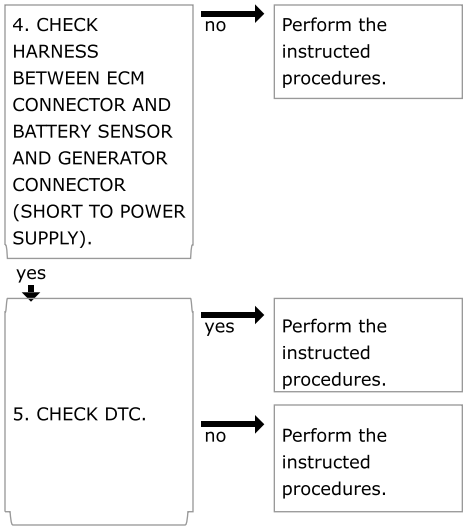
**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR AND GENERATOR CONNECTOR (OPEN). | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR AND GENERATOR CONNECTOR (SHORT TO GROUND). | no → | Perform the instructed procedures. |
| yes ↓ | | |




### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC U0077 displayed? (Current code)

Yes — Go to 2.

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

### 2. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR AND GENERATOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from battery sensor.
4. Disconnect the connector from the generator.
5. Measure the resistance of harness between ECM connector and battery sensor connector and generator connector.
   **Connector & terminal**
   (B61) No. 20 — (B91) No. 3:
   (B61) No. 20 — (Bt52) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the following item.

- Open circuit in harness between ECM connector and battery sensor connector
- Open circuit of harness between ECM connector and generator connector
- Poor contact of coupling connector

### 3. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR AND GENERATOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between the ECM connector and engine ground.
**Connector & terminal**
(B61) No. 20 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 4.

No — Repair the following item.
- Short circuit to ground in harness between ECM connector and battery sensor connector
- Short circuit to ground in harness between ECM connector and generator connector

### 4. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR AND GENERATOR CONNECTOR (SHORT TO POWER SUPPLY).

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 20 — Engine ground:

Is the voltage less than 1 V?

Yes — Go to 5.

No — Repair the following item.
- Short circuit to power supply in harness between ECM connector and battery sensor connector
- Short circuit to power supply in harness between ECM connector and generator connector

### 5. CHECK DTC.

1. Turn the ignition switch to OFF.
2. Connect all connectors.
3. Using the Subaru Select Monitor or a general scan tool, perform the clear memory of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Clear memory.
4. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC U0077 displayed? (Current code)

Yes — Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM).

No — Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

**Note:**
**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**
Detect malfunction of LIN communication.
Judge as NG when the data sent/received via LIN communication is abnormal.

**COMPONENT DESCRIPTION**
LIN communication is used to send/receive the data between ECM, battery sensor, and generator.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**
Always perform the diagnosis continuously.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Data sent/received with control modules connected to LIN | No change<br>Or,<br>Checksum error |

**Time needed for diagnosis:** 1500 ms
**Malfunction indicator light illumination:** Does not illuminate.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U007B CONTROL MODULE COMMUNICATION BUS "I" OFF

**Note:**
**For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure has occurred.

### 2. COMPONENT DESCRIPTION

**(Common specifications)**
CAN Protocol 2.0B (active)
Frame Format: 11 Bit ID Frame (standard frame)
Conforms to ISO11898
Communication speed: 500 kbps

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

### 5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| CAN bus condition | Bus off |

**Time needed for diagnosis:** 436ms
**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U0101 LOST COMMUNICATION WITH TCM

**Note:**
**For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure between TCM, VDC CM and combination meter has occurred.

### 2. COMPONENT DESCRIPTION

**(Common specifications)**
CAN Protocol 2.0B (active)
Frame Format: 11 Bit ID Frame (standard frame)
Conforms to ISO11898
Communication speed: 500 kbps

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

### 5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| ID received from control module connected to CAN | None |

**Time needed for diagnosis:** 500 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

**Note:**
- **For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**
- **For the detection standard, refer to DTC U0101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0101 LOST COMMUNICATION WITH TCM.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE

**Note:**
- **For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**
- **For the detection standard, refer to DTC U0101. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0101 LOST COMMUNICATION WITH TCM.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U0402 INVALID DATA RECEIVED FROM TCM

**Note:**
**For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data received from TCM, VDC CM and combination meter is not normal.

### 2. COMPONENT DESCRIPTION

**(Common specifications)**
CAN Protocol 2.0B (active)
Frame Format: 11 Bit ID Frame (standard frame)
Conforms to ISO11898
Communication speed: 500 kbps

### 3. EXECUTION CONDITION

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

### 5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Data updated from control module connected to CAN | None |

**Time needed for diagnosis:** 500 ms
**Malfunction indicator light illumination:** Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

**Note:**
- **For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**
- **For the detection standard, refer to DTC U0402. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0402 INVALID DATA RECEIVED FROM TCM.**

## DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE

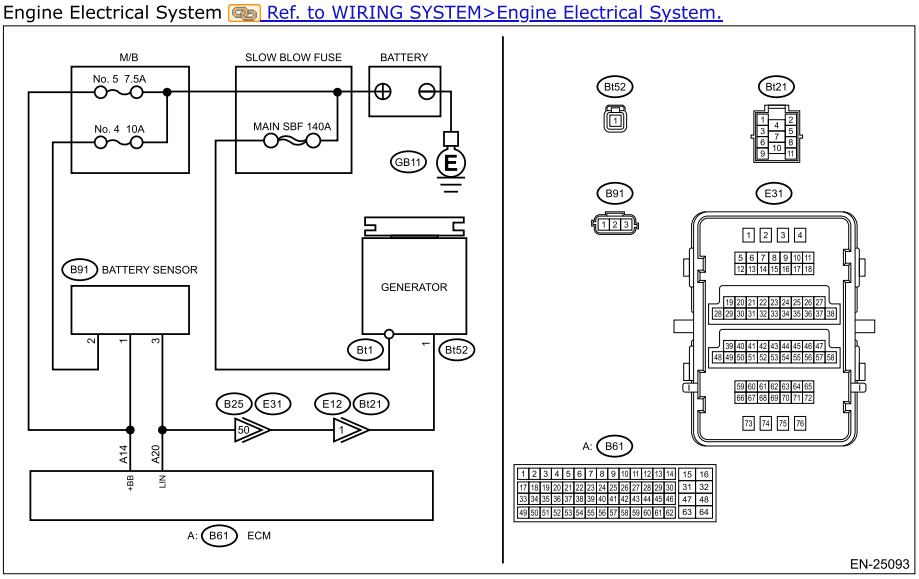
**Note:**
- **For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.**
- **For the detection standard, refer to DTC U0402. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0402 INVALID DATA RECEIVED FROM TCM.**



## DTC U1712 LOST LIN COMMUNICATION WITH BATTERY "1" MONITOR MODULE

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

1. CHECK DTC.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK ECM CONNECTOR.
   - no → Perform the instructed procedures.
   - yes ↓
3. CHECK HARNESS BETWEEN BATTERY AND BATTERY SENSOR CONNECTOR (OPEN).
   - no → Perform the instructed procedures.
   - yes ↓

| | | |
|---|---|---|
| 4. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR CONNECTOR (OPEN). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC U1712 displayed? (Current code)

| | |
|---|---|
| Yes | Go to 2. |
| No | The circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.<br>**Note:**<br>**In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.** |

### 2. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

| | |
|---|---|
| Yes | Go to 3. |
| No | Connect the ECM connector correctly. |

### 3. CHECK HARNESS BETWEEN BATTERY AND BATTERY SENSOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
3. Disconnect the connector from battery sensor.
4. Disconnect the positive terminal of battery.
5. Measure the resistance of the harness between battery positive cable terminal and battery sensor connector.
   **Connector & terminal**
   Positive cable terminal — (B91) No. 1:
   Positive cable terminal — (B91) No. 2:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the open circuit in harness between battery positive cable terminal and battery sensor connector. |

### 4. CHECK HARNESS BETWEEN ECM CONNECTOR AND BATTERY SENSOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and battery sensor connector.
   **Connector & terminal**
   (B91) No. 3 — (B61) No. 20:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector or battery sensor connector. |
| No | Repair the open circuit in harness between ECM connector and battery sensor connector. |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect malfunction of LIN communication.
Judge as NG when LIN communication failure has occurred with the battery sensor.

**COMPONENT DESCRIPTION**

The battery sensor monitors the data of battery voltage, current, temperature, etc.
ECM receives these data via LIN communication with the battery sensor.

**(Common specifications)**

Communication protocol: LIN 2.0
Communication speed: 19.2 kbps

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |

**GENERAL DRIVING CYCLE**

Perform the diagnosis every time after the enable conditions have been established.

**DIAGNOSTIC METHOD**

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

**Judgment value**

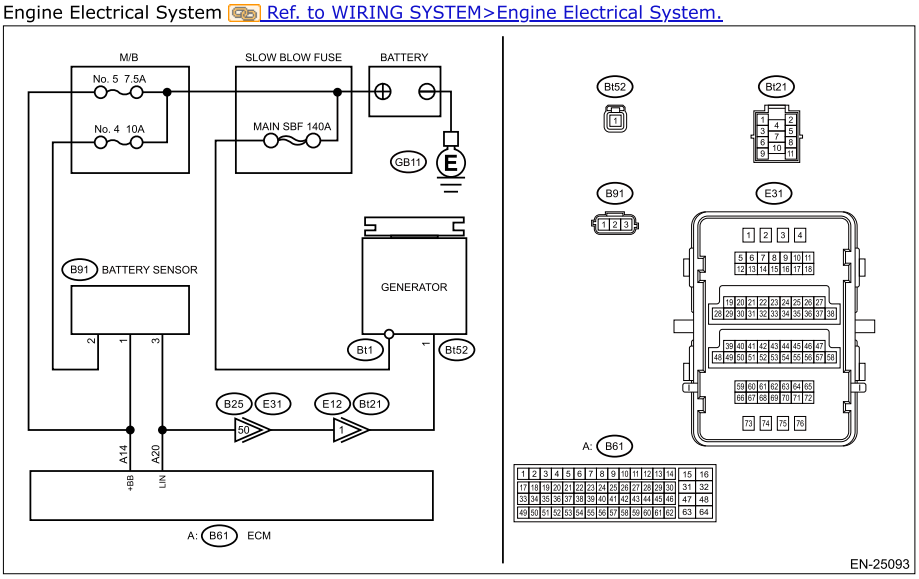
| Malfunction Criteria | Threshold Value |
|---|---|
| Data received from control modules connected to LIN | No change<br>Or,<br>Checksum error |

**Time needed for diagnosis:** 7 s
**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs.

## DTC U171F LOST LIN COMMUNICATION WITH GENERATOR

### 1. —

**DTC detecting condition:**
Immediately at fault recognition
**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System.




**Caution:**
**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

| | | |
|---|---|---|
| 1. CHECK DTC. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 2. CHECK ECM CONNECTOR. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 3. CHECK VOLTAGE OF GENERATOR TERMINAL B. | no → | Perform the instructed procedures. |
| yes ↓ | | |
| 4. CHECK HARNESS BETWEEN ECM AND GENERATOR CONNECTOR (OPEN). | yes → | Perform the instructed procedures. |
| | no → | Perform the instructed procedures. |

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Is DTC U171F displayed? (Current code)

| | |
|---|---|
| Yes | Go to 2. |
| No | Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. |

### 2. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

| | |
|---|---|
| Yes | Go to 3. |
| No | Connect the ECM connector correctly. |

### 3. CHECK VOLTAGE OF GENERATOR TERMINAL B.

1. Turn the ignition switch to OFF.
2. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
3. Measure the voltage of the generator terminal B.
   **Connector & terminal**
   Generator terminal B (+) — Engine ground (−):

Is the voltage battery voltage?

| | |
|---|---|
| Yes | Go to 4. |
| No | Check the generator terminal B harness and fuse. |

### 4. CHECK HARNESS BETWEEN ECM AND GENERATOR CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Disconnect the LIN communication connector from the generator.
3. Measure the resistance of the harness between ECM connector and generator LIN communication connector.
   **Connector & terminal**
   (B61) No. 20 — (Bt52) No. 1:

Is the resistance less than 1 Ω?

| | |
|---|---|
| Yes | Check the connector for poor contact and check the harness again. If no fault is found, replace the generator. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Generator. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and generator<br>• Poor contact of coupling connector |

## GENERAL DESCRIPTION

**OUTLINE OF DIAGNOSIS**

Detect malfunction of LIN communication.
Judge as NG if LIN communication failure has occurred with the generator.

**COMPONENT DESCRIPTION**

LIN communication is a network used for sending/receiving data between the control modules connected by LIN communication system.

**EXECUTION CONDITION**

| Secondary parameters | Execution condition |
|---|---|
| Battery voltage | 10.9 V or more |
| LIN communication schedule | Normal schedule |

**GENERAL DRIVING CYCLE**

Always perform the diagnosis continuously after the enable conditions have been established.

**DIAGNOSTIC METHOD**

Judge as NG when the following conditions are established.

**Judgment value**

| Malfunction Criteria | Threshold Value |
|---|---|
| Data received from control modules connected to LIN<br><br>Or,<br>Internal malfunction flag of generator (communication malfunction warning) | No change<br>Or,<br>Checksum error<br><br>ON |

**Time needed for diagnosis:** 2000 ms

**Malfunction indicator light illumination:** Does not illuminate even when malfunction occurs. (Charge warning light illuminates.)

## LIST

### 1. LIST

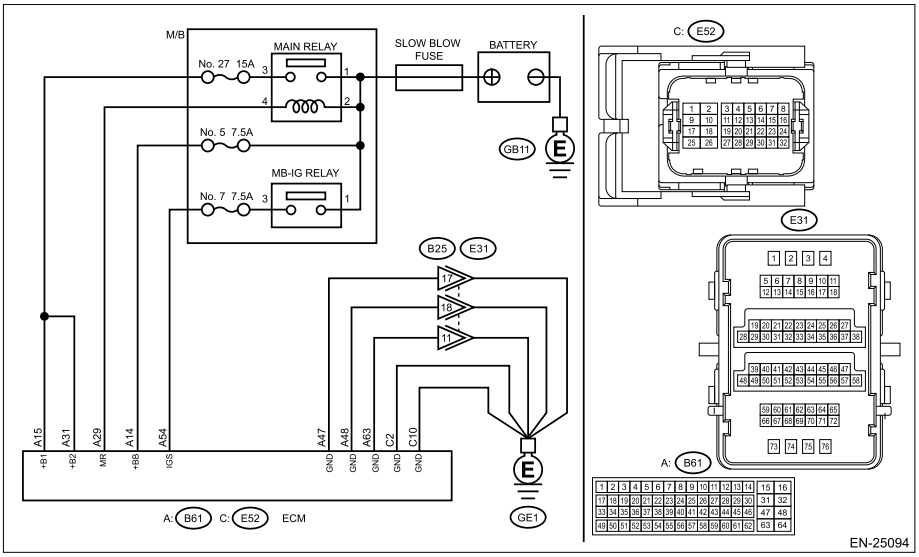
**Note:**
**Malfunction of parts other than those listed is also possible. Ref. to MECHANICAL(H4DOTC)>Symptoms and causes.**

| Symptoms | Item | Reference |
|---|---|---|
| Engine does not start<br>**Note:**<br>**Perform the diagnosis in the numerical order on the right.** | 1. Check fuel level | Check the fuel level. |
| | 2. Check immobilizer | With Telematics: Ref. to TELEMATICS SYSTEM (DIAGNOSTICS)>Diagnostics with Phenomenon>INSPECTION > ENGINE WILL NOT START. |
| | | Without keyless access with push button start system: Ref. to IMMOBILIZER (DIAGNOSTICS)>Basic Diagnostic Procedure. |
| | | With keyless access with push button start system: Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Basic Diagnostic Procedure. |
| | 3. Check ECM power supply and ground line | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM). |
| | 4. Inspection of starter motor circuit | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>STARTER MOTOR CIRCUIT. |
| | 5. Inspection of ignition control system | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM. |
| | 6. Inspection of fuel pump circuit | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT. |
| | 7. Inspection of fuel injector circuit | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>FUEL INJECTOR CIRCUIT. |
| Brake override does not operate | Check brake override system | Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostics with Phenomenon>CHECK BRAKE OVERRIDE SYSTEM. |



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

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

## 1. CHECK MAIN RELAY.

1. Turn the ignition switch to OFF.
2. Remove the main relay.
3. Check the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Main Relay>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Replace the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Main Relay. |

## 2. CHECK GROUND CIRCUIT FOR ECM (OPEN CIRCUIT).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and engine ground.

**Connector & terminal**

(B61) No. 47 — Engine ground:
(B61) No. 48 — Engine ground:
(B61) No. 63 — Engine ground:
(E52) No. 2 — Engine ground:
(E52) No. 10 — Engine ground:

Is the resistance less than 5 Ω?

| | |
|---|---|
| Yes | Go to 3. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and engine ground<br>• Poor contact of coupling connector |

### 3. CHECK INPUT VOLTAGE OF ECM (SHORT TO GROUND).

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 14 (+) — Engine ground (−):
   (B61) No. 54 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the open or ground short in the harness of power supply circuit. |

### 4. CHECK M/B (MAIN RELAY) INPUT VOLTAGE.

Measure the voltage between M/B (main relay) terminal and engine ground.
**Terminals**
No. 1 (+) — Engine ground (−):
No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 5. |
| No | Repair the open or ground short in the harness of power supply circuit. |

### 5. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to OFF.
2. Install the main relay.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 29 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the open circuit of harness between ECM connector and M/B (main relay) terminal. |

### 6. CHECK INPUT VOLTAGE OF ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and engine ground.
   **Connector & terminal**
   (B61) No. 15 (+) — Engine ground (−):
   (B61) No. 31 (+) — Engine ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Check the starter motor circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>STARTER MOTOR CIRCUIT. |
| No | Repair the following item.<br>• Open circuit of harness between ECM connector and M/B (main relay)<br>• Poor contact of M/B (main relay)<br>• Blown out of fuse<br>• Poor contact of ECM connector |

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

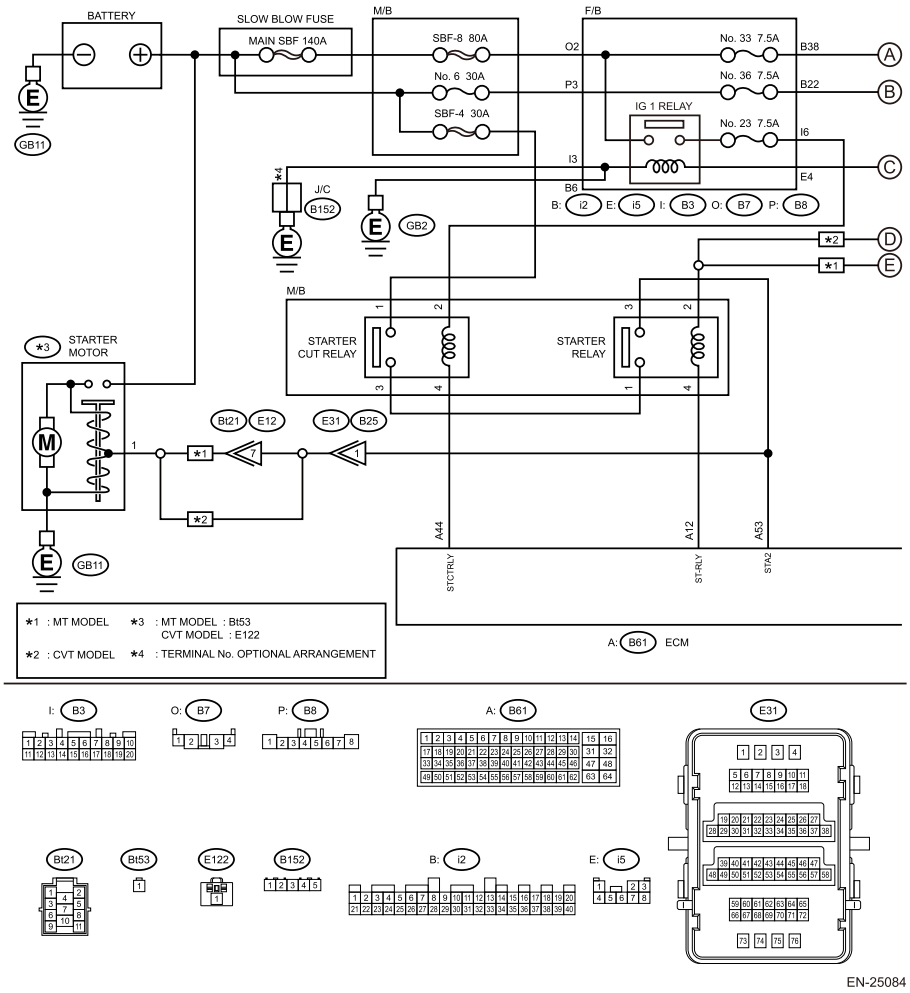
ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostics with Phenomenon

## STARTER MOTOR CIRCUIT

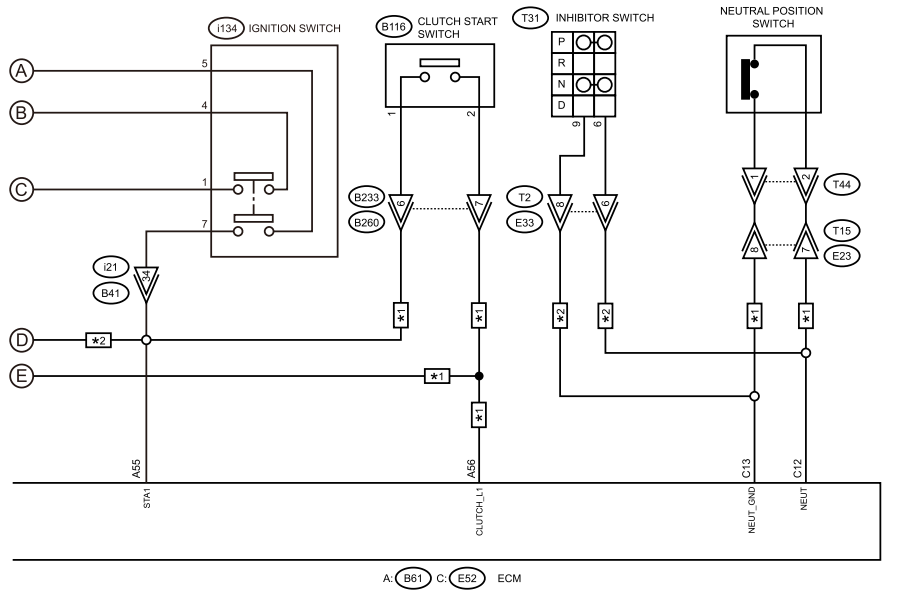
### 1. MODEL WITHOUT PUSH BUTTON START

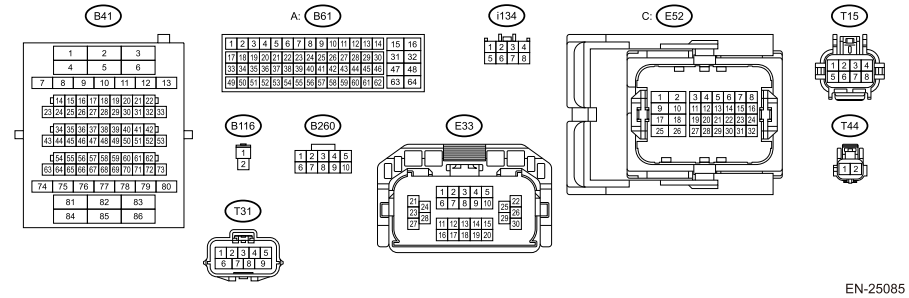
**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




EN-25084




EN-25085

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

1. CHECK BATTERY.
   - no → Perform the instructed procedures.
   - yes ↓

2. CHECK OPERATION OF STARTER MOTOR.
   - no → Go to 4.
   - yes ↓

3. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.

4. CHECK INPUT SIGNAL FOR STARTER MOTOR.
   - yes → Perform the instructed procedures.
   - no → Go to 5.

5. CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.
no → Perform the instructed procedures.
yes ↓

6. CHECK IGNITION SWITCH.
no → Perform the instructed procedures.
yes ↓

7. CHECK INPUT VOLTAGE OF IG1 RELAY.
no → Perform the instructed procedures.
yes ↓

8. CHECK IG1 RELAY GROUND CIRCUIT.
no → Perform the instructed procedures.
yes ↓

9. CHECK IG1 RELAY.
no → Perform the instructed procedures.
yes ↓

10. CHECK INPUT VOLTAGE OF STARTER CUT RELAY.
no → Perform the instructed procedures.
yes ↓

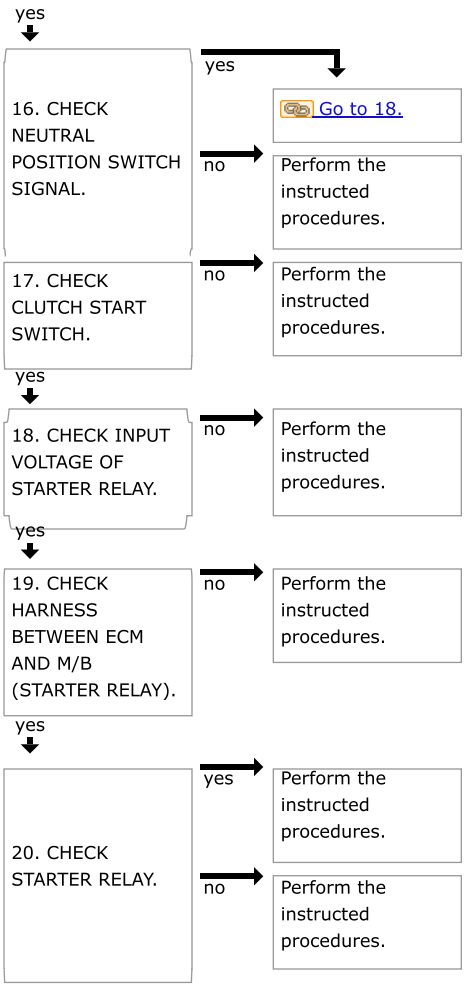
11. CHECK HARNESS BETWEEN ECM AND M/B (STARTER CUT RELAY).
no → Perform the instructed procedures.
yes ↓

12. CHECK STARTER CUT RELAY.
no → Perform the instructed procedures.
yes ↓

13. CHECK TRANSMISSION TYPE.
no → Go to 17.
yes ↓

14. CHECK INHIBITOR SWITCH.
no → Perform the instructed procedures.
yes ↓

15. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.
no → Perform the instructed procedures.




### 1. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.

Is the check result OK?

Yes — Go to 2.

No — Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery.

### 2. CHECK OPERATION OF STARTER MOTOR.

Check the starter motor operation.

Does the starter motor operate?

Yes — Go to 3.

No — Go to 4.

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are any DTCs displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST. |
| No | Check ignition control system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM. |

### 4. CHECK INPUT SIGNAL FOR STARTER MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from starter motor.
3. Measure the voltage between starter motor connector and engine ground with the ignition switch set to START position.
   **Connector & terminal**
   **CVT model**
   (E122) No. 1 (+) — Engine ground (−):
   **MT model**
   (Bt53) No. 1 (+) — Engine ground (−):

**Note:**
- **For CVT model, place the select lever in "P" range or "N" range.**
- **For MT model, depress the clutch pedal.**

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION. |
| No | Go to 5. |

### 5. CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition switch.
3. Measure the voltage between ignition switch connector and chassis ground.
   **Connector & terminal**
   (i134) No. 4 (+) — Chassis ground (−):
   (i134) No. 5 (+) — Chassis ground (−):

Is the voltage 10 V or more?

| | |
|---|---|
| Yes | Go to 6. |
| No | Repair the following item.<br>• Open or short circuit to ground in harness between battery and ignition switch connector<br>• Blown out of fuse<br>• Poor contact of F/B connector<br>• Replacement of F/B<br>• Replace M/B |

### 6. CHECK IGNITION SWITCH.

Measure the resistance between ignition switch terminals after turning the ignition switch to START position.
**Terminals**
No. 4 — No. 1:
No. 5 — No. 7:

Is the resistance less than 1 Ω?

Yes — Go to 7.

No — Replace the ignition switch. Ref. to SECURITY AND LOCKS>Ignition Key Lock>REPLACEMENT.

### 7. CHECK INPUT VOLTAGE OF IG1 RELAY.

1. Turn the ignition switch to OFF.
2. Remove the IG1 relay.
3. Connect the connector to ignition switch.
4. Turn the ignition switch to ON.
5. Measure the voltage between F/B (IG1 relay) connector and chassis ground.
   **Connector & terminal**
   (B7) No. 2 (+) — Chassis ground (−):
   (i5) No. 4 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 8.

No — Repair the following item.
- Open harness between F/B (IG1 relay) connector and ignition switch connector
- Open circuit of the harness between M/B and F/B (IG1 relay) connector
- Blown out of fuse

### 8. CHECK IG1 RELAY GROUND CIRCUIT.

1. Turn the ignition switch to OFF.
2. Measure the resistance in harness between F/B (IG1 relay) connector and chassis ground.
   **Connector & terminal**
   (B3) No. 3 — Chassis ground:
   (i2) No. 6 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 9.

No — Repair the following item.
- Open circuit of the harness between F/B (IG1 relay) connector and chassis ground
- Poor contact of J/C

### 9. CHECK IG1 RELAY.

Check the IG1 relay. Ref. to SECURITY AND LOCKS>Relay and Fuse>INSPECTION.

Is the check result OK?

Yes — Go to 10.

No — Replace the IG1 relay. Ref. to SECURITY AND LOCKS>Relay and Fuse.

### 10. CHECK INPUT VOLTAGE OF STARTER CUT RELAY.

1. Remove the starter cut relay.
2. Install the IG1 relay.
3. Turn the ignition switch to ON.
4. Measure the voltage between M/B (starter cut relay) terminals No. 1 and No. 2 and engine ground.
   **Terminals**
   No. 1 (+) — Engine ground (−):
   No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 11.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between SBF-4 and M/B (starter cut relay)
- Open circuit or short circuit to ground in harness between M/B (starter cut relay) and F/B (IG1 relay) connector
- Blown out of fuse
- Poor contact of F/B connector
- Replacement of F/B
- Replace M/B

### 11. CHECK HARNESS BETWEEN ECM AND M/B (STARTER CUT RELAY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and M/B (starter cut relay) terminal No. 4.
   **Connector & terminal**
   (B61) No. 44 — No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 12.

No — Repair the following item.
- Open circuit in harness between ECM connector and M/B (starter cut relay)
- Replace M/B

### 12. CHECK STARTER CUT RELAY.

Check the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>INSPECTION.

Is the check result OK?

Yes — Go to 13.

No — Replace the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>LOCATION.

### 13. CHECK TRANSMISSION TYPE.

Check the transmission type.

Is the transmission type CVT?

Yes — Go to 14.

No — Go to 17.

### 14. CHECK INHIBITOR SWITCH.

1. Place the select lever in "P" range or "N" range.
2. Disconnect the connector from inhibitor switch.
3. Measure the resistance between inhibitor switch terminals.

**Terminals**

No. 6 — No. 9:

Is the resistance less than 1 Ω?

Yes — Go to 15.

No — Replace the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch.

### 15. CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.

Measure the resistance of harness between ECM connector and inhibitor switch connector.

**Connector & terminal**

(E52) No. 12 — (T31) No. 6:

(E52) No. 13 — (T31) No. 9:

Is the resistance less than 1 Ω?

Yes — Go to 16.

No — Repair the following item.

- Open circuit in harness between ECM connector and inhibitor switch connector
- Poor contact of coupling connector

### 16. CHECK NEUTRAL POSITION SWITCH SIGNAL.

1. Connect all relays and connectors to their proper positions.
2. Turn the ignition switch to ON.
3. Place the select lever in "P" range or "N" range.
4. Using the Subaru Select Monitor, read the value in [Neutral Position Switch].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Is [Neutral] displayed?

Yes — Go to 18.

No — Repair the poor contact of ECM connector.

### 17. CHECK CLUTCH START SWITCH.

Check the clutch start switch. Ref. to CLUTCH SYSTEM>Clutch Switch>INSPECTION > CLUTCH START SWITCH.

Is the check result OK?

Yes — Go to 18.

No — Replace the clutch start switch. Ref. to CLUTCH SYSTEM>Clutch Switch.

### 18. CHECK INPUT VOLTAGE OF STARTER RELAY.

1. Turn the ignition switch to OFF.
2. Remove the starter relay.
3. Turn the ignition switch to START position, and measure the voltage between M/B (starter relay) terminal No. 1 and No. 2 and engine ground.

**Terminals**

No. 1 (+) — Engine ground (−):
No. 2 (+) — Engine ground (−):

**Note:**
- **For CVT model, place the select lever in "P" range or "N" range.**
- **For MT model, depress the clutch pedal.**

Is the voltage 10 V or more?

Yes — Go to 19.

No — Repair the following item.
- Open circuit in harness between M/B (starter relay) and M/B (starter cut relay)
- Open circuit in harness between M/B (starter relay) and ignition switch connector (CVT model)
- Open circuit in harness between M/B (starter relay) and clutch start switch connector (MT model)
- Poor contact of coupling connector
- Poor contact of the clutch start switch connector (MT model)

### 19. CHECK HARNESS BETWEEN ECM AND M/B (STARTER RELAY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and M/B (starter relay) terminal No. 4.

**Connector & terminal**

(B61) No. 12 — No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 20.

No — Repair the following item.
- Open circuit in harness between ECM connector and M/B (starter relay)
- Replace M/B

### 20. CHECK STARTER RELAY.

Check the starter relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>INSPECTION.

Is the check result OK?

Yes — Check the following item and repair if necessary.
- Open circuit of harness between M/B (starter relay) and starter motor connector
- Poor contact of coupling connector

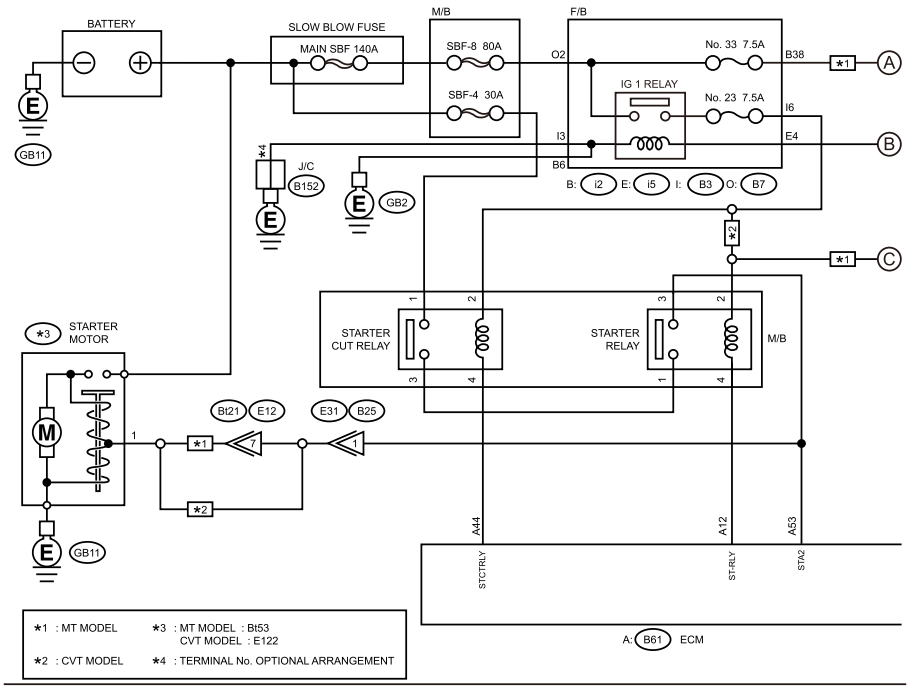
No — Replace the starter relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay.

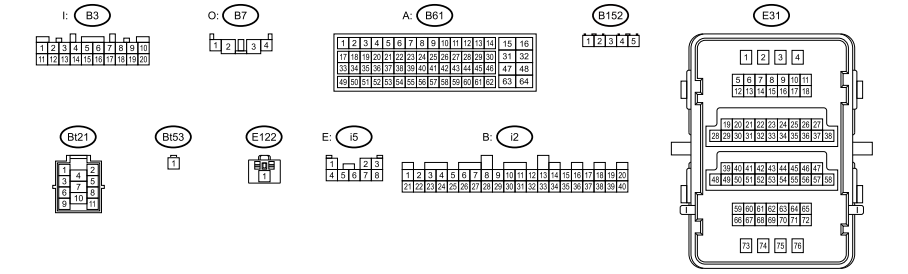
**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

## 2. MODEL WITH PUSH BUTTON START

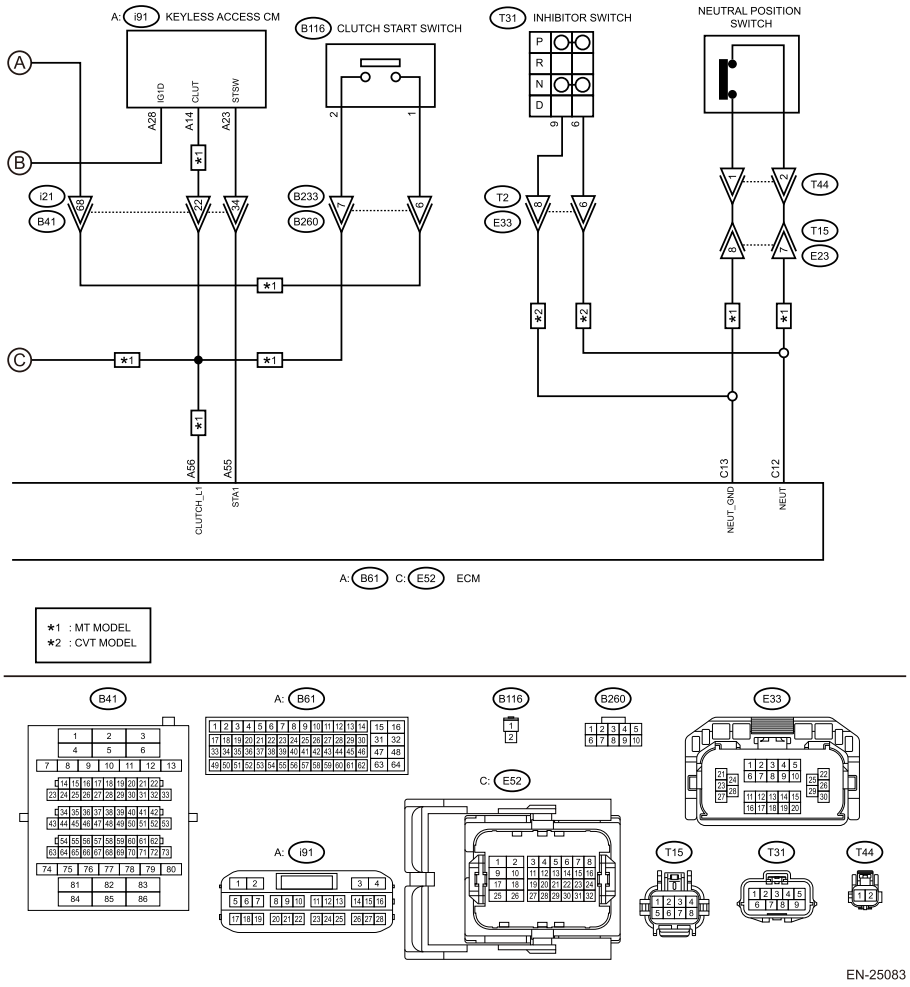
**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


BATTERY
SLOW BLOW FUSE
MAIN SBF 140A
M/B
SBF-8 80A
SBF-4 30A
F/B
O2
No. 33 7.5A
B38
IG 1 RELAY
No. 23 7.5A
I6
I3
E4
B6
B: i2 E: i5 I: B3 O: B7
GB11
J/C
B152
GB2
*1
*2
*3
*4
STARTER MOTOR
STARTER CUT RELAY
STARTER RELAY
M/B
Bt21 E12
E31 B25
A44
A12
A53
STCTRLY
ST-RLY
STA2
A: B61 ECM
*1 : MT MODEL
*2 : CVT MODEL
*3 : MT MODEL : Bt53
CVT MODEL : E122
*4 : TERMINAL No. OPTIONAL ARRANGEMENT


I: B3
O: B7
A: B61
B152
E31
Bt21
Bt53
E122
E: i5
B: i2

EN-25082

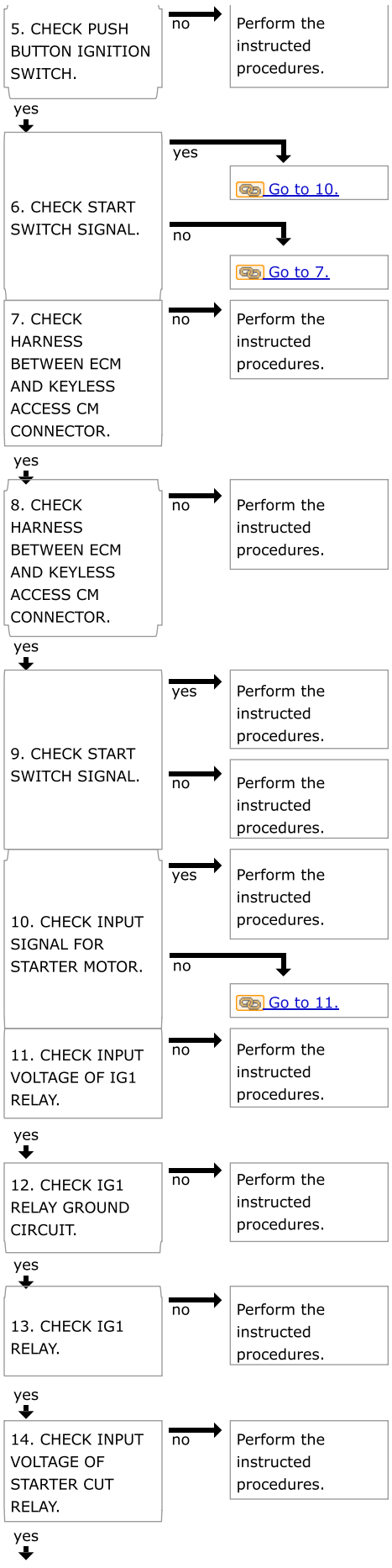


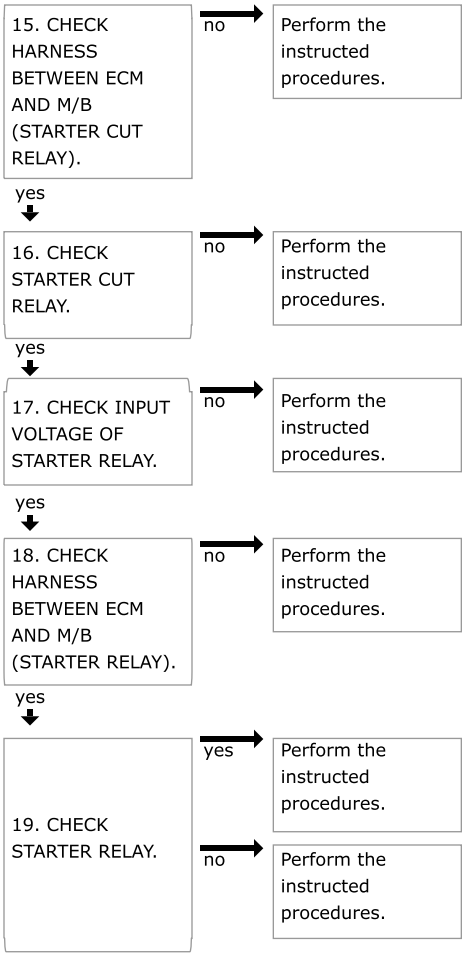

EN-25083

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

1. CHECK BATTERY.
   - no → Perform the instructed procedures.
   - yes ↓
2. CHECK OPERATION OF STARTER MOTOR.
   - no → Go to 4.
   - yes ↓
3. CHECK DTC.
   - yes → Perform the instructed procedures.
   - no → Perform the instructed procedures.
4. CHECK PUSH BUTTON IGNITION SWITCH.
   - no → Perform the instructed procedures.
   - yes ↓


5. CHECK PUSH BUTTON IGNITION SWITCH.
no
Perform the instructed procedures.
yes
6. CHECK START SWITCH SIGNAL.
yes
Go to 10.
no
Go to 7.
7. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM CONNECTOR.
no
Perform the instructed procedures.
yes
8. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM CONNECTOR.
no
Perform the instructed procedures.
yes
9. CHECK START SWITCH SIGNAL.
yes
Perform the instructed procedures.
no
Perform the instructed procedures.
10. CHECK INPUT SIGNAL FOR STARTER MOTOR.
yes
Perform the instructed procedures.
no
Go to 11.
11. CHECK INPUT VOLTAGE OF IG1 RELAY.
no
Perform the instructed procedures.
yes
12. CHECK IG1 RELAY GROUND CIRCUIT.
no
Perform the instructed procedures.
yes
13. CHECK IG1 RELAY.
no
Perform the instructed procedures.
yes
14. CHECK INPUT VOLTAGE OF STARTER CUT RELAY.
no
Perform the instructed procedures.
yes




### 1. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 2. |
| No | Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Battery. |

### 2. CHECK OPERATION OF STARTER MOTOR.

Check the starter motor operation.

Does the starter motor operate?

| | |
|---|---|
| Yes | Go to 3. |
| No | Go to 4. |

### 3. CHECK DTC.

Using the Subaru Select Monitor or a general scan tool, read the DTC of [Engine]. Ref. to COMMON (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are any DTCs displayed? (Current code)

Yes — Check the appropriate DTC using the "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

No — Check ignition control system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>IGNITION CONTROL SYSTEM.

### 4. CHECK PUSH BUTTON IGNITION SWITCH.

Press the push button ignition switch twice with the ignition OFF (ACC OFF).

**Note:**
- **Release the brake pedal. (CVT model)**
- **Release the clutch pedal. (MT model)**

Does the ignition turn to ON?

Yes — Go to 5.

No — Check the push button start system. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostics with Phenomenon>LIST.

### 5. CHECK PUSH BUTTON IGNITION SWITCH.

1. Depress the brake pedal (CVT model) or clutch pedal (MT model).

   **Note:**
   **For CVT model, position the select lever in "P" range.**
2. Check the push button ignition switch indicator.

Does the indicator turn to green?

Yes — Go to 6.

No — Check the push button start system. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START(DIAGNOSTICS)>Diagnostics with Phenomenon>LIST.

### 6. CHECK START SWITCH SIGNAL.

1. Using the Subaru Select Monitor, read the value in [Starter Switch].

   **Note:**
   **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**
2. Press the push button ignition switch once with the brake pedal depressed.

Does the value of [Starter Switch] change according to push button ignition switch operation?

Yes — Go to 10.

No — Go to 7.

### 7. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the keyless access CM.
4. Measure the resistance of harness between ECM connector and keyless access CM.

**Connector & terminal**

(B61) No. 55 — (i91) No. 23:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the following item.
- Open circuit of harness between ECM connector and keyless access CM connector
- Poor contact of coupling connector

### 8. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM CONNECTOR.

Measure the resistance between the ECM connector and engine ground.

**Connector & terminal**

(B61) No. 55 (+) — Engine ground (−):

Is the resistance 1 MΩ or more?

Yes — Go to 9.

No — Repair the short circuit to ground in harness between ECM connector and keyless access CM connector.

### 9. CHECK START SWITCH SIGNAL.

1. Connect the connector to ECM.
2. Connect the connector to the keyless access CM.
3. Read the waveform of start switch signal using an oscilloscope.
4. Press the push button ignition switch once with the brake pedal (CVT model) or clutch pedal (MT model) depressed.

**Connector & terminal**

(B61) No. 55 (+) — Engine ground (−):

Does waveform of the start switch signal occur?

Yes — Repair the poor contact of ECM connector.

No — Repair the poor contact of keyless access CM connector.

### 10. CHECK INPUT SIGNAL FOR STARTER MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from starter motor.
3. Set the select lever in "P" range or "N" range (CVT model), or the shift lever in neutral. (MT model)
4. Press the push button ignition switch once with the brake pedal (CVT model) or clutch pedal (MT model) depressed.
5. Measure the voltage between the starter motor connector and the engine ground.
   **Connector & terminal**
   **CVT model**
   (E122) No. 1 (+) — Engine ground (−):
   **MT model**
   (Bt53) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter>INSPECTION.

No — Go to 11.

### 11. CHECK INPUT VOLTAGE OF IG1 RELAY.

1. Turn the ignition switch to OFF.
2. Remove the IG1 relay.
3. Turn the ignition switch to ON.
4. Measure the voltage between F/B (IG1 relay) connector and chassis ground.
   **Connector & terminal**
   (B7) No. 2 (+) — Chassis ground (−):
   (i5) No. 4 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 12.

No — Repair the following item.
- Open circuit or short circuit to ground in harness between F/B (IG1 relay) connector and keyless access CM connector
- Open circuit of the harness between M/B and F/B (IG1 relay) connector
- Blown out of fuse

### 12. CHECK IG1 RELAY GROUND CIRCUIT.

1. Turn the ignition switch to OFF.
2. Measure the resistance in harness between F/B (IG1 relay) connector and chassis ground.
   **Connector & terminal**
   (B3) No. 3 — Chassis ground:
   (i2) No. 6 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 13.

No — Repair the following item.
- Open circuit of the harness between F/B (IG1 relay) connector and chassis ground
- Poor contact of J/C

### 13. CHECK IG1 RELAY.

Check the IG1 relay. Ref. to SECURITY AND LOCKS>Relay and Fuse>INSPECTION.

Is the check result OK?

Yes — Go to 14.

No — Replace the IG1 relay. Ref. to SECURITY AND LOCKS>Relay and Fuse.

### 14. CHECK INPUT VOLTAGE OF STARTER CUT RELAY.

1. Remove the starter cut relay.
2. Install the IG1 relay.
3. Turn the ignition switch to ON.
4. Measure the voltage between M/B (starter cut relay) terminal No. 1 and No. 2 and engine ground.

**Terminals**

No. 1 (+) — Engine ground (−):
No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 15.

No — Repair the following item.

- Open circuit or short circuit to ground in harness between SBF-4 and M/B (starter cut relay)
- Open circuit or short circuit to ground in harness between M/B (starter cut relay) and F/B (IG1 relay) connector
- Blown out of fuse
- Poor contact of F/B connector
- Replacement of F/B
- Replace M/B

### 15. CHECK HARNESS BETWEEN ECM AND M/B (STARTER CUT RELAY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and M/B (starter cut relay) terminal No. 4.

**Connector & terminal**

(B61) No. 44 — No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 16.

No — Repair the following item.

- Open circuit in harness between ECM connector and M/B (starter cut relay)
- Replace M/B

### 16. CHECK STARTER CUT RELAY.

Check the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>INSPECTION.

Is the check result OK?

Yes — Go to 17.

No — Replace the starter cut relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay.

### 17. CHECK INPUT VOLTAGE OF STARTER RELAY.

1. Remove the starter relay.
2. Install the starter cut relay.
3. Connect the connector to ECM.
4. While depressing the brake pedal (CVT model) or clutch pedal (MT model), press the push button ignition switch once, and measure the voltage between M/B (starter relay) terminal No. 1 and No. 2 and engine ground.
   **Terminals**
   No. 1 (+) — Engine ground (−):
   No. 2 (+) — Engine ground (−):

**Note:**
**For CVT model, position the select lever in "P" range.**

Is the voltage 10 V or more?

Yes — Go to 18.

No — Repair the following item.
- Open circuit in harness between M/B (starter relay) and M/B (starter cut relay)
- Open circuit of the harness between M/B (starter relay) and F/B (IG1 relay) connector (CVT model)
- Open circuit in harness between M/B (starter relay) and clutch start switch connector (MT model)

### 18. CHECK HARNESS BETWEEN ECM AND M/B (STARTER RELAY).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and M/B (starter relay) terminal No. 4.
   **Connector & terminal**
   (B61) No. 12 — No. 4:

Is the resistance less than 1 Ω?

Yes — Go to 19.

No — Repair the following item.
- Open circuit in harness between ECM connector and M/B (starter relay)
- Replace M/B

### 19. CHECK STARTER RELAY.

Check the starter relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay>INSPECTION.

Is the check result OK?

Yes — Check the following item and repair if necessary.
- Open circuit of harness between M/B (starter relay) and starter motor connector
- Poor contact of coupling connector

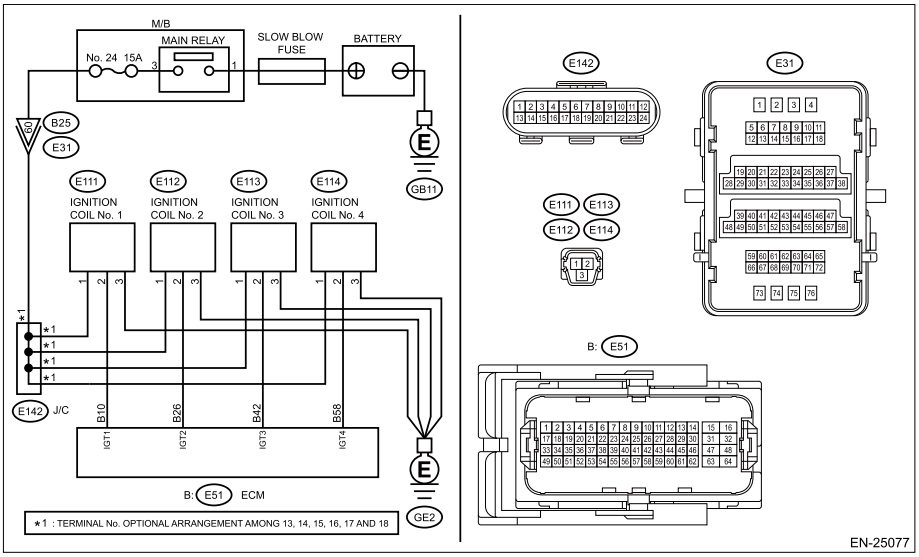
No — Replace the starter relay. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>Starter Relay.

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**



## IGNITION CONTROL SYSTEM

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

## 1. CHECK SPARK PLUG CONDITION.

Remove the spark plug, and check the condition. Ref. to IGNITION(H4DOTC)>Spark Plug>INSPECTION.

Is the check result OK?

Yes — Go to 2.

No — Replace the spark plug. Ref. to IGNITION(H4DOTC)>Spark Plug.

## 2. CHECK IGNITION SYSTEM FOR SPARKS.

1. Connect the spark plug to ignition coil.
2. Release the fuel pressure. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.
3. Contact the spark plug thread portion to engine.
4. While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.

Does spark occur at each cylinder?

Yes — Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL PUMP CIRCUIT.

No — Go to 3.

### 3. CHECK IGNITION COIL POWER SUPPLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition coil.
3. Turn the ignition switch to ON.
4. Measure the voltage between ignition coil connector and engine ground.

**Connector & terminal**

(E111) No. 1 (+) — Engine ground (−):
(E112) No. 1 (+) — Engine ground (−):
(E113) No. 1 (+) — Engine ground (−):
(E114) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Repair the following item.

- Open or short to ground in harness of power supply circuit
- Poor contact of coupling connector
- Poor contact of J/C
- Blown out of fuse

### 4. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between ignition coil connector and engine ground.

**Connector & terminal**

(E111) No. 3 — Engine ground:
(E112) No. 3 — Engine ground:
(E113) No. 3 — Engine ground:
(E114) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Go to 5.

No — Repair the open circuit in harness between ignition coil connector and engine ground.

### 5. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (OPEN).

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and ignition coil connector.

**Connector & terminal**

(E51) No. 10 — (E111) No. 2:
(E51) No. 26 — (E112) No. 2:
(E51) No. 42 — (E113) No. 2:
(E51) No. 58 — (E114) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the open circuit in harness between ECM connector and ignition coil connector.

### 6. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR (SHORT TO GROUND).

Measure the resistance of harness between ECM connector and engine ground.

**Connector & terminal**

(E51) No. 10 — Engine ground:
(E51) No. 26 — Engine ground:
(E51) No. 42 — Engine ground:
(E51) No. 58 — Engine ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the ground short circuit of harness between ECM connector and ignition coil connector.

### 7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes — Repair the poor contact of ECM connector.

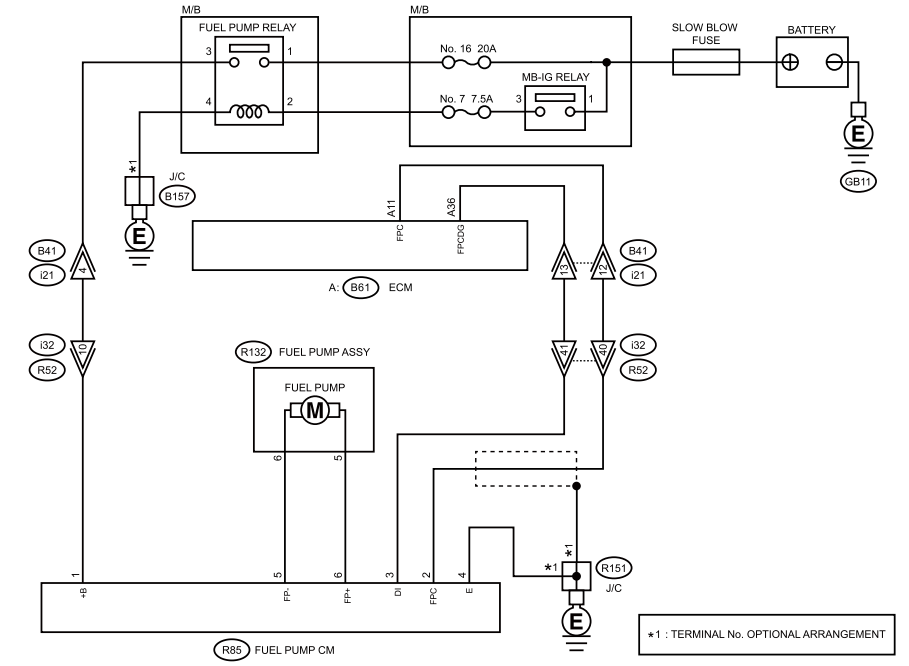
No — Replace the ignition coil. Ref. to IGNITION(H4DOTC)>Ignition Coil.

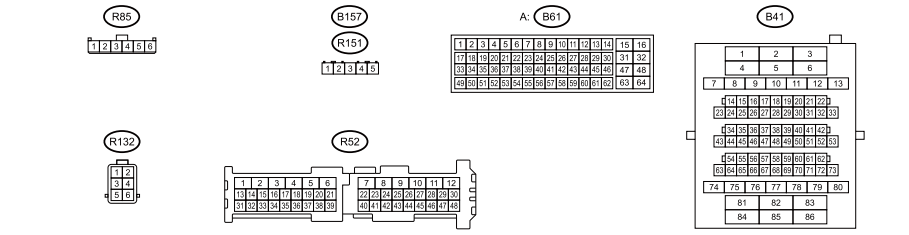
**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

## ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostics with Phenomenon

## FUEL PUMP CIRCUIT

**Wiring diagram:**
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




EN-25074

**Caution:**

**Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

## 1. CHECK OPERATING SOUND OF FUEL PUMP.

Check if the fuel pump operates for two seconds when turning the ignition switch to ON.

**Note:**

**Fuel pump operation can be executed using the Subaru Select Monitor.**

**Refer to "Active Test" for the procedures. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Active Test.**

Does the fuel pump emit operating sound?

Yes — Check the fuel injector circuit. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostics with Phenomenon>FUEL INJECTOR CIRCUIT.

No — Go to 2.

## 2. CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel pump control unit.
3. Measure the resistance of harness between fuel pump control unit connector and chassis ground.
   **Connector & terminal**
   (R85) No. 4 — Chassis ground:

Is the resistance less than 5 Ω?

Yes — Go to 3.

No — Repair the open circuit in harness between fuel pump control unit connector and chassis ground.

## 3. CHECK FUEL PUMP CONTROL UNIT POWER SUPPLY.

1. Turn the ignition switch to ON.
2. Measure the voltage between fuel pump control unit connector and chassis ground.
   **Connector & terminal**
   (R85) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 4.

No — Go to 5.

## 4. CHECK OF FUEL PUMP.

1. Turn the ignition switch to OFF.
2. Check fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly>INSPECTION.

Is the check result OK?

Yes — Repair the poor contact of fuel pump control unit connector.

No — Replace the fuel pump. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Assembly.

## 5. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND M/B (FUEL PUMP RELAY) (OPEN).

1. Remove the fuel pump relay.
2. Measure the resistance of harness between fuel pump control unit connector and M/B (fuel pump relay).
   **Connector & terminal**
   (R85) No. 1 — M/B (fuel pump relay) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 6.

No — Repair the following item.
- Open circuit in harness between fuel pump control unit connector and M/B (fuel pump relay)
- Poor contact of coupling connector

### 6. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND M/B (FUEL PUMP RELAY) (SHORT TO GROUND).

Measure the resistance of harness between fuel pump connector and M/B (fuel pump relay).
**Connector & terminal**
(R85) No. 1 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Go to 7.

No — Repair the short circuit to ground in harness between fuel pump control unit connector and M/B (fuel pump relay).

### 7. CHECK FUEL PUMP RELAY.

Check the fuel pump relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Relay>INSPECTION.

Is the check result OK?

Yes — Go to 8.

No — Replace the fuel pump relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Pump Relay.

### 8. CHECK POWER SUPPLY OF M/B (FUEL PUMP RELAY).

1. Turn the ignition switch to ON.
2. Measure the voltage between M/B (fuel pump relay) and engine ground.
   **Connector & terminal**
   M/B (fuel pump relay) No. 1 (+) — Engine ground (−):
   M/B (fuel pump relay) No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 9.

No — Repair the following item.
- Blown out of fuse
- Faulty MB-IG relay
- Poor contact of MB-IG relay

### 9. CHECK GROUND CIRCUIT OF M/B (FUEL PUMP RELAY) (OPEN).

1. Turn the ignition switch to OFF.
2. Measure the resistance in harness between M/B (fuel pump relay) terminal and engine ground.
   **Connector & terminal**
   M/B (fuel pump relay) No. 4 — Engine ground:

Is the resistance less than 5 Ω?

Yes — Repair the poor contact of fuel pump control unit connector.

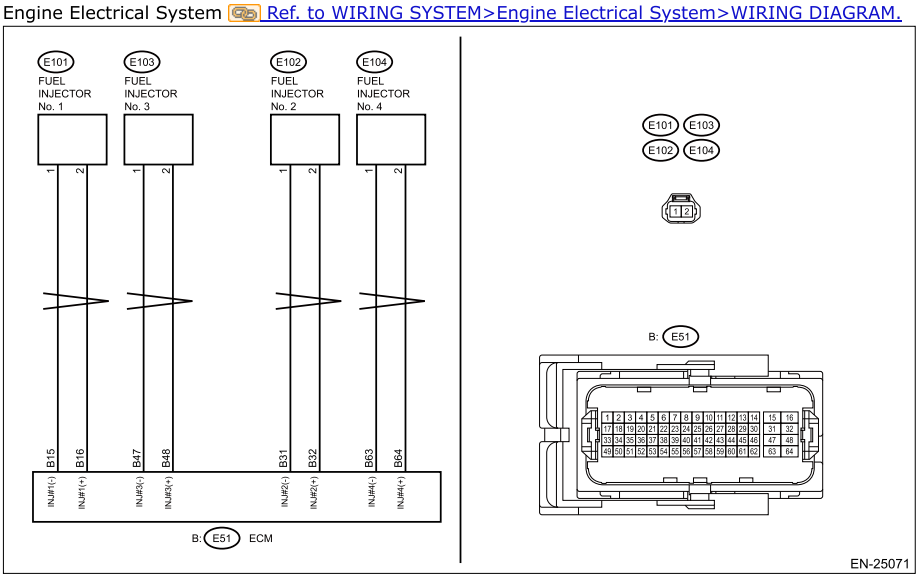
No — Repair the following item.
- Open circuit between M/B (fuel pump relay) and engine ground
- Poor contact of J/C

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

## FUEL INJECTOR CIRCUIT

**Wiring diagram:**

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




**Caution:**

- **Check or repair only faulty parts.**
- **Use the check board when measuring the ECM terminal voltage and resistance. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>General Description>PREPARATION TOOL > HOW TO USE CHECK BOARD.**

### 1. CHECK OPERATION OF EACH FUEL INJECTOR.

While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or attach a screwdriver to the injector to listen to sounds for this check.

Does the fuel injector emit operating sound?

Yes — Check the fuel pressure. Ref. to MECHANICAL(H4DOTC)>Fuel Pressure>INSPECTION.

No — Go to 2.

### 2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (OPEN).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from fuel injector.
4. Measure the resistance of harness between ECM and fuel injector connector.

**Connector & terminal**

#1 (E51) No. 15 — (E101) No. 1:
#1 (E51) No. 16 — (E101) No. 2:
#2 (E51) No. 31 — (E102) No. 1:
#2 (E51) No. 32 — (E102) No. 2:
#3 (E51) No. 47 — (E103) No. 1:
#3 (E51) No. 48 — (E103) No. 2:
#4 (E51) No. 63 — (E104) No. 1:
#4 (E51) No. 64 — (E104) No. 2:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the open circuit in harness between ECM and fuel injector connector.

### 3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR (SHORT TO GROUND).

Measure the resistance between fuel injector connector and engine ground.

**Connector & terminal**

#1 (E101) No. 1 — Engine ground:
#1 (E101) No. 2 — Engine ground:
#2 (E102) No. 1 — Engine ground:
#2 (E102) No. 2 — Engine ground:
#3 (E103) No. 1 — Engine ground:
#3 (E103) No. 2 — Engine ground:
#4 (E104) No. 1 — Engine ground:
#4 (E104) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

| | |
|---|---|
| Yes | Go to 4. |
| No | Repair the short circuit to ground in harness between ECM and fuel injector connector. |

### 4. CHECK EACH FUEL INJECTOR.

Check each fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Repair the poor contact of ECM connector. |
| No | Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Fuel Injector. |

**Note:**
**After the faulty parts are repaired or replaced, perform the final check in Basic Diagnostic Procedure. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Basic Diagnostic Procedure>PROCEDURE.**

ENGINE (DIAGNOSTICS)(H4DOTC) > Diagnostics with Phenomenon

## CHECK BRAKE OVERRIDE SYSTEM

**Warning:**
**Perform this test in a location where the driving can be checked safely, while paying sufficient attention to the vicinity. While driving, the traffic laws and regulations such as speed limit must always be observed.**

### 1. CHECK DTC.

1. Turn the ignition switch to ON.
2. Read the DTC of all systems using the Subaru Select Monitor or a general scan tool. Ref. to LAN SYSTEM (DIAGNOSTICS)>Diagnostic Trouble Code (DTC).

Are any DTCs displayed? (Current code)

| | |
|---|---|
| Yes | Check the appropriate DTC using the “Diagnostic Trouble Code (DTC)”. |
| No | Go to 2. |

### 2. READ DATA MONITOR.

Using the Subaru Select Monitor, read the value in [Stop Light Switch].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Stop Light Switch] change according to brake pedal operation?

| | |
|---|---|
| Yes | Go to 3. |
| No | Check the stop light switch and relevant harness, and repair the defective part or replace when necessary. Ref. to LIGHTING SYSTEM>Stop Light System. |

### 3. CHECK BRAKE PEDAL.

Check the brake pedal. Ref. to BRAKE>Brake Pedal>INSPECTION.

Is the check result OK?

| | |
|---|---|
| Yes | Go to 4. |
| No | Adjust or replace the brake pedal. Ref. to BRAKE>Brake Pedal. |

### 4. READ DATA MONITOR.

Using the Subaru Select Monitor, read the values in [Accelerator Pedal Pos.#1] and [Accelerator Pedal Pos.#2].

**Note:**
**For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Do the values of [Accelerator Pedal Pos.#1] and [Accelerator Pedal Pos.#2] change according to accelerator pedal operation?

| | |
|---|---|
| Yes | Go to 5. |
| No | Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(H4DOTC)>Accelerator Pedal. |

### 5. READ DATA MONITOR.

Using Subaru Select Monitor, read the value of [Vehicle Speed] when driving at a constant vehicle speed of 16.1 km/h (10 MPH) or 64.4 km/h (40 MPH).

**Warning:**
**During the driving test, the traffic laws and regulations such as speed limit must always be observed.**

**Note:**
- **Use of the data storage function of Subaru Select Monitor allows the data during driving to be stored. The stored data can be checked after the driving.**
- **For detailed operation procedures, refer to "COMMON (DIAGNOSTICS)". Ref. to COMMON (DIAGNOSTICS)>Data Monitor.**

Does the value of [Vehicle Speed] change widely?

| | |
|---|---|
| Yes | Check the combination meter. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure. |
| No | In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause. |

**Note:**

- **The value of [Accel. Opening Angle] on the data monitor normally changes according to the value of accelerator sensor No. 1 voltage ratio. (The values do not become the same. For values, refer to "Data Monitor".)**
- **Even if the voltage difference between [Accel. Opening Angle] and the accelerator sensor No. 1 is large and the value of [Accel. Opening Angle] is not consistent, the corresponding control can be considered to be activated if the value of the accelerator sensor No. 1 voltage ratio is consistent. (Use of the data storage function of Subaru Select Monitor allows the data during driving to be stored. The stored data can be checked after the driving.)**
- **When the customer complains of deceleration feeling when he/she intentionally depresses both the accelerator pedal and the brake pedal, advise them not to depress both pedals. (Example: Operated the brake pedal with the left foot while operating the accelerator pedal)**

## OPERATION

### 1. HOW TO USE GENERAL SCAN TOOL

1. Prepare a scan tool (general scan tool) required by SAE J1978.
2. Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side). Ref. to COMMON (DIAGNOSTICS)>Data Link Connector.
3. Using the general scan tool, call up each data. General scan tool functions consist of:
   (1) MODE $01: Current powertrain diagnostic data
   (2) MODE $02: Powertrain freeze frame data
   (3) MODE $03: Emission-related powertrain DTC
   (4) MODE $04: Clear/Reset emission-related diagnostic information
   (5) MODE $06: Request on-board monitoring test results for intermittently monitored systems
   (6) MODE $07: Initial emission-related powertrain DTC
   (7) MODE $08: Request control for on-board system, test, and component
   (8) MODE $09: Request vehicle information
   (9) MODE $0A: Emission-related DTC (with Permanent Status)
4. Read out the data according to repair procedures. (For detailed operation procedures, refer to the general scan tool operation manual.)

**Note:**
**For details concerning DTC, refer to "Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.**

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

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

| PID | Data | Unit |
|---|---|---|
| $01 | Number of emission-related powertrain DTC, and malfunction indicator light status and diagnosis support information | — |
| $03 | Fuel system control status | — |
| $04 | Calculated engine load value | % |
| $05 | Engine coolant temperature | Celsius |
| $06 | Short term fuel trim (bank 1) | % |
| $07 | Long term fuel trim (bank 1) | % |
| $0C | Engine speed | rpm |
| $0D | Vehicle speed | km/h |
| $0E | Ignition timing advance | ° |
| $10 | Intake air amount | g/s |
| $11 | Throttle valve opening angle | % |
| $13 | Air fuel ratio sensor | — |
| $15 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 1 sensor 2) | V and % |
| $1C | Supporting OBD system | — |
| $1F | Elapsed time after starting the engine | sec |
| $21 | Travel distance after the malfunction indicator light illuminates | km |
| $24 | A/F value and A/F sensor output voltage (bank 1 sensor 1) | — and V |
| $2C | Target EGR | % |
| $2D | EGR deviation | % |
| $2E | Evaporative purge | % |
| $2F | Fuel level | % |
| $30 | Number of warm ups after DTC clear | Time |
| $31 | Travel distance after DTC clear | km |
| $33 | Barometric pressure | kPa |
| $34 | A/F value and A/F sensor current (bank 1 sensor 1) | — and mA |
| $3C | Catalyst temperature #1 | Celsius |
| $41 | Diagnostic monitor of each drive cycle | — |
| $42 | ECM power voltage | V |
| $43 | Absolute load | % |
| $44 | A/F target lambda | — |
| $45 | Relative throttle opening angle | % |
| $46 | Ambient temperature | Celsius |
| $47 | Absolute throttle opening angle 2 | % |
| $49 | Absolute accelerator opening angle 1 | % |
| $4A | Absolute accelerator opening angle 2 | % |
| $4C | Target throttle opening angle | % |
| $4D | Engine operating time while malfunction indicator lit | min |
| $4E | Elapsed time after DTC clear | min |
| $51 | Fuel used | — |
| $53 | ELCM pressure | kPa |
| $5A | Relative accelerator opening angle | % |
| $5C | Engine oil temperature | Celsius |
| $62 | Actual engine illustrated torque | % |
| $63 | Engine reference torque | Nm |
| $65 | Neutral status | — |
| $68 | Intake air temperature | Celsius |
| $6D | Fuel pressure and target fuel pressure | kPa |
| $72 | Actual wastegate opening angle and target wastegate opening angle | % |
| $87 | Intake manifold absolute pressure | kPa |
| $8E | Engine friction torque | % |
| $9D | Engine fuel consumption and vehicle fuel consumption | g/s |
| $9E | Engine exhaust flow | kg/h |
| $A6 | Vehicle Odometer | km |

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

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

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

| PID | Data | Unit |
|---|---|---|
| $02 | DTC that caused freeze frame data to be stored | — |
| $03 | Fuel system control status | — |
| $04 | Calculated engine load value | % |
| $05 | Engine coolant temperature | Celsius |
| $06 | Short term fuel trim (bank 1) | % |
| $07 | Long term fuel trim (bank 1) | % |
| $0C | Engine speed | rpm |
| $0D | Vehicle speed | km/h |
| $0E | Ignition timing advance | ° |
| $10 | Intake air amount | g/s |
| $11 | Throttle valve opening angle | % |
| $13 | Air fuel ratio sensor | — |
| $15 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 1 sensor 2) | V and % |
| $1F | Elapsed time after starting the engine | sec |
| $24 | A/F value and A/F sensor output voltage (bank 1 sensor 1) | — and V |
| $2C | Target EGR | % |
| $2D | EGR deviation | % |
| $2E | Evaporative purge | % |
| $2F | Fuel level | % |
| $33 | Barometric pressure | kPa |
| $34 | A/F value and A/F sensor current (bank 1 sensor 1) | — and mA |
| $3C | Catalyst temperature #1 | Celsius |
| $42 | ECM power voltage | V |
| $43 | Absolute load | % |
| $44 | A/F target lambda | — |
| $45 | Relative throttle opening angle | % |
| $46 | Ambient temperature | Celsius |
| $47 | Absolute throttle opening angle 2 | % |
| $49 | Absolute accelerator opening angle 1 | % |
| $4A | Absolute accelerator opening angle 2 | % |
| $4C | Target throttle opening angle | % |
| $5C | Engine oil temperature | Celsius |
| $65 | Neutral status | — |
| $68 | Intake air temperature | Celsius |
| $6D | Fuel pressure and target fuel pressure | kPa |
| $72 | Actual wastegate opening angle and target wastegate opening angle | % |

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

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

Refer to "Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. Ref. to ENGINE (DIAGNOSTICS) (H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.

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

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

**Note:**
- **Refer to the manufacturer's operation manual for the general scan tool to clear the emission-related diagnostic information (MODE $04).**
- **Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.**

### 6. MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR INTERMITTENTLY MONITORED SYSTEMS)

OPERATION

1. On [Start] screen, select [Generic OBDII].
2. On [Main Menu] screen, select [Each System].

***3.*** On [Select System] screen, select [ECM-Engine Control] and then select [Enter].
***4.*** On [Select Function] screen, select [On-board monitor test result].
Refer to diagnostic value of troubleshooting and data of test limit indicated on the support data bit sequence table. A list of the support data is shown in the table 1.

**Note:**
- **Subaru Select Monitor**
  **For detailed operation procedures, refer to "Help" of application.**
- **General scan tool**
  **For detailed operation procedures, refer to the general scan tool operation manual.**
- **Some items are not displayed according to the specifications.**
- **List of measurement items for each DTC of "VVT monitor bank 1" and "VVT monitor bank 2"**
  **A list of the measurement items is shown in the table 2. (Used to check on-board monitor test results of DTC P000A, P000B, P000C, P000D, P0011, P0014, P0016, P0017, P0018, P0019, P0021 and P0024.)**

List 1

| OBDMID | TID | SID | Diagnostic item |
|---|---|---|---|
| $01 | $84 | $1E | A/F sensor range failure (bank 1 sensor 1) |
| | $85 | $1E | |
| | $91 | $20 | A/F sensor response failure (bank 1 sensor 1) |
| | $92 | $10 | |
| | $A3 | $20 | |
| | $A4 | $10 | |
| | $AC | $10 | |
| | $AD | $10 | |
| | $AE | $10 | |
| | $AF | $10 | |
| | $CD | $20 | |
| | $CF | $20 | |
| $02 | $05 | $10 | Oxygen sensor response failure (bank 1 sensor 2) |
| | $06 | $10 | |
| | $07 | $0B | Oxygen sensor drop failure (bank 1 sensor 2) |
| | $08 | $0B | |
| | $D1 | $10 | Oxygen sensor delay failure (bank 1 sensor 2) |
| | $D2 | $10 | |
| $21 | $89 | $3B | Catalyst deterioration diagnosis (bank 1) |
| $31 | $BE | $17 | EGR system diagnosis |
| | $BF | $17 | |
| $35 | $8B | $9D | VVT monitor bank 1 |
| | $8C | $9D | |
| | $8D | $9D | |
| | $8E | $9D | |
| | $D3 | $9D | |
| | $D5 | $9D | |
| | $D6 | $9D | |
| $36 | $8B | $9D | VVT monitor bank 2 |
| | $8C | $9D | |
| | $8D | $9D | |
| | $8E | $9D | |
| | $D3 | $9D | |
| | $D5 | $9D | |
| | $D6 | $9D | |
| $3C | $C1 | $FE | Evaporative emission control system |
| | $C2 | $FE | |
| | $C3 | $FE | |
| | $C4 | $FE | |
| | $C5 | $FE | |
| | $C6 | $35 | |
| | $C7 | $FE | |
| | $C8 | $FE | |
| | $C9 | $FE | |
| | $CA | $FE | |
| $3D | $E2 | $FE | ELCM purge flow |

| OBDMID | TID | SID | Diagnostic item |
|---|---|---|---|
| | $EA | $FC | |
| | $EB | $FC | |
| | $EC | $FE | |
| $41 | $9B | $14 | A/F sensor heater characteristics failure (bank 1 sensor 1) |
| $42 | $E1 | $0E | Oxygen sensor heater characteristics failure (bank 1 sensor 2) |
| $81 | $DB | $24 | Imbalance diagnosis |
| | $DC | $24 | Imbalance diagnosis |
| | $DD | $03 | Imbalance diagnosis |
| | $DE | $03 | Imbalance diagnosis |
| $A1 | $0B | $24 | Misfire monitoring (all cylinders) |
| | $0C | $24 | |
| $A2 | $0B | $24 | Misfire monitoring (#1 cylinder) |
| | $0C | $24 | |
| $A3 | $0B | $24 | Misfire monitoring (#2 cylinder) |
| | $0C | $24 | |
| $A4 | $0B | $24 | Misfire monitoring (#3 cylinder) |
| | $0C | $24 | |
| $A5 | $0B | $24 | Misfire monitoring (#4 cylinder) |
| | $0C | $24 | |

List 2

| OBDMID | TID | SID | Diagnostic item | | |
|---|---|---|---|---|---|
| $35 | $8B | $9D | + | Intake | VVT monitor bank 1 (RH) |
| | $8C | $9D | − | | |
| | $8D | $9D | + | Exhaust | |
| | $8E | $9D | − | | |
| $36 | $8B | $9D | + | Intake | VVT monitor bank 2 (LH) |
| | $8C | $9D | − | | |
| | $8D | $9D | + | Exhaust | |
| | $8E | $9D | − | | |

## 7. MODE $07 (INITIAL EMISSION-RELATED POWERTRAIN DTC)

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

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

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

## 9. MODE $09 (REQUEST VEHICLE INFORMATION)

Refer to the data of the vehicle specification.

## 10. MODE $0A (EMISSION-RELATED DTC (WITH PERMANENT STATUS))

Refer to “Diagnostic Trouble Code (DTC)” for information about data denoting emission-related DTC. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Diagnostic Trouble Code (DTC)>LIST.