**DESCRIPTION**

Refer to DTC P0412 (See page ES-214).

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P2444   | Air pump stuck ON. The secondary air pressure is more than 5 kPa (38 mmHg) despite the ECM ordering the air pump to turn off. (2 trip detection logic) | • Short in air pump circuit  
• Air injection control driver (AID)  
• Pressure sensor  
• Open or short in pressure sensor circuit  
• ECM |
| P2445   | Air pump stuck OFF or air injection volume is insufficient. The amount of air flow is below the criteria. (The secondary air pressure is less than specified value despite the ECM ordering the air pump turn ON.) (2 trip detection logic) | • Air pump fuse  
• Vacuum hose  
• Air pump assembly  
• Air injection control driver (AID)  
• Open in air pump circuit  
• Air injection system piping  
• Pressure sensor  
• Open or short in pressure sensor circuit  
• ECM |

**MONITOR DESCRIPTION**

P2444:
The ECM observes the pressure in the secondary air passage using the pressure sensor located on the air switching valve in the secondary air injection system. The sensor measures the pressure in the secondary air passage and sends a signal to the ECM.

If the pressure level from the sensor exceeds a certain level despite the ECM turning off the air pump, the ECM interprets this as a fault in the secondary air injection system and sets a DTC.

P2445:
The ECM calculates the amount of air flow within the secondary air system based on the output values of the pressure sensor and mass air flow meter.

The ECM determines whether the amount of air flow is normal or not according to the calculated value. When the amount of air flow is below the criteria, the ECM stores the DTC and illuminates the MIL.

**MONITOR STRATEGY**

| Related DTCs | (Case 1) P2444 Air pump stuck ON  
(Case 2) P2445 Air pump stuck OFF  
(Case 3) P2445 Air insufficient  
(Case 4) P2445 Air pressure sensor stuck |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Required sensors/Components</td>
<td>AIR valve, AIR VSV bank 1, AIR VSV bank 2</td>
</tr>
<tr>
<td>Required sensors/Components</td>
<td>AIR pressure sensor</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>Within 20 seconds</td>
</tr>
<tr>
<td>MIL operation</td>
<td>2 driving cycles</td>
</tr>
<tr>
<td>Sequence operation</td>
<td>None</td>
</tr>
</tbody>
</table>
TYPICAL ENABLING CONDITIONS

All:

- P0010, P0020: VVT system
- P0011: VVT System 1 - Advance
- P0012: VVT System 1 - Retard
- P0016, P0018: VVT System - Misalignment
- P0021: VVT System 2 - Advance
- P0022: VVT System 2 - Retard
- P0031, P0032, P0051, P0052: Front A/F sensor heater
- P0100 - P0103: MAF sensor
- P0110 - P0113: IAT sensor
- P0115 - P0118: ECT sensor
- P0120 - P0223, P2125: TP sensor
- P0125: Closed loop
- P0171 - P0175: Fuel trim
- P0300 - P0308: Misfire
- P0327 - P0333: Knock sensor
- P0335: CKP sensor
- P0340 - P0346: VVT sensor
- P0351 - P0358: Igniter
- P0445 - P0446: EVAP system
- P0450 - P0453: EVAP press sensor
- P0500: VSS
- P2196, P2198: A/F sensor - rationality
- P2237, P2240: A/F sensor - open
- P2430 - P2433: AIR pressure sensor
- P2A00, P2A03: A/F sensor - slow response

This monitor runs whenever these DTCs are not present

Air pressure sensor stuck

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECT at engine start</td>
<td>Lower than 5°C (41°F)</td>
</tr>
<tr>
<td>IAT at engine start</td>
<td>-15°C (5°F) or higher</td>
</tr>
<tr>
<td>Time that ECT is 80°C (176°F) or higher</td>
<td>10 to 60 minutes</td>
</tr>
<tr>
<td>Cumulative intake air amount</td>
<td>109 g/sec. or more</td>
</tr>
<tr>
<td>Monitor Sequence 3</td>
<td>Completed</td>
</tr>
<tr>
<td>AIR valve</td>
<td>OFF</td>
</tr>
<tr>
<td>AIR valve bank 1</td>
<td>OFF</td>
</tr>
<tr>
<td>AIR valve bank 2</td>
<td>OFF</td>
</tr>
<tr>
<td>One of the following conditions is met</td>
<td>-</td>
</tr>
<tr>
<td>- Vehicle speed</td>
<td>80 km/h or more</td>
</tr>
<tr>
<td>- Engine RPM</td>
<td>0 rpm or more</td>
</tr>
<tr>
<td>- Throttle position</td>
<td>0° or more</td>
</tr>
</tbody>
</table>

Other:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric pressure</td>
<td>45 kPa (420 mmHg) or more</td>
</tr>
<tr>
<td>Battery voltage</td>
<td>10.5 V or higher</td>
</tr>
</tbody>
</table>

AIR monitor runs in accordance with the monitor sequence 1 to 5

Monitor Sequence 1

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle</td>
<td>ON</td>
</tr>
<tr>
<td>AIR status</td>
<td>ON</td>
</tr>
<tr>
<td>AIR pump</td>
<td>ON</td>
</tr>
<tr>
<td>AIR valve</td>
<td>ON</td>
</tr>
<tr>
<td>Either of following conditions 1 or 2 is met</td>
<td>-</td>
</tr>
<tr>
<td>1. Both of the following conditions are met</td>
<td>-</td>
</tr>
<tr>
<td>- AIR valve bank 1</td>
<td>ON</td>
</tr>
<tr>
<td>- AIR valve bank 2</td>
<td>OFF</td>
</tr>
<tr>
<td>2. Both of the following conditions are met</td>
<td>-</td>
</tr>
<tr>
<td>- AIR valve bank 1</td>
<td>OFF</td>
</tr>
</tbody>
</table>
### TYPICAL MALFUNCTION THRESHOLDS

#### P2444 AIR pump ON stuck

- AIR pressure during AIR OFF: 5 kPa or more

#### P2445 AIR pump OFF stuck

- AIR pressure during AIR ON: Less than 1 kPa
P2445 AIR insufficient
AIR amount 100 L/min. or less

P2445 AIR pressure sensor stuck
AIR pressure change 5 kPa or more

MONITOR RESULT
Refer to CHECKING MONITOR STATUS (See page ES-17).

WIRING DIAGRAM
Refer to DTC P0412 (See page ES-217).

INSPECTION PROCEDURE
HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

1. CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2444 AND P2445)
(a) Connect the intelligent tester to the DLC3 with CAN VIM.
(b) Turn the ignition switch ON and push the intelligent tester main switch ON.
(c) Enter the following menus: DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES.
(d) Read the DTCs.

Result

<table>
<thead>
<tr>
<th>Display (DTC Output)</th>
<th>Proceed to</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2445</td>
<td>A</td>
</tr>
<tr>
<td>P2444</td>
<td>B</td>
</tr>
<tr>
<td>P2444 and P2445</td>
<td>C</td>
</tr>
<tr>
<td>“P2444 and P2445” and other DTCs</td>
<td></td>
</tr>
</tbody>
</table>

HINT:
If any other codes besides P2444 or P2445 is output, perform the troubleshooting for those DTCs first.

B  Go to step 7

C  GO TO DTC CHART
2 CHECK AIR INJECTION SYSTEM PRESSURE

(a) Start the engine and warm it up.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the DLC3 with CAN VIM.
(d) Turn the ignition switch ON and push the intelligent tester main switch ON.
(e) Start the engine.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.
   HINT:
   OPERATION 1: AP: OFF, EASV: CLOSE, ASV1: CLOSE, ASV2: CLOSE
   OPERATION 2: AP: ON, EASV: OPEN, ASV1: OPEN, ASV2: OPEN
(g) Check that the PRESSURE on the intelligent tester.
   NOTICE:
   This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.
   While the AI system operation using the intelligent tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.

   Standard pressure

<table>
<thead>
<tr>
<th>Tester operation</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation 1</td>
<td>Less than 2.5 kPa</td>
</tr>
<tr>
<td>Operation 2</td>
<td>5 to 8 kPa or more</td>
</tr>
</tbody>
</table>

NG Go to step 4

OK

3 CHECK WHETHER DTC OUTPUT RECURS

(a) Start the engine and warm it up.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the DLC3 with CAN VIM.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Clear the DTCs (See page ES-35).
(f) Start the engine.
(g) Perform ACTIVE TEST to operate the air injection system.
   Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / AUTOMATIC OPERATION
(h) After operating the secondary air injection system, confirm the pending codes for the secondary air injection system by entering the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(i) Read DTC and check DTC.
   **OK:**
   DTC P2444 or P2445 for the secondary air injection system is not output.

NG  Go to step 4

CHECK FOR INTERMITTENT PROBLEMS

4 CHECK VACUUM HOSES

(a) Remove the intake manifold (See page ES-501).
(b) Check the vacuum hose connection between the pressure sensor and air switching valve.
   **OK:**
   The vacuum hose is securely connected.
(c) Inspect the vacuum hose for blockage and damage.
   **OK:**
   The vacuum hose has no blockage and damage.

NG  REPAIR OR REPLACE VACUUM HOSES

OK

5 READ VALUE OF INTELLIGENT TESTER (AIR VOLTAGE)

(a) Remove the intake manifold (See page ES-501).
(b) Connect the pressure gauge to the pressure sensor as shown in the illustration.
(c) Connect the intelligent tester to the DLC3 with CAN VIM.
(d) Turn the ignition switch ON and push the intelligent tester main switch ON (Do not start engine).
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / AIR PMP PRS.
(f) Check that the pressure displayed on the intelligent tester fluctuates when applying the pressure to the pressure sensor with the pressure gauge.
   **OK:**
   Pressure fluctuates in response to the pressure applied with pressure gauge.

NG  REPLACE PRESSURE SENSOR

OK
6  CHECK PIPING AND HOSES (CONNECTION OF ALL AIR INJECTION SYSTEM)

(a) Remove the intake manifold (See page ES-501).
(b) Check that all the pipes and hoses between the air pump and air switching valve are securely connected.
   OK:
   All air injection pipes and hoses are securely connected.
(c) Check all pipes and hoses for blockages and damage.
   OK:
   All air injection pipes and hoses have no blockages and damage.
   NG
   REPAIR OR REPLACE AIR INJECTION SYSTEM PIPING AND HOSES

7  INSPECT AIR INJECTION CONTROL DRIVER (POWER SOURCE CIRCUIT)

(a) Remove the intake manifold (See page ES-501).
(b) Disconnect the A44 Air Injection Control Driver (AID) connectors.
(c) Turn the ignition switch ON.
(d) Measure the voltage between terminals A44-5 (+B) and A43-1 (BATT) of the AID and body ground.
   Standard voltage

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>+B (A44-5) - Body ground</td>
<td>10 V or more</td>
</tr>
<tr>
<td>BATT (A43-1) - Body ground</td>
<td></td>
</tr>
</tbody>
</table>

(e) Measure the resistance between the terminal A44-1 (E) of the AID and body ground.
   Standard resistance

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>E (A44-1) - Body ground</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

(f) Reconnect the AID connector.

NG
REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

---

Wire Harness Side

A44 AID Connector

A43 AID Connector

E +B BATT

Front View

Front View

---

A115720E02

G032737E01
INSPECT ECM (AIRP AND AIRV VOLTAGE)

(a) Connect the intelligent tester to the DLC3 with CAN VIM.
(b) Turn the ignition switch ON and turn the tester ON.
(c) When the air pump and air switching valve are operated using the intelligent tester, measure voltage between terminal E8-25 (AIRP) and E8-4 (AIRV) of the AID connector and body ground.

**Standard voltage**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Air pump operation</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRP (E8-25) - Body ground</td>
<td>ON</td>
<td>10 V or more</td>
</tr>
<tr>
<td>AIRP (E8-25) - Body ground</td>
<td>OFF</td>
<td>3.5 to 7.7 V*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Air switching valve (ASV) operation (EASV)</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRV (E8-4) - Body ground</td>
<td>OPEN</td>
<td>10 V or more</td>
</tr>
<tr>
<td>AIRV (E8-4) - Body ground</td>
<td>CLOSE</td>
<td>3.5 to 7.7 V*</td>
</tr>
</tbody>
</table>

(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.

**HINT:**
OPERATION 1: AP: OFF, EASV: CLOSE, ASV1: CLOSE, ASV2: CLOSE
OPERATION 2: AP: ON, EASV: OPEN, ASV1: OPEN, ASV2: OPEN

**NOTICE:**
This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the intelligent tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.

**HINT:**
*: 35 to 55 % of the +B voltage.

NG REPLACE ECM
(a) Disconnect the A44 air injection driver connector.
(b) Connect the intelligent tester to the DLC3 with CAN VIM.
(c) Turn the ignition switch ON and turn the tester ON.
(d) When the air pump and air switching valve are operated using the intelligent tester, measure the voltage between terminals A44-3 (SIV) and A44-4 (SIP) of the air injection driver connector and body ground.

**Standard voltage**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Air pump operation</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIP (A44-4) - Body ground</td>
<td>ON</td>
<td>10 V or more</td>
</tr>
<tr>
<td>SIP (A44-4) - Body ground</td>
<td>OFF</td>
<td>3.5 to 7.7 V*</td>
</tr>
</tbody>
</table>

**Standard voltage**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>ASV operation (EASV)</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIV (A44-3) - Body ground</td>
<td>OPEN</td>
<td>10 V or more</td>
</tr>
<tr>
<td>SIV (A44-3) - Body ground</td>
<td>CLOSE</td>
<td>3.5 to 7.7 V*</td>
</tr>
</tbody>
</table>

(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.

**HINT:**
OPERATION 1: AP: OFF, EASV: CLOSE, ASV1: CLOSE, ASV2: CLOSE
OPERATION 2: AP: ON, EASV: OPEN, ASV1: OPEN, ASV2: OPEN

**NOTICE:**
This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the intelligent tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.

*: 35 to 55 % of the +B voltage.

**NG**

REPAIR OR REPLACE HARNESS OR CONNECTOR
Remove the hose between EASV and ASV.
(b) Connect the intelligent tester to the DLC3 with CAN VIM.
(c) Turn the ignition switch ON and turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / AIR INJ CHECK / MANUAL / OPERATION / OPERATION 2.
(e) When the air pump is operated, check that air comes out from the air pump.
HINT:
OPERATION 2: AP: ON, EASV: CLOSE, ASV1: CLOSE, ASV2: CLOSE
NOTICE:
• This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.
  While the AI system operation using the intelligent tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.
• When performing the AIR INJ CHECK operation after the battery cable has been reconnected, wait for 7 minutes with the ignition switch turned ON or the engine running.
• Turn the ignition switch OFF when the AIR INJ CHECK operation finishes.
OK:
Air comes out from the air pump

NG > REPLACE AIR PUMP

CHECK WHETHER DTC OUTPUT NOT RECURS