Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>W</td>
<td>Knock sensor (bank 1)</td>
<td>[Engine is running] • Idle speed</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>W</td>
<td>Knock sensor (bank 2)</td>
<td></td>
<td>Approximately 2.5V</td>
</tr>
</tbody>
</table>

Diagnostic Procedure

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and body ground. Refer to Wiring Diagram.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistence: Approximately 532 - 588 kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor (bank 1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 4.
   NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

● Harness connectors F26, F101
● Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

Refer to EC-253, "Component Inspection".

OK or NG
OK >> GO TO 5.
NG >> Replace knock sensor.
5. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check harness continuity between knock sensor terminal 2 and body ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F26, F101
- Harness connectors F14, E5
- Harness for open or short between knock sensor terminal 2 and body ground

>> Repair open circuit or short power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END
Component Inspection
KNOCK SENSOR
Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Removal and Installation
KNOCK SENSOR
Refer to EM-74, "CYLINDER BLOCK".
DTC P0335 CKP SENSOR (POS)

Component Description

The crankshaft position sensor (POS) is located on the A/T assembly facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG SPEED</td>
<td>Run engine and compare CONSULT-II value with the tachometer indication.</td>
<td>Almost the same speed as the tachometer indication.</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0335</td>
<td>Crankshaft position sensor (POS) circuit</td>
<td>• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.</td>
<td>• Harness or connectors (The sensor circuit is open or shorted) • Crankshaft position sensor (POS) • Signal plate</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-256, “Diagnostic Procedure” .

WITH GST

Follow the procedure “WITH CONSULT-II” above.
DTC P0335 CKP SENSOR (POS)

Wiring Diagram

EC-POS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

Revision: July 2007 2004 Titan

EC-255

2004 Titan
DTC P0335 CKP SENSOR (POS)

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 13           | O          | Crankshaft position sensor (POS) | [Engine is running]  
  ● Warm-up condition  
  ● Idle speed  
  **NOTE:**  
The pulse cycle changes depending on rpm at idle. | ![Graph] 1.0 - 2.0V ★ |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to [EC-132, "Ground Inspection"] .

**OK or NG**

**OK**  >> GO TO 2.
**NG**  >> Repair or replace ground connections.
2. **CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT**

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.

3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-II or tester.
   - **Voltage:** Battery voltage

4. Also check harness for short to ground and short to power.
   - **OK or NG**
     - OK >> GO TO 4.
     - NG >> GO TO 3.

3. **DETECT MALFUNCTIONING PART**

   Check the following.
   - Harness connectors F32, E2
   - Harness for open or short between crankshaft position sensor (POS) and ECM
   - Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. **CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 1 and body ground. Refer to Wiring Diagram.
   - **Continuity should exist.**

3. Also check harness for short to power.
   - **OK or NG**
     - OK >> GO TO 6.
     - NG >> GO TO 5.

5. **DETECT MALFUNCTIONING PART**

Check the following.
   - Harness connectors F32, E2
   - Harness for open or short between crankshaft position sensor (POS) and ground

   >> Repair open circuit or short to power in harness or connectors.
6. **CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.
   - **Continuity should exist.**
3. Also check harness for short to ground and short to power.
   - **OK or NG**
   - OK >> GO TO 7.
   - NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. **CHECK CRANKSHAFT POSITION SENSOR (POS)**

Refer to **EC-259, "Component Inspection"**.

- **OK or NG**
  - OK >> GO TO 8.
  - NG >> Replace crankshaft position sensor (POS).

8. **CHECK GEAR TOOTH**

Visually check for chipping signal plate gear tooth.

- **OK or NG**
  - OK >> GO TO 9.
  - NG >> Replace the signal plate.

9. **CHECK INTERMITTENT INCIDENT**

Refer to **EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"**.

> **INSPECTION END**
Component Inspection
CRANKSHAFT POSITION SENSOR (POS)
1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.

5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance Ω [at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+) - 2 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>1 (+) - 3 (-)</td>
<td></td>
</tr>
<tr>
<td>2 (+) - 3 (-)</td>
<td></td>
</tr>
</tbody>
</table>

Removal and Installation
CRANKSHAFT POSITION SENSOR (POS)
Refer to AT-269, "TRANSMISSION ASSEMBLY".
DTC P0340 CAMSHAFT POSITION (CMP) SENSOR (PHASE)

Component Description

The camshaft position sensor (PHASE) senses the protrusion of exhaust valve cam sprocket to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0340  | Camshaft position sensor (PHASE) circuit|  ● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.  
  ● The cylinder No. signal is not sent to ECM during engine running.  
  ● The cylinder No. signal is not in the normal pattern during engine running. | ● Harness or connectors (The sensor circuit is open or shorted)  
  ● Camshaft position sensor (PHASE)  
  ● Camshaft (Exhaust)  
  ● Starter motor (Refer to SC-10, "STARTING SYSTEM".)  
  ● Starting system circuit (Refer to SC-10, "STARTING SYSTEM".)  
  ● Dead (Weak) battery |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-262, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-262, "Diagnostic Procedure".

WITH GST

Follow the procedure “WITH CONSULT-II” above.
Wiring Diagram

EC-PHASE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".
DTC P0340 CAMSHAFT POSITION (CMP) SENSOR (PHASE)

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 14 Y         | Y          | Camshaft position sensor (PHASE) | [Engine is running]  
  ● Warm-up condition  
  ● Idle speed  
  **NOTE:**  
  The pulse cycle changes depending on rpm at idle. | ![Image](PBB1039E) |
|              |            |      | [Engine is running]  
  ● Engine speed is 2,000 rpm. | ![Image](PBB1040E) |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

**Does the engine turn over?**  
**Does the starter motor operate?**

Yes or No
Yes  >> GO TO 2.  
No   >> Check starting system. (Refer to SC-10, "STARTING SYSTEM".)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.  
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG
OK   >> GO TO 3.  
NG   >> Repair or replace ground connections.
DTC P0340 CAMSHAFT POSITION (CMP) SENSOR (PHASE)

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.

3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.
   **Voltage:** Battery voltage

4. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F32, E2
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

   >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and body ground.
   **Continuity should exist.**

3. Also check harness for short to power.
   OK or NG
   OK >> GO TO 7.
   NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F32, E2
- Harness for open or short between CMP sensor (PHASE) and body ground

   >> Repair open circuit or short to power in harness or connectors.
7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2.
   Refer to Wiring Diagram.
   *Continuity should exist.*
3. Also check harness for short to ground or short to power.

   **OK or NG**
   - OK  >> GO TO 8.
   - NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-265, "Component Inspection".

**OK or NG**
- OK  >> GO TO 9.
- NG  >> Replace camshaft position sensor (PHASE).

9. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END
Component Inspection
CAMSHAFT POSITION SENSOR (PHASE)
1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.

5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance Ω [at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3(+) - 1 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>2 (+) - 1 (-)</td>
<td></td>
</tr>
<tr>
<td>3 (+) - 2 (-)</td>
<td></td>
</tr>
</tbody>
</table>

Removal and Installation
CAMSHAFT POSITION SENSOR (PHASE)
Refer to EM-43, "CAMSHAFT".
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

On Board Diagnosis Logic

The ECM monitors the switching frequency ratio of air fuel sensor (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase. When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

DTC Confirmation Procedure

NOTE: If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II
TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F). If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.

DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause
---|---|---|---
P0420 0420 (Bank 1) | Catalyst system efficiency below threshold | Three way catalyst (manifold) does not operate properly. | Three way catalyst (manifold) 
Exhaust tube 
Intake air leaks 
Fuel injector 
Fuel injector leaks 
Spark plug 
Improper ignition timing

P0430 0430 (Bank 2) | Catalyst system efficiency below threshold | Three way catalyst (manifold) does not have enough oxygen storage capacity.
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.

9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCM” of “CATALYST” changed to “CMPLT”, go to step 12.

10. Wait 5 seconds at idle.

11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCM” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
   If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-268, “Diagnostic Procedure”.

Overall Function Check
Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals ECM terminals 74 [HO2S2 (bank 1) signal], 55 [HO2S2 (bank 2) signal] and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
    If the voltage fluctuation cycle takes less than 5 seconds, go to EC-268, “Diagnostic Procedure”.
    ● 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0
Diagnostic Procedure

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

OK or NG

OK  >> GO TO 2.
NG  >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).

OK or NG

OK  >> GO TO 3.
NG  >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK  >> GO TO 4.
NG  >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-79, "Basic Inspection".

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target idle speed</td>
<td>650 ± 50 rpm (in P or N position)</td>
</tr>
<tr>
<td>Ignition timing</td>
<td>15 ± 5° BTDC (in P or N position)</td>
</tr>
</tbody>
</table>

OK or NG

OK  >> GO TO 5.
NG  >> Follow the EC-79, "Basic Inspection".
5. CHECK INJECTORS

1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42, 44, 63 and ground with CONSULT-II or tester.
   Refer to Wiring Diagram for Injectors, EC-576.
   Battery voltage should exist.

OK or NG

OK >> GO TO 6.
NG >> Perform EC-577, "Diagnostic Procedure".

6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect ignition coil assembly from rocker cover.
3. Connect a known-good spark plug to the ignition coil assembly.
4. Disconnect all injector harness connectors.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

OK or NG

OK >> GO TO 7.
NG >> Check ignition coil with power transistor and their circuit.
   Refer to EC-563, "IGNITION SIGNAL".

7. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EM-29, "FUEL INJECTOR AND FUEL TUBE".
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Reconnect injector harness connector.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

Trouble is fixed.>>INSPECTION END
Trouble is not fixed.>>Replace three way catalyst assembly.
DTC P0441 EVAP CONTROL SYSTEM

System Description

NOTE:
If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0441</td>
<td>EVAP control system incorrect</td>
<td>EVAP control system does not operate properly, EVAP control system has a leak between</td>
<td>● EVAP canister purge volume control solenoid valve stuck closed</td>
</tr>
<tr>
<td></td>
<td>purge flow</td>
<td>intake manifold and EVAP control system pressure sensor</td>
<td>● EVAP control system pressure sensor and the circuit</td>
</tr>
<tr>
<td>0441</td>
<td></td>
<td></td>
<td>● Loose, disconnected or improper connection of rubber tube</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Blocked rubber tube</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Cracked EVAP canister</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● EVAP canister purge volume control solenoid valve circuit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Accelerator pedal position sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Blocked purge port</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● EVAP canister vent control valve</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.
WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

<table>
<thead>
<tr>
<th>Selector lever</th>
<th>Suitable position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle speed</td>
<td>32 - 120 km/h (20 - 75 MPH)</td>
</tr>
<tr>
<td>ENGSPEED</td>
<td>500 - 3,000 rpm</td>
</tr>
<tr>
<td>B/FUEL SCHDL</td>
<td>1.0 - 12.0 msec</td>
</tr>
<tr>
<td>Engine coolant temperature</td>
<td>70 - 100°C (158 - 212°F)</td>
</tr>
</tbody>
</table>

If “TESTING” is not changed for a long time, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-272, "Diagnostic Procedure".

Overall Function Check
Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST
1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

<table>
<thead>
<tr>
<th>Air conditioner switch</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headlamp switch</td>
<td>ON</td>
</tr>
<tr>
<td>Rear window defogger switch</td>
<td>ON</td>
</tr>
<tr>
<td>Engine speed</td>
<td>Approx. 3,000 rpm</td>
</tr>
<tr>
<td>Gear position</td>
<td>Any position other than P, N or R</td>
</tr>
</tbody>
</table>

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-272, "Diagnostic Procedure".

**Diagnostic Procedure**

1. **CHECK EVAP CANISTER**
   
   1. Turn ignition switch OFF.
   2. Check EVAP canister for cracks.
   
   **OK or NG**
   
   OK (With CONSULT-II)>>GO TO 2.
   OK (Without CONSULT-II)>>GO TO 3.
   NG>> Replace EVAP canister.

2. **CHECK PURGE FLOW**

   ⚠️ With CONSULT-II
   
   1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".
   2. Start engine and let it idle.
   3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
   4. Rev engine up to 2,000 rpm.
   5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

<table>
<thead>
<tr>
<th>PURG VOL CONT/V</th>
<th>Vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>Should exist.</td>
</tr>
<tr>
<td>0%</td>
<td>Should not exist.</td>
</tr>
</tbody>
</table>

   **OK or NG**
   
   OK >> GO TO 7.
   NG >> GO TO 4.

3. **CHECK PURGE FLOW**

   ✗ Without CONSULT-II
   
   1. Start engine and warm it up to normal operating temperature.
   2. Stop engine.
   3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".
   4. Start engine and let it idle.
   
   Do not depress accelerator pedal even slightly.
   5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   **Vacuum should not exist.**
   6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   **Vacuum should exist.**

   **OK or NG**
   
   OK >> GO TO 7.
   NG >> GO TO 4.
4. CHECK EVAP PURGE LINE

1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

OK or NG
OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve B.
2. Blow air into each hose and EVAP purge port C.

3. Check that air flows freely.

OK or NG
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG
OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-289, "Component Inspection".

OK or NG
OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.
8. **CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR**

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.
   
   **Water should not exist.**

OK or NG

OK  >> GO TO 9.
NG  >> Replace EVAP control system pressure sensor.

9. **CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION**

Refer to DTC Confirmation Procedure for DTC P0452 [EC-301](#), P0453 [EC-307](#).

OK or NG

OK  >> GO TO 10.
NG  >> Replace EVAP control system pressure sensor.

10. **CHECK RUBBER TUBE FOR CLOGGING**

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK  >> GO TO 11.
NG  >> Clean the rubber tube using an air blower.

11. **CHECK EVAP CANISTER VENT CONTROL VALVE**

Refer to [EC-296, "Component Inspection"](#).

OK or NG

OK  >> GO TO 12.
NG  >> Replace EVAP canister vent control valve.

12. **CHECK EVAP PURGE LINE**

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to [EC-606, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

OK  >> GO TO 13.
NG  >> Replace it.

13. **CLEAN EVAP PURGE LINE**

Clean EVAP purge line (pipe and rubber tube) using air blower.

   >> GO TO 14.

14. **CHECK INTERMITTENT INCIDENT**

Refer to [EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

   >> INSPECTION END
DTC P0442 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum. If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions. The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.

---

**DTC No.** | **Trouble diagnosis name** | **DTC detecting condition** | **Possible cause**
---|---|---|---
P0442 0442 | EVAP control system small leak detected (negative pressure) | EVAP control system has a leak, EVAP control system does not operate properly. | ● Incorrect fuel tank vacuum relief valve  
● Incorrect fuel filler cap used  
● Fuel filler cap remains open or fails to close.  
● Foreign matter caught in fuel filler cap.  
● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.  
● Foreign matter caught in EVAP canister vent control valve.  
● EVAP canister or fuel tank leaks  
● EVAP purge line (pipe and rubber tube) leaks  
● EVAP purge line rubber tube bent  
● Loose or disconnected rubber tube  
● EVAP canister vent control valve and the circuit  
● EVAP canister purge volume control solenoid valve and the circuit  
● Fuel tank temperature sensor  
● O-ring of EVAP canister vent control valve is missing or damaged  
● EVAP canister is saturated with water  
● EVAP control system pressure sensor  
● Fuel level sensor and the circuit  
● Refueling EVAP vapor cut valve  
● ORVR system leaks
CAUTION:
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC Confirmation Procedure

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

WITH CONSULT-II
1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

   WITH GST

NOTE:
Be sure to read the explanation of EC-59, “Driving Pattern” before driving vehicle.
1. Start engine.
2. Drive vehicle according to EC-59, “Driving Pattern”.

NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-79, ”Basic Inspection”.

6. Make sure that “OK” is displayed.
If “NG” is displayed, refer to EC-277, ”Diagnostic Procedure”.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
DTC P0442 EVAP CONTROL SYSTEM

3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select MODE 7 with GST.
   - If P0442 is displayed on the screen, go to EC-277, "Diagnostic Procedure".
   - If P0441 is displayed on the screen, go to EC-272, "Diagnostic Procedure".

Diagnostic Procedure

1. CHECK FUEL FILLER CAP DESIGN

   1. Turn ignition switch OFF.
   2. Check for genuine NISSAN fuel filler cap design.
      
      OK or NG
      OK >> GO TO 2.
      NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

   Check that the cap is tightened properly by rotating the cap clockwise.
   
   OK or NG
   OK >> GO TO 3.
   NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
   2. Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

   Check for air releasing sound while opening the fuel filler cap.
   
   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

   Refer to EC-608, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)".
   
   OK or NG
   OK >> GO TO 5.
   NG >> Replace fuel filler cap with a genuine one.
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.
6. CHECK FOR EVAP LEAK

With CONSULT-II
1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   **NOTE:**
   - Never use compressed air or a high pressure pump.
   - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

OK or NG
   - OK >> GO TO 8.
   - NG >> Repair or replace.
7. CHECK FOR EVAP LEAK

**Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   **NOTE:**
   - Never use compressed air or a high pressure pump.
   - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

**OK or NG**

OK  >> GO TO 8.
NG  >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-609, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-296, "Component Inspection".

**OK or NG**

OK  >> GO TO 9.
NG  >> Repair or replace EVAP canister vent control valve and O-ring.
9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?
   Yes or No
   Yes >> GO TO 10.
   No (With CONSULT-II)>>GO TO 12.
   No (Without CONSULT-II)>>GO TO 13.

10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached. The weight should be less than 2.2 kg (4.9 lb).

OK or NG
   OK (With CONSULT-II)>>GO TO 12.
   OK (Without CONSULT-II)>>GO TO 13.
   NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
   ● EVAP canister for damage
   ● EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

   >> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG
   OK >> GO TO 15.
   NG >> GO TO 14.
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.

OK or NG
OK  >> GO TO 16.
NG  >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-24, "Vacuum Hose Drawing".

OK or NG
OK  >> GO TO 15.
NG  >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-289, "Component Inspection".

OK or NG
OK  >> GO TO 16.
NG  >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-228, "Component Inspection".

OK or NG
OK  >> GO TO 17.
NG  >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-300, "Component Inspection".

OK or NG
OK  >> GO TO 18.
NG  >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

OK or NG
OK  >> GO TO 19.
NG  >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

   >> GO TO 20.
20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-612, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)"

OK or NG
   OK >> GO TO 21.
   NG >> Repair or replace hoses and tubes.

21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG
   OK >> GO TO 22.
   NG >> Repair or replace hose, tube or filler neck tube.

22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-615, "Component Inspection"

OK or NG
   OK >> GO TO 23.
   NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to DI-22, "Fuel Level Sensor Unit Inspection"

OK or NG
   OK >> GO TO 24.
   NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"

>> INSPECTION END
**DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

**Description**

**SYSTEM DESCRIPTION**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input signal to ECM</th>
<th>ECM function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor (POS)</td>
<td>Engine speed*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camshaft position sensor (PHASE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>Battery voltage*1</td>
<td>EVAP canister purge flow control</td>
<td>EVAP canister purge volume control solenoid valve</td>
</tr>
<tr>
<td>Throttle position sensor</td>
<td>Throttle position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/F sensor 1</td>
<td>Density of oxygen in exhaust gas (Mixture ratio feedback signal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel tank temperature sensor</td>
<td>Fuel temperature in fuel tank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel sensor*2</td>
<td>Vehicle speed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

**COMPONENT DESCRIPTION**

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURG VOL C/V</td>
<td>● Engine: After warming up&lt;br&gt;● Air conditioner switch: OFF&lt;br&gt;● Shift lever: N&lt;br&gt;● No load</td>
<td>Idle (Accelerator pedal is not depressed even slightly, after starting engine)&lt;br&gt;2,000 rpm</td>
</tr>
</tbody>
</table>
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0444 0444</td>
<td>EVAP canister purge volume control solenoid valve circuit open</td>
<td>An excessively low voltage signal is sent to ECM through the valve</td>
<td>● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve</td>
</tr>
<tr>
<td>P0445 0445</td>
<td>EVAP canister purge volume control solenoid valve circuit shorted</td>
<td>An excessively high voltage signal is sent to ECM through the valve</td>
<td>● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

 WITH CONSULT-II
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-288, “Diagnostic Procedure”.

 WITH GST
Follow the procedure “WITH CONSULT-II” above.
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Wiring Diagram

EC-PGC/V-01

- DETECTABLE LINE FOR DTC
- NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

Battery

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

ECM RELAY

ECM

W/B

BR

111

120

119

13

1

L/Y

SSOFF

VB

VB

EVAP

ECM

F15

F32

F54

F54

F54

H.S.

EC-286

2004 Titan

Revision: July 2007
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 45           | L/Y        | EVAP canister purge volume control solenoid valve | [Engine is running]  
- Idle speed  
- Accelerator pedal is not depressed even slightly, after starting engine. | BATTERY VOLTAGE  
(11 - 14V) ★ |
| 111          | W/B        | ECM relay (Self shut-off) | [Engine is running]  
[Ignition switch: OFF]  
- For a few seconds after turning ignition switch OFF | BATTERY VOLTAGE  
(11 - 14V) |
| 119          | BR         | Power supply for ECM | [Ignition switch: ON]  
BATTERY VOLTAGE  
(11 - 14V) |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
Diagnostic Procedure

1. **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT**

   1. Turn ignition switch OFF.
   2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
   3. Turn ignition switch ON.

   ![Diagram of EVAP canister purge volume control solenoid valve](image1)

   4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

      **Voltage: Battery voltage**

      OK or NG
      
      OK >> GO TO 3.
      NG >> GO TO 2.

2. **DETECT MALFUNCTIONING PART**

   Check the following.
   
   - Harness connectors E2, F32
   - Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
   - Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

     >> Repair harness or connectors.

3. **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

   OK or NG
   
   OK (With CONSULT-II)>>GO TO 4.
   OK (Without CONSULT-II)>>GO TO 5.
   NG >> Repair open circuit or short to ground or short to power in harness or connectors.
4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG
- OK >> GO TO 6.
- NG >> GO TO 5.

**ACTIVE TEST**

<table>
<thead>
<tr>
<th>PURG VOL CONT/V value</th>
<th>ENG SPEED</th>
<th>A/F ALPHA-B1</th>
<th>A/F ALPHA-B2</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX %</td>
<td>XXX rpm</td>
<td>XX %</td>
<td>XX %</td>
</tr>
</tbody>
</table>

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-289, "Component Inspection" .

OK or NG
- OK >> GO TO 6.
- NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> INSPECTION END

**Component Inspection**

**EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

**With CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

<table>
<thead>
<tr>
<th>Condition (PURG VOL CONT/V value)</th>
<th>Air passage continuity between A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>Yes</td>
</tr>
<tr>
<td>0%</td>
<td>No</td>
</tr>
</tbody>
</table>

**Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Air passage continuity between A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V direct current supply between terminals 1 and 2</td>
<td>Yes</td>
</tr>
<tr>
<td>No supply</td>
<td>No</td>
</tr>
</tbody>
</table>
Removal and Installation
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Refer to EM-15, "INTAKE MANIFOLD".
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components. This solenoid valve is used only for diagnosis, and usually remains opened. When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VENT CONT/V</td>
<td>Ignition switch: ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0447 0447</td>
<td>EVAP canister vent control valve circuit open</td>
<td>An improper voltage signal is sent to ECM through EVAP canister vent control valve.</td>
<td>• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

☆ WITH CONSULT-II
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 8 seconds.
4. If 1st trip DTC is detected, go to EC-294, "Diagnostic Procedure".

☆ WITH GST
Follow the procedure “WITH CONSULT-II” above.
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Wiring Diagram

EC-VENT/V-01

REFER TO "PG-POWER".

REFER TO THE FOLLOWING

C1 SUPER MULTIPLE JUNCTION (SMJ)

Revision: July 2007

EC-293
2004 Titan
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>L/Y</td>
<td>EVAP canister vent control valve</td>
<td>[Ignition switch: ON]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
</tbody>
</table>

Diagnostic Procedure

1. **INSPECTION START**

Do you have CONSULT-II?
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. **CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT**

- **WITH CONSULT-II**
  1. Turn ignition switch OFF and then turn ON.
  2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
  3. Touch “ON/OFF” on CONSULT-II screen.
  4. Check for operating sound of the valve. **Clicking noise should be heard.**

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.
3. **CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.

3. Turn ignition switch ON.
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**

   OK or NG
   - OK >> GO TO 5.
   - NG >> GO TO 4.

4. **DETECT MALFUNCTIONING PART**

Check the following.
- Harness connectors E41, C1
- IPDM E/R harness connector E119
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

   >> Repair harness or connectors.

5. **CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.
   
   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG
   - OK >> GO TO 7.
   - NG >> GO TO 6.
6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E41, C1
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG
OK  >> GO TO 8.
NG  >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-296, "Component Inspection".

OK or NG
OK  >> GO TO 9.
NG  >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END

Component Inspection
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion B of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.
5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

<table>
<thead>
<tr>
<th>Condition (VENT CONTROL/V)</th>
<th>Air passage continuity between A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>No</td>
</tr>
<tr>
<td>OFF</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.
If OK, go to next step.
7. Clean the air passage (portion A to B) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion B of EVAP canister vent control valve for being rusted.

3. Check air passage continuity and operation delay time under the following conditions. **Make sure new O-ring is installed properly.**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Air passage continuity between A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V direct current supply between terminals 1 and 2</td>
<td>No</td>
</tr>
<tr>
<td>OFF</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Operation takes less than 1 second.*

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (portion A to B) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP SYS PRES</td>
<td>Ignition switch: ON</td>
<td>Approx. 1.8 - 4.8V</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0451</td>
<td>EVAP control system pressure sensor performance</td>
<td>ECM detects a sloshing signal from the EVAP control system pressure sensor</td>
<td>Harness or connectors</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

被判罚
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
   If 1st trip DTC is detected, go to EC-299, “Diagnostic Procedure”.

被判罚
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

1. CHECK GROUND CONNECTIONS

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

      Refer to EC-132, “Ground Inspection”.

   OK or NG
   OK  >> GO TO 2.
   NG  >> Repair or replace ground connections.
2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check sensor harness connector for water.

   Water should not exist.

   OK or NG
   OK  >> GO TO 3.
   NG  >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

   Refer to EC-300, "Component Inspection" .

   OK or NG
   OK  >> GO TO 4.
   NG  >> Replace EVAP control system pressure sensor.

4. CHECK INTERMITTENT INCIDENT

   Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
   For wiring diagram, refer to EC-303, "Wiring Diagram" .

   >> INSPECTION END

Component Inspection
EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Applied vacuum kPa (mmHg, inHg)</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applied</td>
<td>1.8 - 4.8</td>
</tr>
<tr>
<td>-26.7 (-200, -7.87)</td>
<td>2.1 to 2.5V lower than above value</td>
</tr>
</tbody>
</table>

**CAUTION:**
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
4. If NG, replace EVAP control system pressure sensor.
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP SYS PRES</td>
<td>● Ignition switch: ON</td>
<td>Approx. 1.8 - 4.8V</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0452</td>
<td>EVAP control system pressure sensor low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>● Harness or connectors (The sensor circuit is open or shorted.)</td>
</tr>
<tr>
<td>0452</td>
<td></td>
<td></td>
<td>● EVAP control system pressure sensor</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
   If 1st trip DTC is detected, go to EC-304, “Diagnostic Procedure”.

WITH GST
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-304, “Diagnostic Procedure”.

![Diagram of data monitor](image1)
![Diagram of GST connection](image2)
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Wiring Diagram

EC-PRE/SE-01

- DETECTABLE LINE FOR DTC
- NON-DETECTABLE LINE FOR DTC

REFER TO THE FOLLOWING:
C1 - SUPER MULTIPLE JUNCTION (SMJ)

ECM

AVCC
FTPRS
GND-A

SB
L
B

SB
L
B

SB
L
B

EC

Revision: July 2007

UB602ESQ

2004 Titan
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>L</td>
<td>EVAP control system pressure sensor</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 1.8 - 4.8V</td>
</tr>
<tr>
<td>48</td>
<td>SB</td>
<td>Sensor power supply (EVAP control system pressure sensor)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
</tbody>
</table>
| 67           | B          | Sensor ground | [Engine is running] | Warm-up condition
● Idle speed | Approximately 0V |

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**
   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG

OK  >> GO TO 2.
NG  >> Repair or replace ground connections.

2. **CHECK CONNECTOR**
   1. Disconnect EVAP control system pressure sensor harness connector.

   ![Diagram of EVAP control system pressure sensor and related components]

   2. Check sensor harness connector for water.

   **Water should not exist.**

OK or NG

OK  >> GO TO 3.
NG  >> Repair or replace harness connector.
3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.
   Voltage: Approximately 5V

   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

   OK or NG
   OK >> GO TO 7.
   NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. 
   
   *Continuity should exist.*

2. Also check harness for short to ground and short to power.

   OK or NG
   
   OK >> GO TO 9.

   NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-306, "Component Inspection".

OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END

**Component Inspection**

**EVAP CONTROL SYSTEM PRESSURE SENSOR**

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. 
   
   *Always replace O-ring with a new one.*

2. Install a vacuum pump to EVAP control system pressure sensor.

3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Applied vacuum kPa (mmHg, inHg)</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applied</td>
<td>1.8 - 4.8</td>
</tr>
<tr>
<td>-26.7 (-200, -7.87)</td>
<td>2.1 to 2.5V lower than above value</td>
</tr>
</tbody>
</table>

**CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).

4. If NG, replace EVAP control system pressure sensor.
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP SYS PRES</td>
<td>Ignition switch: ON</td>
<td>Approx. 1.8 - 4.8V</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0453 0453</td>
<td>EVAP control system pressure sensor high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td>• Harness or connectors (The sensor circuit is open or shorted.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• EVAP control system pressure sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• EVAP canister vent control valve</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• EVAP canister</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Rubber hose from EVAP canister vent control valve to vehicle frame</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to EC-310, “Diagnostic Procedure”.

WITH GST
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-310, “Diagnostic Procedure”.

DATA MONITOR

<table>
<thead>
<tr>
<th>MONITOR</th>
<th>NO DTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG SPEED</td>
<td>XXX rpm</td>
</tr>
<tr>
<td>COOLANT TEMP</td>
<td>XXX °C</td>
</tr>
<tr>
<td>FUEL T/TEMP SE</td>
<td>XXX °C</td>
</tr>
</tbody>
</table>

ECM CONNECTOR

107

V S C H
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>L</td>
<td>EVAP control system pressure sensor</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 1.8 - 4.8V</td>
</tr>
<tr>
<td>48</td>
<td>SB</td>
<td>Sensor power supply (EVAP control system pressure sensor)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
<tr>
<td>67</td>
<td>B</td>
<td>Sensor ground</td>
<td>[Engine is running]</td>
<td>Approximately 0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG

OK  >> GO TO 2.
NG  >> Repair or replace ground connections.
2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check sensor harness connector for water.
   
   Water should not exist.

   OK or NG
   - OK >> GO TO 3.
   - NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.
   
   Voltage: Approximately 5V

   OK or NG
   - OK >> GO TO 5.
   - NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors C1, E41
   - Harness connectors E5, F14
   - Harness for open or short between EVAP control system pressure sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67. Refer to Wiring Diagram.
   
   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.
   
   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, E41
- Harness connectors E5, F14
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent or kinked.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.
10. **CHECK EVAP CANISTER VENT CONTROL VALVE**

Refer to EC-296, "Component Inspection".

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

11. **CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR**

Refer to EC-314, "Component Inspection".

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

12. **CHECK IF EVAP CANISTER SATURATED WITH WATER**

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

<table>
<thead>
<tr>
<th>Yes or No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

13. **CHECK EVAP CANISTER**

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

*The weight should be less than 2.2 kg (4.9 lb).*

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

14. **DETECT MALFUNCTIONING PART**

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

=> Repair hose or replace EVAP canister.

15. **CHECK INTERMITTENT INCIDENT**

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

=> INSPECTION END
Component Inspection
EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.

2. Install a vacuum pump to EVAP control system pressure sensor.

3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Applied vacuum kPa (mmHg, inHg)</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applied</td>
<td>1.8 - 4.8</td>
</tr>
<tr>
<td>-26.7 (-200, -7.87)</td>
<td>2.1 to 2.5V lower than above value</td>
</tr>
</tbody>
</table>

**CAUTION:**
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).

4. If NG, replace EVAP control system pressure sensor.
This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.

### CAUTION:
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

### DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause
--- | --- | --- | ---
P0455 0455 | EVAP control system gross leak detected | EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly. | - Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling EVAP vapor cut valve
- ORVR system leaks
DTC Confirmation Procedure

CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

WITH CONSULT-II
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that the following conditions are met.
   - COOLANT TEMP/S: 0 - 70°C (32 - 158°F)
   - INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-79, "Basic Inspection".

7. Make sure that “OK” is displayed.
   If “NG” is displayed, select “SELF-DIAG RESULTS” mode and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-317, "Diagnostic Procedure".
   If P0442 is displayed, perform Diagnostic Procedure for DTC P0442 EC-277, "Diagnostic Procedure".
DTC P0455 EVAP CONTROL SYSTEM

NOTE:
Be sure to read the explanation of EC-59, "Driving Pattern" before driving vehicle.
1. Start engine.
2. Drive vehicle according to EC-59, "Driving Pattern".
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select MODE 7 with GST.
   - If P0455 is displayed on the screen, go to EC-317, "Diagnostic Procedure".
   - If P0442 is displayed on the screen, go to EC-277, "Diagnostic Procedure".
   - If P0441 is displayed on the screen, go to EC-272, "Diagnostic Procedure".

Diagnostic Procedure

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG
- OK >> GO TO 2.
- NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG
- OK >> GO TO 3.
- NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
  2. Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG
- OK >> GO TO 5.
- NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-608, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)".

OK or NG
- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.
5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".
OK or NG
   OK   >> GO TO 6.
   NG   >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

   >> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
   ● EVAP canister vent control valve is installed properly.
     Refer to EC-609, "Removal and Installation".
   ● EVAP canister vent control valve.
     Refer to EC-296, "Component Inspection".
OK or NG
   OK   >> GO TO 8.
   NG   >> Repair or replace EVAP canister vent control valve and O-ring.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II>>GO TO 9.
Without CONSULT-II>>GO TO 10.
9. CHECK FOR EVAP LEAK

* With CONSULT-II
  1. Turn ignition switch ON.
  2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
  3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
     **NOTE:**
     * Do not use compressed air or a high pressure pump.
     * Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

  4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.

     Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

     OK or NG
     OK >> GO TO 11.
     NG >> Repair or replace.
10. CHECK FOR EVAP LEAK

**Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

**NOTE:**
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

OK or NG
- OK >> GO TO 12.
- NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG
- OK >> GO TO 14.
- NG >> GO TO 13.
12. **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION**

**Without CONSULT-II**
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   **Vacuum should exist.**

   OK or NG
   - OK >> GO TO 15.
   - NG >> GO TO 13.

13. **CHECK VACUUM HOSE**

Check vacuum hoses for clogging or disconnection. Refer to EC-24, “Vacuum Hose Drawing”.

OK or NG
- OK (With CONSULT-II)>>GO TO 14.
- OK (Without CONSULT-II)>>GO TO 15.
- NG >> Repair or reconnect the hose.

14. **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

**With CONSULT-II**
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG
- OK >> GO TO 16.
- NG >> GO TO 15.

15. **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

Refer to EC-289, “Component Inspection”.

OK or NG
- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.

16. **CHECK FUEL TANK TEMPERATURE SENSOR**

Refer to EC-228, “Component Inspection”.

OK or NG
- OK >> GO TO 17.
- NG >> Replace fuel level sensor unit.
17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-300, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-612, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)".

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

19. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hose, tube or filler neck tube.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-615, "Component Inspection".

OK or NG

OK >> GO TO 21.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END
On Board Diagnosis Logic

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0456 0456 | Evaporative emission control system very small leak (negative pressure check) | ● EVAP system has a very small leak.  
● EVAP system does not operate properly. | ● Incorrect fuel tank vacuum relief valve  
● Incorrect fuel filler cap used  
● Fuel filler cap remains open or fails to close.  
● Foreign matter caught in fuel filler cap.  
● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.  
● Foreign matter caught in EVAP canister vent control valve.  
● EVAP canister or fuel tank leaks  
● EVAP purge line (pipe and rubber tube) leaks  
● EVAP purge line rubber tube bent  
● Loose or disconnected rubber tube  
● EVAP canister vent control valve and the circuit  
● EVAP canister purge volume control solenoid valve and the circuit  
● Fuel tank temperature sensor  
● O-ring of EVAP canister vent control valve is missing or damaged  
● EVAP canister is saturated with water  
● EVAP control system pressure sensor  
● Refueling EVAP vapor cut valve  
● ORVR system leaks  
● Fuel level sensor and the circuit  
● Foreign matter caught in EVAP canister purge volume control solenoid valve |
**CAUTION:**
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

**DTC Confirmation Procedure**

**NOTE:**
- If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.
- After repair, make sure that the hoses and clips are installed properly.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
- Open engine hood before conducting following procedure.
- If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
  - Fuel filler cap is removed.
  - Fuel is refilled or drained.
  - EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

**WITH CONSULT-II**

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   - FUEL LEVEL SE: 0.25 - 1.4V
   - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   - FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   - INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.

5. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-326, "Diagnostic Procedure" .

**NOTE:**
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-79, "Basic Inspection" .
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
Overall Function Check

WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- Do not use compressed air, doing so may damage the EVAP system.
- Do not start engine.
- Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).

1. Attach the EVAP service port adapter securely to the EVAP service port.

2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using mode 8 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.
   - **Pressure to be applied**: 2.7 kPa (20 mmHg, 0.79 inHg)
   - **Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped**: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).

   If NG, go to EC-326, "Diagnostic Procedure". If OK, go to next step.
8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

**NOTE:**
For more information, refer to GST instruction manual.
Diagnostic Procedure

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt; GO TO 2.</td>
<td>Replace with genuine NISSAN fuel filler cap.</td>
</tr>
</tbody>
</table>

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
</table>
| >> GO TO 3. | 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.  
2. Retighten until ratcheting sound is heard. |

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt; GO TO 5.</td>
<td>&gt;&gt; GO TO 4.</td>
</tr>
</tbody>
</table>

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-608, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)".

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt; GO TO 5.</td>
<td>Replace fuel filler cap with a genuine one.</td>
</tr>
</tbody>
</table>
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to EC-606, “EVAPORATIVE EMISSION LINE DRAWING”.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.
6. CHECK FOR EVAP LEAK

⚠ With CONSULT-II
1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   **NOTE:**
   - Do not use compressed air or a high pressure pump.
   - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-606, “EVAPORATIVE EMISSION LINE DRAWING”.

**OK or NG**
- **OK**  >> GO TO 8.
- **NG**  >> Repair or replace.
7. CHECK FOR EVAP LEAK

**Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   **NOTE:**
   - Do not use compressed air or a high pressure pump.
   - Do not exceed 4.12 kPa (0.042 kg/cm$^2$, 0.6 psi) of pressure in the system.

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-606, "EVAPORATIVE EMISSION LINE DRAWING".

   **OK or NG**
   - OK >> GO TO 8.
   - NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to EC-609, "Removal and Installation".
- EVAP canister vent control valve. Refer to EC-296, "Component Inspection".

   **OK or NG**
   - OK >> GO TO 9.
   - NG >> Repair or replace EVAP canister vent control valve and O-ring.
DTC P0456 EVAP CONTROL SYSTEM

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?
   Yes or No
   Yes  >> GO TO 10.
   No (With CONSULT-II)  >> GO TO 12.
   No (Without CONSULT-II)  >> GO TO 13.

10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.
The weight should be less than 2.2 kg (4.9 lb).
   OK or NG
   OK (With CONSULT-II)  >> GO TO 12.
   OK (Without CONSULT-II)  >> GO TO 13.
   NG  >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
   • EVAP canister for damage
   • EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

   >> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

☆ With CONSULT-II
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG
   OK  >> GO TO 15.
   NG  >> GO TO 14.
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.

OK or NG
OK  >> GO TO 16.
NG  >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-24, “Vacuum Hose Drawing”.

OK or NG
OK  >> GO TO 15.
NG  >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-289, “Component Inspection”.

OK or NG
OK  >> GO TO 16.
NG  >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-228, “Component Inspection”.

OK or NG
OK  >> GO TO 17.
NG  >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-300, “Component Inspection”.

OK or NG
OK  >> GO TO 18.
NG  >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-606, “EVAPORATIVE EMISSION LINE DRAWING”.

OK or NG
OK  >> GO TO 19.
NG  >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

   >> GO TO 20.
20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-612, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)".

OK or NG
- OK >> GO TO 21.
- NG >> Repair or replace hoses and tubes.

21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG
- OK >> GO TO 22.
- NG >> Repair or replace hose, tube or filler neck tube.

22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-615, "Component Inspection".

OK or NG
- OK >> GO TO 23.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to DI-22, "Fuel Level Sensor Unit Inspection".

OK or NG
- OK >> GO TO 24.
- NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END
DTC P0460 FUEL LEVEL SENSOR

Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

NOTE:
If DTC P0460 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE". When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to EC-334, "Diagnostic Procedure".

WITH GST
Follow the procedure “WITH CONSULT-II” above.
DTC P0460 FUEL LEVEL SENSOR

Diagnostic Procedure

1. CHECK DTC WITH COMBINATION METER

Refer to DI-5, “COMBINATION METERS”.

OK or NG

OK >> GO TO 2.
NG >> Go to DI-22, "Fuel Level Sensor Unit Inspection".

2. CHECK INTERMITTENT INCIDENT

Refer to EC-126, “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”.

>> INSPECTION END

Removal and Installation
FUEL LEVEL SENSOR

Refer to FL-5, “FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY”.
DTC P0461 FUEL LEVEL SENSOR

Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

NOTE:
If DTC P0461 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE".

Driving long distances naturally affect fuel gauge level. This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0461 0461</td>
<td>Fuel level sensor circuit range/performance</td>
<td>The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.</td>
<td>• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor</td>
</tr>
</tbody>
</table>

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-10, "FUEL TANK".

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.
1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-46, "FUEL PRESSURE RELEASE".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
   If NG, go to EC-336, “Diagnostic Procedure”.

### WITH GST

**NOTE:**
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-46, "FUEL PRESSURE RELEASE".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to EC-336, "Diagnostic Procedure".

### Diagnostic Procedure

1. **CHECK DTC WITH COMBINATION METER**

Refer to DI-5, "COMBINATION METERS".

OK or NG

- OK >> GO TO 2.
- NG >> Go to DI-22, "Fuel Level Sensor Unit Inspection".

### 2. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

**>> INSPECTION END**

### Removal and Installation

**FUEL LEVEL SENSOR**

Refer to FL-5, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY".
DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

NOTE:
If DTC P0462 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE" . This diagnosis indicates the former, to detect open or short circuit malfunction.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0462</td>
<td>Fuel level sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>● Harness or connectors (The CAN communication line is open or shorted)</td>
</tr>
<tr>
<td>0463</td>
<td>Fuel level sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td>● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter ● Fuel level sensor</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-338, "Diagnostic Procedure"

WITH CONSULT-II

WITH GST

Follow the procedure “WITH CONSULT-II” above.
DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

Diagnostic Procedure
1. CHECK DTC WITH COMBINATION METER

   Refer to DI-5, "COMBINATION METERS".
   OK or NG
   OK >> GO TO 2.
   NG >> Go to DI-22, "Fuel Level Sensor Unit Inspection".

2. CHECK INTERMITTENT INCIDENT

   Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

   >> INSPECTION END

Removal and Installation
FUEL LEVEL SENSOR

   Refer to FL-5, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY".
DTC P0500 VSS

Description

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE".

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

On Board Diagnosis Logic

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II
1. Start engine (VDC switch OFF).
2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-340, "Diagnostic Procedure".
   If OK, go to following step.
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0500</td>
<td>Vehicle speed sensor</td>
<td>The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.</td>
<td>• Harness or connectors (The CAN communication line is open or shorted)</td>
</tr>
<tr>
<td>0500</td>
<td></td>
<td></td>
<td>• Harness or connectors (The vehicle speed signal circuit is open or shorted)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Wheel sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Combination meter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ABS actuator and electric unit (control unit)</td>
</tr>
</tbody>
</table>

Overall Function Check

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST
1. Lift up drive wheels.
2. Start engine.

3. Read vehicle speed sensor signal in MODE 1 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with
   suitable gear position.

4. If NG, go to EC-340, "Diagnostic Procedure".

**Diagnostic Procedure**

1. **CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)**

Refer to BRC-11, "TROUBLE DIAGNOSIS" or BRC-101, "TROUBLE DIAGNOSIS".

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 2.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Repair or replace.</td>
</tr>
</tbody>
</table>

2. **CHECK DTC WITH COMBINATION METER**

Refer to DI-5, "COMBINATION METERS".

>> **INSPECTION END**
DTC P0506 ISC SYSTEM

Description

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let
into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is
varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects
the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value
memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily.
The optimum value stored in the ECM is determined by taking into consideration various engine conditions,
such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan
operation, etc.).

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0506</td>
<td>Idle speed control system</td>
<td>The idle speed is less than the target idle speed by 100 rpm or more.</td>
<td>Electric throttle control actuator</td>
</tr>
<tr>
<td>0506</td>
<td>RPM lower than expected</td>
<td></td>
<td>Intake air leak</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait
  at least 10 seconds before conducting the next test.
- If the target idle speed is out of the specified value, perform EC-44, "Idle Air Volume Learning" ,
  before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-621,
  "SERVICE DATA AND SPECIFICATIONS (SDS)" .

TESTING CONDITION:
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
- Always perform the test at a temperature above –10°C (14°F).

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-342, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II" above.
DTC P0506 ISC SYSTEM

Diagnostic Procedure

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-138, "ECM Re-communicating Function".
4. Perform EC-44, "Accelerator Pedal Released Position Learning".
5. Perform EC-44, "Throttle Valve Closed Position Learning".
6. Perform EC-44, "Idle Air Volume Learning".

>> INSPECTION END
DTC P0507 ISC SYSTEM

Description

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let
into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is
varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects
the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value
memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily.
The optimum value stored in the ECM is determined by taking into consideration various engine conditions,
such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan
operation, etc.).

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0507   | Idle speed control system RPM higher than expected | The idle speed is more than the target idle speed by 200 rpm or more. | • Electric throttle control actuator
| 0507    |                                         |                                                             | • Intake air leak
|         |                                         |                                                             | • PCV system                |

DTC Confirmation Procedure

NOTE:
● If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait
at least 10 seconds before conducting the next test.
● If the target idle speed is out of the specified value, perform EC-44, "Idle Air Volume Learning" ,
before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-621,
"SERVICE DATA AND SPECIFICATIONS (SDS)" .

TESTING CONDITION:
● Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
● Always perform the test at a temperature above −10°C (14°F).

WITH CONSULT-II
1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-344, "Diagnostic Procedure" .

WITH GST
Follow the procedure “WITH CONSULT-II” above.
Diagnostic Procedure

1. **CHECK PCV HOSE CONNECTION**

   Confirm that PCV hose is connected correctly.

   **OK or NG**
   - **OK**  >> GO TO 2.
   - **NG**  >> Repair or replace.

2. **CHECK INTAKE AIR LEAK**

   1. Start engine and let it idle.
   2. Listen for an intake air leak after the mass air flow sensor.

   **OK or NG**
   - **OK**  >> GO TO 3.
   - **NG**  >> Discover air leak location and repair.

3. **REPLACE ECM**

   1. Stop engine.
   2. Replace ECM.
   3. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to [BL-138, "ECM Re-communicating Function"](BL-138).

   >> INSPECTION END
DTC P0550 PSP SENSOR

Component Description

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW/ST SIGNAL</td>
<td>• Engine: After warming up, idle the engine</td>
<td>Steering wheel is in neutral position. (Forward direction) OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steering wheel is turned. ON</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

The MIL will not light up for this diagnosis.

NOTE:
If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-423, "DTC P1229 SENSOR POWER SUPPLY".

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II
1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-347, "Diagnostic Procedure".

WITH GST
Follow the procedure “WITH CONSULT-II” above.
DTC P0550 PSP SENSOR

Wiring Diagram

EC-PS/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

AVCC (PS PRES)
PS PRES
GND-A
ECM

F54

F46

F46

F54

H.S.
DTC P0550 PSP SENSOR

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 12           | R          | Power steering pressure sensor | [Engine is running]  
                  • Steering wheel is being turned.  
                  [Engine is running]  
                  • Steering wheel is not being turned. | 0.5 - 4.5V  
                                                      0.4 - 0.8V |
| 67           | B          | Sensor ground | [Engine is running]  
                                                      • Warm-up condition  
                                                      • Idle speed | Approximately 0V |
| 68           | W/L        | Sensor power supply (Power steering pressure sensor) | [Ignition switch: ON] | Approximately 5V |

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

Refer to **EC-132, "Ground Inspection"**.

**OK or NG**

OK  >> GO TO 2.

NG  >> Repair or replace ground connections.
2. **CHECK PSP SENSOR POWER SUPPLY CIRCUIT**

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.

3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.

   **Voltage: Approximately 5V**

   OK or NG
   - **OK** >> GO TO 3.
   - **NG** >> Repair harness or connectors.

3. **CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground or short to power.

   OK or NG
   - **OK** >> GO TO 4.
   - **NG** >> Repair open circuit or short to ground or short to power in harness or connectors.

4. **CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

   OK or NG
   - **OK** >> GO TO 5.
   - **NG** >> Repair open circuit or short to ground or short to power in harness or connectors.

5. **CHECK PSP SENSOR**

Refer to EC-349, "Component Inspection".

OK or NG
- **OK** >> GO TO 6.
- **NG** >> Replace PSP sensor.
6. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END

Component Inspection
POWER STEERING PRESSURE SENSOR
1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering wheel is being turned.</td>
<td>0.5 - 4.5V</td>
</tr>
<tr>
<td>Steering wheel is not being turned.</td>
<td>0.4 - 0.8V</td>
</tr>
</tbody>
</table>

Removal and Installation
POWER STEERING PRESSURE SENSOR
Refer to PS-32, "HYDRAULIC LINE".

---

Revision: July 2007
EC-349
2004 Titan
DTC P0605 ECM

Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

This self-diagnosis has one or two trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0605 0605 | Engine control module | A) ECM calculation function is malfunctioning.  
B) ECM EEP-ROM system is malfunctioning.  
C) ECM self shut-off function is malfunctioning. | ECM |

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction A is detected.

- **Detected items**
  - Malfunction A
    - ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
    - ECM deactivates ASCD operation.

DTC Confirmation Procedure

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**PROCEDURE FOR MALFUNCTION A**

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-351, "Diagnostic Procedure".

**With GST**

Follow the procedure “With CONSULT-II” above.
PROCEDURE FOR MALFUNCTION B

With CONSULT-II
1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. If 1st trip DTC is detected, go to EC-351, “Diagnostic Procedure”.

With GST
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II
1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-351, “Diagnostic Procedure”.

With GST
Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

1. INSPECTION START

With CONSULT-II
1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform DTC Confirmation Procedure.
   See EC-350, “DTC Confirmation Procedure”.
5. Is the 1st trip DTC P0605 displayed again?

With GST
1. Turn ignition switch ON.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. Perform DTC Confirmation Procedure.
   See EC-350, “DTC Confirmation Procedure”.
5. Is the 1st trip DTC P0605 displayed again?

Yes or No
Yes >> GO TO 2.
No >> INSPECTION END
2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-138, "ECM Re-communicating Function".
3. Perform EC-44, "Accelerator Pedal Released Position Learning".
4. Perform EC-44, "Throttle Valve Closed Position Learning".
5. Perform EC-44, "Idle Air Volume Learning".

>> INSPECTION END
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

Description

SYSTEM DESCRIPTION

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camshaft position sensor (PHASE)</td>
<td>Engine speed</td>
<td>Air fuel ratio (A/F) sensor 1 heater control</td>
<td>Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td>Crankshaft position sensor (POS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F S1 HTR (B1) A/F S1 HTR (B2)</td>
<td>Engine: After warming up, idle the engine</td>
<td>0 - 100%</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1031 1031 (Bank 1)</td>
<td>Air fuel ratio (A/F) sensor 1 heater control circuit low</td>
<td>The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.)</td>
<td>Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater</td>
</tr>
<tr>
<td>P1051 1051 (Bank 2)</td>
<td>Air fuel ratio (A/F) sensor 1 heater control circuit high</td>
<td>The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.)</td>
<td>Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and let it idle for at least 10 seconds.
3. If 1st trip DTC is detected, go to EC-357, "Diagnostic Procedure".

WITH GST

Follow the procedure “WITH CONSULT-II” above.
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 2            | O/B        | A/F sensor 1 heater (Bank 1) | [Engine is running]  
  - Warm-up condition  
  - Idle speed | Approximately 5V★ |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

BANK 2

EC-AF1HB2-01

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC
DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 24           | BR/W       | A/F sensor 1 heater (Bank 2) | [Engine is running]  
   - Warm-up condition  
   - Idle speed | Approximately 5V ★ |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   ![View with battery removed](image)

   Refer to [EC-132, "Ground Inspection"](link).

   **OK or NG**
   - **OK** >> GO TO 2.
   - **NG** >> Repair or replace ground connections.
2. **CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT**

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

2. Turn ignition switch ON.

3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**

   OK or NG
   
   OK >> GO TO 4.
   NG >> GO TO 3.

---

3. **DETECT MALFUNCTIONING PART**

Check the following.

- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 10A fuse
- Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.

---

4. **CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT**

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and A/F sensor 1 terminal 4.

   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground or short to power.

   OK or NG
   
   OK >> GO TO 5.
   NG >> Repair open circuit or short to ground or short to power in harness or connectors.

---

5. **CHECK A/F SENSOR 1 HEATER**

Refer to **EC-359, "Component Inspection"**.

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.
6. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

OK or NG
- OK ➞ Replace A/F sensor 1.
- NG ➞ Repair or replace.

Component Inspection
AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the A/F sensor 1.

CAUTION:
- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

Removal and Installation
AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1065 ECM POWER SUPPLY

Component Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1065</td>
<td>ECM power supply circuit</td>
<td>ECM back-up RAM system does not function properly.</td>
<td>• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.]</td>
</tr>
<tr>
<td>1065</td>
<td></td>
<td></td>
<td>• ECM</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II
1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-362, "Diagnostic Procedure".

WITH GST
Follow the procedure “WITH CONSULT-II” above.
Wiring Diagram

DTC P1065 ECM POWER SUPPLY

Refer to "PG-POWER".

Revision: July 2007

EC-361

2004 Titan
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>W</td>
<td>Power supply for ECM (Back-up) [Ignition switch: OFF]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK ECM POWER SUPPLY**
   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**

   OK or NG
   - **OK** >> GO TO 3.
   - **NG** >> GO TO 2.

2. **DETECT MALFUNCTIONING PART**
   Check the following.
   - IPDM E/R connector E121
   - 20A fuse
   - Harness for open or short between ECM and battery

   >> Repair or replace harness or connectors.

3. **CHECK INTERMITTENT INCIDENT**
   Refer to **EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"**.

   OK or NG
   - **OK** >> GO TO 4.
   - **NG** >> Repair or replace harness or connectors.
4. PERFORM DTC CONFIRMATION PROCEDURE

**With CONSULT-II**
1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-360, “DTC Confirmation Procedure”.
5. Is the 1st trip DTC P1065 displayed again?

**With GST**
1. Turn ignition switch ON.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-360, “DTC Confirmation Procedure”.
5. Is the 1st trip DTC P1065 displayed again?

**Yes or No**
- Yes >> GO TO 5.
- No >> INSPECTION END

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-138, "ECM Re-communicating Function".
3. Perform EC-44, "Accelerator Pedal Released Position Learning".
4. Perform EC-44, "Throttle Valve Closed Position Learning".
5. Perform EC-44, "Idle Air Volume Learning".

>> INSPECTION END
DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

This self-diagnosis has one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1121</td>
<td>Electric throttle control actuator</td>
<td>A) Electric throttle control actuator does not function properly due to the return spring malfunction.</td>
<td>Electric throttle control actuator</td>
</tr>
<tr>
<td>1121</td>
<td></td>
<td>B) Throttle valve opening angle in fail-safe mode is not in specified range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C) ECM detects the throttle valve is stuck open.</td>
<td></td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items | Engine operating condition in fail-safe mode
--- | ---
Malfunction A | The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B | ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C | While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

NOTE:
- Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position and wait at least 2 seconds.
4. Shift selector lever to P position.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position and wait at least 2 seconds.
8. Shift selector lever to P position.
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. If DTC is detected, go to EC-365, "Diagnostic Procedure".

With GST

Follow the procedure “With CONSULT-II” above.
DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Shift selector lever to D position and wait at least 2 seconds.
4. Shift selector lever to N, P position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-365, "Diagnostic Procedure".

With CONSULT-II

Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY
   
   1. Remove the intake air duct.
   2. Check if a foreign matter is caught between the throttle valve and the housing.

   OK or NG
   - OK >> GO TO 2.
   - NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR
   
   1. Replace the electric throttle control actuator.
   2. Perform EC-44, "Throttle Valve Closed Position Learning".
   3. Perform EC-44, "Idle Air Volume Learning".

>> INSPECTION END
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-364 or EC-372.

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1122</td>
<td>Electric throttle control performance problem</td>
<td>Electric throttle control function does not operate properly.</td>
<td>● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator</td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

- Engine operating condition in fail-safe mode
- ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-368, "Diagnostic Procedure".

WITH GST

Follow the procedure “WITH CONSULT-II” above.
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Wiring Diagram

EC-ETC1-01

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

Revision: July 2007

EC-367

2004 Titan
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>L</td>
<td>Throttle control motor relay power supply</td>
<td>[Ignition switch: ON]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
<tr>
<td>4</td>
<td>L/W</td>
<td>Throttle control motor (Close)</td>
<td>[Ignition switch: ON]</td>
<td>0 - 14V★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Engine stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Shift lever: D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Accelerator pedal: Released</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>L/B</td>
<td>Throttle control motor (Open)</td>
<td>[Ignition switch: ON]</td>
<td>0 - 14V★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Engine stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Shift lever: D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Accelerator pedal: Fully depressed</td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>O</td>
<td>Throttle control motor relay</td>
<td>[Ignition switch: OFF]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[Ignition switch: ON]</td>
<td>0 - 1.0V</td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   ![View with battery removed](image)

   Refer to EC-132, "Ground Inspection".

   OK or NG
   - OK >> GO TO 2.
   - NG >> Repair or replace ground connections.
2. **CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I**

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

<table>
<thead>
<tr>
<th>Ignition switch</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Approximately 0V</td>
</tr>
<tr>
<td>ON</td>
<td>Battery voltage (11 - 14V)</td>
</tr>
</tbody>
</table>

OK or NG
- OK >> GO TO 9.
- NG >> GO TO 3.

3. **CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II**

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
   - **Continuity should exist.**
5. Also check harness for short to ground and short to power.

OK or NG
- OK >> GO TO 5.
- NG >> GO TO 4.

4. **DETECT MALFUNCTIONING PART**

Check the following.
- Harness connectors E2, F32
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. **CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I**

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch OFF.
3. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.
   - **Voltage:** Battery voltage

OK or NG
- OK >> GO TO 8.
- NG >> GO TO 6.
DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E122.
3. Check harness continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.
   - **Continuity should exist.**
4. Also check harness for short to ground and short to power.
   - **OK or NG**
     - OK >> GO TO 7.
     - NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUSE

1. Disconnect 20A fuse.
2. Check 20A fuse for blown.
   - **OK or NG**
     - OK >> GO TO 8.
     - NG >> Replace 20A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](EC-126).

   - **OK or NG**
     - NG >> Repair or replace harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Electric throttle control actuator terminal</th>
<th>ECM terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>Should not exist</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Should exist</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>Should exist</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Should not exist</td>
</tr>
</tbody>
</table>

5. Also check harness for short to ground and short to power.
   - **OK or NG**
     - OK >> GO TO 10.
     - NG >> Repair or replace.
10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.
   OK or NG
   OK  >> GO TO 11.
   NG  >> Remove the foreign matter and clean the electric throttle control actuator inside.

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-371, "Component Inspection" .

OK or NG
OK  >> GO TO 12.
NG  >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG
OK  >> GO TO 13.
NG  >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.

>> INSPECTION END

Component Inspection
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.
   
   Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
5. Perform EC-44, "Idle Air Volume Learning" .

Remove and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "INTAKE MANIFOLD" .
DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Component Description

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>THRTL RELAY</td>
<td>Ignition switch: ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1124 1124</td>
<td>Throttle control motor relay circuit short</td>
<td>ECM detect the throttle control motor relay is stuck ON.</td>
<td>● Harness or connectors  (Throttle control motor relay circuit is shorted)</td>
</tr>
<tr>
<td>P1126 1126</td>
<td>Throttle control motor relay circuit open</td>
<td>ECM detects a voltage of power source for throttle control motor is excessively low.</td>
<td>● Harness or connectors  (Throttle control motor relay circuit is open)</td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V when engine is running.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-375, "Diagnostic Procedure".

With GST

Follow the procedure “With CONSULT-II” above.
PROCEDURE FOR DTC P1126

With CONSULT-II
1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-375, “Diagnostic Procedure”.

With GST
Follow the procedure “With CONSULT-II” above.
Wiring Diagram

EC-ETC2-01

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

BBWA1179E
DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>L</td>
<td>Throttle control motor relay</td>
<td>[Ignition switch: ON]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>O</td>
<td>Throttle control motor relay</td>
<td>[Ignition switch: OFF]</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[Ignition switch: ON]</td>
<td>0 - 1.0V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I**

   1. Turn ignition switch OFF.
   2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

      **Voltage: Battery voltage**

      - **OK or NG**
        - **OK** >> GO TO 4.
        - **NG** >> GO TO 2.

2. **CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II**

   1. Disconnect ECM harness connector.
   2. Disconnect IPDM E/R harness connector E122.
   3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47.
      Refer to Wiring Diagram.

      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

      - **OK or NG**
        - **OK** >> GO TO 3.
        - **NG** >> Repair open circuit or short to ground or short to power in harness or connectors.

3. **CHECK FUSE**

   1. Disconnect 20A fuse.
   2. Check 20A fuse for blown.

      - **OK or NG**
        - **OK** >> GO TO 7.
        - **NG** >> Replace 20A fuse.
4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

<table>
<thead>
<tr>
<th>Ignition switch</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Approximately 0V</td>
</tr>
<tr>
<td>ON</td>
<td>Battery voltage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 7.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; GO TO 5.</td>
</tr>
</tbody>
</table>

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 7.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; GO TO 6.</td>
</tr>
</tbody>
</table>

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Replace IPDM E/R. Refer to PG-16, &quot;IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)&quot; .</td>
</tr>
<tr>
<td>NG</td>
<td>Repair or replace harness or connectors.</td>
</tr>
</tbody>
</table>
DTC P1128 THROTTLE CONTROL MOTOR

Component Description
The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic
This self-diagnosis has the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1128</td>
<td>Throttle control motor circuit short</td>
<td>ECM detects short in both circuits between ECM and throttle control motor.</td>
<td>• Harness or connectors (Throttle control motor circuit is shorted.)</td>
</tr>
<tr>
<td>1128</td>
<td></td>
<td></td>
<td>• Electric throttle control actuator (Throttle control motor)</td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE
When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II
1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-379, "Diagnostic Procedure".

WITH GST
Follow the procedure “WITH CONSULT-II” above.
DTC P1128 THROTTLE CONTROL MOTOR

Wiring Diagram

EC-ETC3-01

REFER TO "PG-POWER".

BBWA1180E
DTC P1128 THROTTLE CONTROL MOTOR

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 4            | L/W        | Throttle control motor (Close) | [Ignition switch: ON]  
  - Engine stopped  
  - Shift lever: D  
  - Accelerator pedal: Released | 0 - 14V★ |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG

OK   >> GO TO 2.
NG   >> Repair or replace ground connections.
2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Electric throttle control actuator terminal</th>
<th>ECM terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>Should not exist</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Should exist</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>Should exist</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Should not exist</td>
</tr>
</tbody>
</table>

4. Also check harness for short to ground and short to power.
   OK or NG
   OK  >> GO TO 3.
   NG  >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-380, "Component Inspection".
   OK or NG
   OK  >> GO TO 4.
   NG  >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".
   OK or NG
   OK  >> GO TO 5.
   NG  >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-44, "Throttle Valve Closed Position Learning".
3. Perform EC-44, "Idle Air Volume Learning".

>> INSPECTION END

Component Inspection
THROTTLE CONTROL MOTOR
1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.
   Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]
3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-44, "Throttle Valve Closed Position Learning".
5. Perform EC-44, "Idle Air Volume Learning".
DTC P1128 THROTTLE CONTROL MOTOR

Removal and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR
Refer to EM-15, “INTAKE MANIFOLD” .
DTC P1146, P1166 HO2S2

Component Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO2S2 (B1)</td>
<td>Warm-up condition</td>
<td>0 - 0.3V ←→ Approx. 0.6 - 1.0V</td>
</tr>
<tr>
<td>HO2S2 (B2)</td>
<td>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.</td>
<td>LEAN ←→ RICH</td>
</tr>
<tr>
<td>HO2S2 MNTR (B1)</td>
<td>Revving engine from idle to 3,000 rpm quickly.</td>
<td></td>
</tr>
<tr>
<td>HO2S2 MNTR (B2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1146</td>
<td>Heated oxygen sensor 2 minimum voltage monitoring</td>
<td>The minimum voltage from the sensor is not reached to the specified voltage.</td>
<td>• Harness or connectors (The sensor circuit is open or shorted)</td>
</tr>
<tr>
<td>1146</td>
<td></td>
<td></td>
<td>• Heated oxygen sensor 2</td>
</tr>
<tr>
<td>(Bank 1)</td>
<td></td>
<td></td>
<td>• Fuel pressure</td>
</tr>
<tr>
<td>P1166</td>
<td>Heated oxygen sensor 2 minimum voltage monitoring</td>
<td></td>
<td>• Injectors</td>
</tr>
<tr>
<td>1166</td>
<td>(Bank 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1146” or “HO2S2 (B2) P1166” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-388, “Diagnostic Procedure”.
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.18V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
   The voltage should be below 0.18V at least once during this procedure.

8. If NG, go to EC-388, "Diagnostic Procedure".
DTC P1146, P1166 HO2S2

Wiring Diagram
BANK 1

IGNITION SWITCH
ON OR START

10A
F4
8
R/B

E5
F14
20
R/B

IPDM E/R
(INTELLIGENT
POWER
DISTRIBUTION
MODULE
ENGINE ROOM)
E119

REFER TO "PG-POWER".

HEATED OXYGEN
SENSOR 2
(BANK 1)
F13

O2HRL
O2SRL

ECM
F54

EC-O2S2B1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

Revision: July 2007

EC-385

2004 Titan
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 55           | R          | Heated oxygen sensor 2 (bank 1) | [Engine is running]  
  ● Warm-up condition  
  ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met  
    - After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - Approximately 1.0V |
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 74           | L          | Heated oxygen sensor 2 (bank 2) | [Engine is running]  
- Warm-up condition  
- Revving engine from idle to 3,000 rpm quickly after the following conditions are met  
  - After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - Approximately 1.0V |

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   Refer to [EC-132, “Ground Inspection”](#).

**OK or NG**

- **OK**  >> GO TO 2.
- **NG**  >> Repair or replace ground connections.
2. CLEAR THE SELF-LEARNING DATA

⚠️ With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

❌ Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

Yes or No
- Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-216 .
- No >> GO TO 3.
3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.

3. Check harness continuity between HO2S2 terminal 4 and body ground. Refer to Wiring Diagram.
   
   **Continuity should exist.**

4. Also check harness for short to power.

   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

   Check the following.
   ● Harness connectors F14, E5
   ● Harness for open or short between HO2S2 and body ground

   >> Repair open circuit or short to power in harness or connectors.
5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminals</th>
<th>Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECM</td>
<td>Sensor</td>
</tr>
<tr>
<td>P1146</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>P1166</td>
<td>74</td>
<td>1</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

3. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminals</th>
<th>Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECM</td>
<td>Sensor</td>
</tr>
<tr>
<td>P1146</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>P1166</td>
<td>74</td>
<td>1</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-391, "Component Inspection".

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

> INSPECTION END

Component Inspection
HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

<table>
<thead>
<tr>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL INJECTION</td>
</tr>
<tr>
<td>ENG SPEED</td>
</tr>
<tr>
<td>HO2S2 (B1)</td>
</tr>
<tr>
<td>HO2S2 (B2)</td>
</tr>
</tbody>
</table>

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.

- The voltage should be above 0.70V at least one time.
- The voltage should be below 0.18V at least one time.

**CAUTION:**
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Without CONSULT-II**
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.)
   - The voltage should be above 0.70V at least once during this procedure.
   - If the voltage is above 0.70V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
   - The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

**CAUTION:**
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.
DTC P1146, P1166 HO2S2

Removal and Installation
HEATED OXYGEN SENSOR 2

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1147, P1167 HO2S2

Component Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO2S2 (B1)</td>
<td>Warm-up condition</td>
<td>0 - 0.3V ←→ Approx. 0.6 - 1.0V</td>
</tr>
<tr>
<td>HO2S2 (B2)</td>
<td>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.</td>
<td>LEAN ←→ RICH</td>
</tr>
<tr>
<td>HO2S2 MNTR (B1)</td>
<td>Revving engine from idle to 3,000 rpm quickly.</td>
<td></td>
</tr>
<tr>
<td>HO2S2 MNTR (B2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
---------|------------------------|-------------------------|----------------|
P1147    | Heated oxygen sensor 2 maximum voltage monitoring | The maximum voltage from the sensor is not reached to the specified voltage. | Harness or connectors (The sensor circuit is open or shorted) |
         | (Bank 1)               |                         | Heated oxygen sensor 2 |
P1167    | Heated oxygen sensor 2 maximum voltage monitoring | The maximum voltage from the sensor is not reached to the specified voltage. | Fuel pressure |
         | (Bank 2)               |                         | Injectors |
         |                        |                         | Intake air leaks |
DTC Confirmation Procedure

**NOTE:**
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**WITH CONSULT-II**

**TESTING CONDITION:**
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1147” or “HO2S2 (B2) P1167” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-400, “Diagnostic Procedure”.
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
    a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
    b. Return to step 1.

**Overall Function Check**

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

**WITH GST**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times. (Depress and release accelerator pedal as soon as possible.) *The voltage should be above 0.70V at least once during this procedure.* If the voltage can be confirmed in step 6, step 7 is not necessary.

7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position. *The voltage should be above 0.70V at least once during this procedure.*

8. If NG, go to EC-400, "Diagnostic Procedure".
Specification data are reference values and are measured between each terminal and ground. **CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 55           | R          | Heated oxygen sensor 2 (bank 1) | [Engine is running]  
  - Warm-up condition  
  - Revving engine from idle to 3,000 rpm quickly after the following conditions are met  
  - After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - Approximately 1.0V |
DTC P1147, P1167 HO2S2

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 74           | L          | Heated oxygen sensor 2 (bank 2) | [Engine is running]  
  • Warm-up condition  
  • Revving engine from idle to 3,000 rpm quickly after the following conditions are met  
    - After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - Approximately 1.0V |

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

Refer to **EC-132, "Ground Inspection"**.

**OK or NG**

- **OK**  
  => GO TO 2.
- **NG**  
  => Repair or replace ground connections.
2. CLEAR THE SELF-LEARNING DATA

**With CONSULT-II**
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   - Is the 1st trip DTC P0171 or P0174 detected?
   - Is it difficult to start engine?

**Without CONSULT-II**
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   - Is the 1st trip DTC P0171 or P0174 detected?
   - Is it difficult to start engine?

Yes or No
- Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to EC-207.
- No >> GO TO 3.
3. **CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.

3. Check harness continuity between HO2S2 terminal 4 and body ground.
   Refer to Wiring Diagram.
   
   **Continuity should exist.**

4. Also check harness for short to power.

   **OK or NG**
   
   OK  >> GO TO 5.
   NG  >> GO TO 4.

4. **DETECT MALFUNCTIONING PART**

   Check the following.
   
   - Harness connectors F14, E5
   - Harness for open or short between HO2S2 and body ground

   >> Repair open circuit or short to power in harness or connectors.
5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminals</th>
<th>Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1147</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>P1167</td>
<td>74</td>
<td>2</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

3. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminals</th>
<th>Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1147</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>P1167</td>
<td>74</td>
<td>2</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-403, "Component Inspection".

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> INSPECTION END

Component Inspection
HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

DATA MONITOR

<table>
<thead>
<tr>
<th>MONITOR</th>
<th>NO DTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG SPEED</td>
<td>XXX rpm</td>
</tr>
<tr>
<td>COOLANT TEMP</td>
<td>XXX °C</td>
</tr>
</tbody>
</table>
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

<table>
<thead>
<tr>
<th>ACTIVE TEST</th>
<th>FUEL INJECTION</th>
<th>25 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONITOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG SPEED</td>
<td>XXX rpm</td>
<td></td>
</tr>
<tr>
<td>HO2S2 (B1)</td>
<td>XXX V</td>
<td></td>
</tr>
<tr>
<td>HO2S2 (B2)</td>
<td>XXX V</td>
<td></td>
</tr>
</tbody>
</table>

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.

![Graph showing voltage response](image)

"HO2S2 (B1)/(B2)" should be above 0.70V at least once when the “FUEL INJECTION” is +25%.

"HO2S2 (B1)/(B2)" should be below 0.18V at least once when the “FUEL INJECTION” is -25%.

**CAUTION:**
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

**Without CONSULT-II**
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] or 74 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.70V at least once during this procedure.**
   If the voltage is above 0.70V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position.
   **The voltage should be below 0.18V at least once during this procedure.**
8. If NG, replace heated oxygen sensor 2.

**CAUTION:**
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.
Removal and Installation
HEATED OXYGEN SENSOR 2
Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
These self-diagnoses have the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1148</td>
<td>Closed loop control function</td>
<td>The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.</td>
<td>Harness or connectors [The air fuel ratio (A/F) sensor 1 circuit is open or shorted.]</td>
</tr>
<tr>
<td>1148</td>
<td>(Bank 1)</td>
<td></td>
<td>Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>P1168</td>
<td>Closed loop control function</td>
<td>The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.</td>
<td>Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td>1168</td>
<td>(Bank 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DTC P1148 or P1168 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.
DTC P1211 TCS CONTROL UNIT

Description

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM. Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1211/1211</td>
<td>TCS control unit</td>
<td>ECM receives a malfunction information from “ABS actuator electric unit (control unit)”</td>
<td>• ABS actuator and electric unit (control unit) • TCS related parts</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to EC-407, "Diagnostic Procedure".

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

Go to BRC-101, "TROUBLE DIAGNOSIS".
DTC P1212 TCS COMMUNICATION LINE

Description

NOTE:
If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE". This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”. Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1212  1212</td>
<td>TCS communication line</td>
<td>ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.</td>
<td>• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

® WITH CONSULT-II
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If a 1st trip DTC is detected, go to EC-408, "Diagnostic Procedure".

® WITH GST
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

1. CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) FUNCTION

Refer to BRC-101, "TROUBLE DIAGNOSIS".

>> INSPECTION END
DTC P1217 ENGINE OVER TEMPERATURE

Description

SYSTEM DESCRIPTION

NOTE:

If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-134, "DTC U1000, U1001 CAN COMMUNICATION LINE".

Cooling Fan Control

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input signal to ECM</th>
<th>ECM function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor (POS)</td>
<td>Engine speed*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camshaft position sensor (PHASE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>Battery voltage*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel sensor*2</td>
<td>Vehicle speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner ON signal*2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerant pressure sensor</td>
<td>Refrigerant pressure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 2-step control [ON/OFF].

Cooling Fan Operation

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOLING FAN</td>
<td>• Engine: After warming up, idle the engine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engine coolant temperature is 99°C (210°F) or less</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>Engine coolant temperature is 100°C (212°F) or more</td>
<td>ON</td>
</tr>
</tbody>
</table>
DTC P1217 ENGINE OVER TEMPERATURE

On Board Diagnosis Logic

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated. This self-diagnosis has the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1217 1217</td>
<td>Engine over temperature (Overheat)</td>
<td>● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.</td>
<td>● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-417, &quot;Main 12 Causes of Overheating&quot;.</td>
</tr>
</tbody>
</table>

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-8, "Changing Engine Oil".

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "ANTI-FREEZE COOLANT MIXTURE RATIO".

2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Overall Function Check

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator. Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

1. Check the coolant level in the reservoir tank and radiator. Allow engine to cool before checking coolant level. If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-414, "Diagnostic Procedure".

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-414, "Diagnostic Procedure".

3. Turn ignition switch ON.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to **EC-414, “Diagnostic Procedure”**.

### WITH GST
1. Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.**
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to **EC-414, “Diagnostic Procedure”**.
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to **EC-414, “Diagnostic Procedure”**.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Start engine and make sure that cooling fan operates at higher speed than low speed. **Be careful not to overheat engine.**
6. If NG, go to **EC-414, "Diagnostic Procedure"**.
DTC P1217 ENGINE OVER TEMPERATURE

EC-COOL/F-02

- DETECTABLE LINE FOR DTC
- NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

Revision: July 2007

EC-413

2004 Titan
Diagnostic Procedure

1. INSPECTION START

Do you have CONSULT-II?
Yes or No

Yes  >> GO TO 2.
No   >> GO TO 3.

2. CHECK COOLING FAN MOTOR OPERATION

With CONSULT-II
1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that cooling fan operates.

OK or NG

OK  >> GO TO 4.
NG  >> Check cooling fan control circuit. (Go to EC-416, “PROCEDURE A”.)

3. CHECK COOLING FAN MOTOR OPERATION

Without CONSULT-II
1. Disconnect engine coolant temperature sensor harness connector.
2. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
3. Start engine and let it idle.
4. Make sure that cooling fan operates.

OK or NG

OK  >> GO TO 4.
NG  >> Check cooling fan control circuit. (Go to EC-416, “PROCEDURE A”.)
4. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

   Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)

**CAUTION:**
Higher than the specified pressure may cause radiator damage. Pressure should not drop.

OK or NG
OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS".
   - Hose
   - Radiator
   - Water pump

5. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

   Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)

OK or NG
OK >> GO TO 6.
NG >> Replace radiator cap.

6. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures. **It should seat tightly.**
2. Check valve opening temperature and valve lift.
   - Valve opening temperature: 82°C (180°F) [standard]
   - Valve lift: More than 10.0 mm/95°C (0.394 in/203°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
   For details, refer to CO-17, "THERMOSTAT AND WATER PIPING".

OK or NG
OK >> GO TO 7.
NG >> Replace thermostat

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-168, "Component Inspection".

OK or NG
OK >> GO TO 8.
NG >> Replace engine coolant temperature sensor.
8. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-417, "Main 12 Causes of Overheating".

>> INSPECTION END

PROCEDURE A

1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E120.
3. Check voltage between IPDM E/R terminal 24 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- 40A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN OR SHORT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between cooling fan motor terminal 1 and IPDM E/R terminal 24, cooling fan motor terminal 2 and body ground.
   Refer to wiring diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR

Refer to EC-418, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace cooling fan motor.
5. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .

NG >> Repair or replace harness connectors.

Main 12 Causes of Overheating

<table>
<thead>
<tr>
<th>Engine</th>
<th>Step</th>
<th>Inspection item</th>
<th>Equipment</th>
<th>Standard</th>
<th>Reference page</th>
</tr>
</thead>
</table>
| OFF    | 1    | ● Blocked radiator
       | ● Blocked condenser
       | ● Blocked radiator grille
       | ● Blocked bumper | ● Visual | No blocking | — |
|        | 2    | ● Coolant mixture | ● Coolant tester | 50 - 50% coolant mixture | MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS" |
|        | 3    | ● Coolant level | ● Visual | Coolant up to MAX level in reservoir tank and radiator filler neck | CO-9, "Changing Engine Coolant" |
|        | 4    | ● Radiator cap | ● Pressure tester | 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi) (Limit) | CO-12, "Checking Reservoir Cap" |
| ON²    | 5    | ● Coolant leaks | ● Visual | No leaks | CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" |
| ON²    | 6    | ● Thermostat | ● Touch the upper and lower radiator hoses | Both hoses should be hot | CO-17, "THERMOSTAT AND WATER PIPING" |
| ON¹    | 7    | ● Cooling fan | ● CONSULT-II | Operating | See trouble diagnosis for DTC P1217 (EC-409) . |
| OFF    | 8    | ● Combustion gas leak | ● Color checker chemical tester 4 Gas analyzer | Negative | — |
| ON³    | 9    | ● Coolant temperature gauge | ● Visual | Gauge less than 3/4 when driving | — |
|        |      | ● Coolant overflow to reservoir tank | ● Visual | No overflow during driving and idling | CO-9, "Changing Engine Coolant" |
| OFF⁴   | 10   | ● Coolant return from reservoir tank to radiator | ● Visual | Should be initial level in reservoir tank | CO-9, "Changing Engine Coolant" |
| OFF    | 11   | ● Cylinder head | ● Straight gauge feeler gauge | 0.1 mm (0.004 in) Maximum distortion (warping) | EM-64, "Inspection After Disassembly" |
|        | 12   | ● Cylinder block and pistons | ● Visual | No scuffing on cylinder walls or piston | EM-90, "Inspection After Disassembly" |

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.

For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .
Component Inspection
COOLING FAN MOTOR
1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.
   Cooling fan motor should operate.
   If NG, replace cooling fan motor.
DTC P1225 TP SENSOR

Component Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

The MIL will not light up for this diagnosis.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-420, “Diagnostic Procedure”.

WITH GST
Follow the procedure “WITH CONSULT-II” above.
Diagnostic Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 2.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Remove the foreign matter and clean the electric throttle control actuator inside.</td>
</tr>
</tbody>
</table>

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.

>> INSPECTION END

Removal and Installation
ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "INTAKE MANIFOLD" .
DTC P1226 TP SENSOR

Component Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

The MIL will not light up for this diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1226</td>
<td>Closed throttle position learning performance problem</td>
<td>Closed throttle position learning is not performed successfully, repeatedly.</td>
<td>Electric throttle control actuator (TP sensor 1 and 2)</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

พยายามกับ CONSULT-II
1. Turn ignition switch ON.
2. Select "DATA MONITOR" mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-422, "Diagnostic Procedure".

ให้กับ GST
Follow the procedure “WITH CONSULT-II” above.
Diagnostic Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>GO TO 2.</td>
</tr>
<tr>
<td>NG</td>
<td>Remove the foreign matter and clean the electric throttle control actuator inside.</td>
</tr>
</tbody>
</table>

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-44, “Throttle Valve Closed Position Learning”.

>> INSPECTION END

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "INTAKE MANIFOLD".
DTC P1229 SENSOR POWER SUPPLY

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1229</td>
<td>Sensor power supply circuit short</td>
<td>ECM detects a voltage of power source for sensor is excessively low or high.</td>
<td>• Harness or connectors&lt;br&gt;  (APP sensor 1 circuit is shorted.)&lt;br&gt;  (PSP sensor circuit is shorted.)&lt;br&gt;  (Refrigerant pressure sensor circuit is shorted.)&lt;br&gt;  (EVAP control system pressure sensor circuit is shorted.)&lt;br&gt;  Accelerator pedal position sensor&lt;br&gt;  Power steering pressure sensor&lt;br&gt;  Refrigerant pressure sensor&lt;br&gt;  EVAP control system pressure sensor</td>
</tr>
</tbody>
</table>

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

---

**NOTE:**

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

**WITH CONSULT-II**

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-425, “Diagnostic Procedure”.

**WITH GST**

Follow the procedure “WITH CONSULT-II” above.
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>SB</td>
<td>Sensor power supply (EVAP control system pressure sensor)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
<tr>
<td>49</td>
<td>R/Y</td>
<td>Sensor power supply (Refrigerant pressure sensor)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
<tr>
<td>68</td>
<td>W/L</td>
<td>Sensor power supply (Power steering pressure sensor)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
<tr>
<td>90</td>
<td>L</td>
<td>Sensor power supply (APP sensor 1)</td>
<td>[Ignition switch: ON]</td>
<td>Approximately 5V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   Refer to **EC-132, "Ground Inspection"**.

**OK or NG**

OK  >> GO TO 2.
NG  >> Repair or replace ground connections.
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

3. Check voltage between APP sensor terminal 7 and ground with CONSULT-II or tester.

   **Voltage: Approximately 5V**

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
- Harness for short to power and short to ground, between the following terminals

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>Sensor terminal</th>
<th>Reference Wiring Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>EVAP control system pressure sensor terminal 3</td>
<td>EC-303</td>
</tr>
<tr>
<td>49</td>
<td>Refrigerant pressure sensor terminal 1</td>
<td>EC-588</td>
</tr>
<tr>
<td>68</td>
<td>Power steering pressure sensor terminal 1</td>
<td>EC-346</td>
</tr>
<tr>
<td>90</td>
<td>APP sensor terminal 7</td>
<td>EC-424</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

4. CHECK COMPONENTS

Check the following.
- EVAP control system pressure sensor (Refer to EC-306, "Component Inspection".)
- Power steering pressure sensor (Refer to EC-349, "Component Inspection".)
- Refrigerant pressure sensor (Refer to MTC-78, "COMPONENT INSPECTION".)

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

5. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-562, "Component Inspection".

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>
6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal position assembly.
2. Perform EC-44, "Accelerator Pedal Released Position Learning".
3. Perform EC-44, "Throttle Valve Closed Position Learning".
4. Perform EC-44, "Idle Air Volume Learning".

> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

> INSPECTION END
DTC P1271, P1281 A/F SENSOR 1

Component Description

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element. The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \text{air}$). The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

Specified data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1271</td>
<td>Air fuel ratio (A/F) sensor 1 circuit no activity detected</td>
<td>The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.</td>
<td>Harness or connectors (The A/F sensor 1 circuit is open or shorted.) Air fuel ratio (A/F) sensor 1</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE: If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 0V, go to [EC-433, "Diagnostic Procedure"].
   If the indication is not constantly approx. 0V, go to next step.

4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.

5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

6. Maintain the following conditions for about 20 consecutive seconds.

<table>
<thead>
<tr>
<th>ENG SPEED</th>
<th>1,000 - 3,200 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHCL SPEED SE</td>
<td>More than 40 km/h (25 MPH)</td>
</tr>
<tr>
<td>B/FUEL SCHDL</td>
<td>1.5 - 9.0 msec</td>
</tr>
<tr>
<td>Gear position</td>
<td>Suitable position</td>
</tr>
</tbody>
</table>

   **NOTE:**
   - Keep the accelerator pedal as steady as possible during the cruising.
   - If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. If 1st trip DTC is displayed, go to [EC-433, "Diagnostic Procedure"].

   **WITH GST**
   Follow the procedure “WITH CONSULT-II” above.
Wiring Diagram

BANK 1

DTC P1271, P1281 A/F SENSOR 1

EC-430

Revision: July 2007

2004 Titan
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 16           | BR/R       | A/F sensor 1 (Bank 1) | [Engine is running]  
  ● Warm-up condition  
  ● Idle speed | Approximately 3.1V |
| 35           | BR/G       | A/F sensor 1 (Bank 1) | Approximately 2.6V |
| 56           | LG/B       | A/F sensor 1 (Bank 1) | Approximately 2.3V |
| 75           | P/B        | A/F sensor 1 (Bank 1) | Approximately 2.3V |
DTC P1271, P1281 A/F SENSOR 1

BANK 2

EC-AF1B2-01

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

ECM

AF-H2

AF-IA2

AF-VM2

AF-UN2

AF-IP2

BR/W

BR/B

L/P

G/L

GR/G

24

57

76

58

F5

F5

B

F5

F5

B

H.S.

3

4

1

2

10A

54

E10

E5

F14

3

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24
DTC P1271, P1281 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running]</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td>• Warm-up condition</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td>• Idle speed</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

Diagnostic Procedure
1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   Voltage: Battery voltage

   OK or NG
   OK  >> GO TO 4.
   NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 10A fuse
- Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
### 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>Bank 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

OK or NG

OK >> Replace A/F sensor 1.

NG >> Repair or replace.

**Removal and Installation**

**AIR FUEL RATIO (A/F) SENSOR 1**

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
**DTC P1272, P1282 A/F SENSOR 1**

**Component Description**

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \infty$). The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C ($1,292 - 1,472°F$).

**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Fluctuates around 1.5V</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td>Maintaining engine speed at 2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>

**On Board Diagnosis Logic**

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1272</td>
<td>Air fuel ratio (A/F) sensor 1 circuit no activity detected</td>
<td>The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.</td>
<td>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</td>
</tr>
<tr>
<td>1272 (Bank 1)</td>
<td></td>
<td></td>
<td>Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>P1282</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1282 (Bank 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DTC Confirmation Procedure**

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

** WITH CONSULT-II **
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication. If the indication is constantly approx. 5V, go to **EC-441, "Diagnostic Procedure"**. If the indication is not constantly approx. 5V, go to next step.

4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.

5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

6. Maintain the following conditions for about 20 consecutive seconds.

<table>
<thead>
<tr>
<th>ENG SPEED</th>
<th>1,000 - 3,200 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHCL SPEED SE</td>
<td>More than 40 km/h (25 MPH)</td>
</tr>
<tr>
<td>B/FUEL SCHDL</td>
<td>1.5 - 9.0 msec</td>
</tr>
<tr>
<td>Gear position</td>
<td>Suitable position</td>
</tr>
</tbody>
</table>

**NOTE:**
- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.

7. If 1st trip DTC is displayed, go to **EC-441, "Diagnostic Procedure"**.

**WITH GST**

Follow the procedure "WITH CONSULT-II" above.
Wiring Diagram

BANK 1

EC-AF1B1-01

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC

DTC P1272, P1282 A/F SENSOR 1

2004 Titan

Revision: July 2007

EC-438

2004 Titan
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 16           | BR/R       | A/F sensor 1 (Bank 1) | [Engine is running]  
  • Warm-up condition  
  • Idle speed | Approximately 3.1V |
| 35           | BR/G       |      |           | Approximately 2.6V |
| 56           | LG/B       |      |           | Approximately 2.3V |
| 75           | P/B        |      |           | Approximately 2.3V |
DTC P1272, P1282 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running] Warm-up condition Idle speed</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td></td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to **EC-132, "Ground Inspection"**.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.
2. **CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT**

1. Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   **Voltage:** Battery voltage

   **OK or NG**
   - OK >> GO TO 4.
   - NG >> GO TO 3.

3. **DETECT MALFUNCTIONING PART**

   Check the following.
   - Harness connectors E5, F14
   - IPDM E/R harness connector E119
   - 10A fuse
   - Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG  
OK  >> GO TO 5.  
NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

OK or NG  
OK  >> Replace A/F sensor 1.  
NG  >> Repair or replace.

Removal and Installation
AIR FUEL RATIO (A/F) SENSOR 1
Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1273, P1283 A/F SENSOR 1

Component Description
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \infty$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode
Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Fluctuates around 1.5V</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td>Maintaining engine speed at 2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic
To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted LEAN side or RICH side.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1273</td>
<td>Air fuel ratio (A/F) sensor 1</td>
<td>The output voltage</td>
<td>• Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>1273</td>
<td>lean shift monitoring</td>
<td>computed by ECM from</td>
<td>• Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td>(Bank 1)</td>
<td></td>
<td>the A/F sensor 1 signal</td>
<td>• Fuel pressure</td>
</tr>
<tr>
<td>P1283</td>
<td></td>
<td></td>
<td>• Injector</td>
</tr>
<tr>
<td>1283</td>
<td></td>
<td></td>
<td>• Intake air leaks</td>
</tr>
<tr>
<td>(Bank 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-449, “Diagnostic Procedure”.

**WITH GST**
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select “MODE 3” with GST and make sure that DTC P0102 is detected.
7. Select “MODE 4” with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select “MODE 7” with GST.
    If 1st trip DTC is detected, go to EC-449, “Diagnostic Procedure”.
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>BR/R</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>[Engine is running]</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>35</td>
<td>BR/G</td>
<td></td>
<td>• Warm-up condition</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>56</td>
<td>LG/B</td>
<td></td>
<td>• Idle speed</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>75</td>
<td>P/B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DTC P1273, P1283 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running] ● Warm-up condition ● Idle speed</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td></td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to [EC-132, "Ground Inspection"](EC-132).

**OK or NG**
- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2. **RETIGHTEN A/F SENSOR 1**

Loosen and retighten the A/F sensor 1.

**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.
3. CLEAR THE SELF-LEARNING DATA

⚠️ With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

⚠️ Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Yes or No
Yes  >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to EC-207.
No    >> GO TO 4.
4. **CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.

3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**

   OK or NG
   - OK >> GO TO 6.
   - NG >> GO TO 5.

5. **DETECT MALFUNCTIONING PART**

   Check the following.
   - Harness connectors E5, F14
   - IPDM E/R harness connector E119
   - 10A fuse
   - Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>Bank 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

OK  >> GO TO 7.
NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK A/F SENSOR 1 HEATER

Refer to EC-359, "Component Inspection".

OK or NG

OK  >> GO TO 8.
NG  >> Replace A/F sensor 1.

8. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

OK or NG

OK  >> Replace A/F sensor 1.
NG  >> Repair or replace.

Removal and Installation

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1274, P1284 A/F SENSOR 1

Component Description

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td></td>
<td>Fluctuates around 1.5V</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to the LEAN side or RICH side.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1274 1274 (Bank 1)</td>
<td>Air fuel ratio (A/F) sensor 1 rich shift monitoring</td>
<td>● The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.</td>
<td>● Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>P1284 1244 (Bank 2)</td>
<td></td>
<td></td>
<td>● Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Fuel pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Injector</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-458, “Diagnostic Procedure”.

**WITH GST**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select “MODE 3” with GST and make sure that DTC P0102 is detected.
7. Select “MODE 4” with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select “MODE 7” with GST.
If 1st trip DTC is detected, go to EC-458, “Diagnostic Procedure”.
Wiring Diagram
BANK 1

DTC P1274, P1284 A/F SENSOR 1

EC-AF1B1-01

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC

: NON-DETECTABLE LINE FOR DTC
DTC P1274, P1284 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM: A/F sensor 1 (Bank 1)</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>BR/R</td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>35</td>
<td>BR/G</td>
<td></td>
<td>Warm-up condition</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>56</td>
<td>LG/B</td>
<td></td>
<td>Idle speed</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>75</td>
<td>P/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>
DTC P1274, P1284 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running]</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td>Warm-up condition</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td>Idle speed</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

Diagnostic Procedure

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   Refer to EC-132, "Ground Inspection".

   OK or NG
   
   OK   >> GO TO 2.
   NG   >> Repair or replace ground connections.

2. **RETIGHTEN A/F SENSOR 1**

   Loosen and retighten the A/F sensor 1.

   **Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

   >> GO TO 3.
3. CLEAR THE SELF-LEARNING DATA.

**With CONSULT-II**
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

**Without CONSULT-II**
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No
- Yes  >> Perform trouble diagnosis for DTC P0172 or P0175. Refer to EC-216.
- No    >> GO TO 4.
4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.

3. Check harness connector for water.
   **Water should not exit.**

   OK or NG
   
   OK  >> GO TO 5.
   NG  >> Repair or replace harness connector.

5. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.
   
   **Voltage: Battery voltage**

   OK or NG
   
   OK  >> GO TO 7.
   NG  >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 10A fuse
- Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
7. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

ContINUITY should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

Continuity should not exist.

5. Also check harness for short to power.
OK or NG
OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK A/F SENSOR 1 HEATER

Refer to `EC-359, "Component Inspection"`.

OK or NG
OK >> GO TO 9.
NG >> Replace A/F sensor 1.

9. CHECK INTERMITTENT INCIDENT

Perform `EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"`.

OK or NG
OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation
AIR FUEL RATIO (A/F) SENSOR 1
Refer to `EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST"`.
DTC P1276, P1286 A/F SENSOR 1

Component Description

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \infty$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td>Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1276</td>
<td>Air fuel ratio (A/F) sensor 1 circuit high voltage</td>
<td>The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.</td>
<td>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</td>
</tr>
<tr>
<td>1276 (Bank 1)</td>
<td></td>
<td></td>
<td>Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>P1286</td>
<td>Air fuel ratio (A/F) sensor 1 circuit high voltage</td>
<td>The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.</td>
<td>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</td>
</tr>
<tr>
<td>1286 (Bank 2)</td>
<td></td>
<td></td>
<td>Air fuel ratio (A/F) sensor 1</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
DTC P1276, P1286 A/F SENSOR 1

If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-468, "Diagnostic Procedure".

If the indication fluctuates around 1.5V, go to next step.

4. Select “A/F SEN1 (B1) P1276” or “A/F SEN1 (B2) P1286” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.

5. Touch “START”.

6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

<table>
<thead>
<tr>
<th>ENG SPEED</th>
<th>850 - 3,200 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle speed</td>
<td>More than 64 km/h (40 MPH)</td>
</tr>
<tr>
<td>B/FUEL SCDL</td>
<td>1.0 - 8.0 msec</td>
</tr>
<tr>
<td>Selector lever</td>
<td>D position with “OD” ON</td>
</tr>
</tbody>
</table>

If “TESTING” is not displayed after 20 seconds, retry from step 2.

   NOTE: Never apply brake during releasing the accelerator pedal.

8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.

9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-468, "Diagnostic Procedure".

Overall Function Check
Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set 5th position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE: Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-468, "Diagnostic Procedure".
DTC P1276, P1286 A/F SENSOR 1

Wiring Diagram
BANK 1

EC-AF1B1-01

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC
.: NON-DETECTABLE LINE FOR DTC
DTC P1276, P1286 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>BR/R</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>[Engine is running]</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>35</td>
<td>BR/G</td>
<td></td>
<td>• Warm-up condition</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>56</td>
<td>LG/B</td>
<td></td>
<td>• Idle speed</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>75</td>
<td>P/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running]</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td>● Warm-up condition</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td>● Idle speed</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. CHECK GROUND CONNECTIONS

   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

   Refer to EC-132, "Ground Inspection".

   **OK or NG**
   - OK >> GO TO 2.
   - NG >> Repair or replace ground connections.
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   **Voltage:** Battery voltage

   OK or NG
   OK >> GO TO 4.
   NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E5, F14
   - IPDM E/R harness connector E119
   - 10A fuse
   - Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
4. **CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>Bank 2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>Bank 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F sensor 1 terminal</td>
<td>ECM terminal</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. **CHECK INTERMITTENT INCIDENT**

Perform [EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](EC-126).

OK or NG

OK >> Replace A/F sensor 1.

NG >> Repair or replace.

**Removal and Installation**

**AIR FUEL RATIO (A/F) SENSOR 1**

Refer to [EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST"](EM-19).
DTC P1278, P1288 A/F SENSOR 1

Component Description

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| A/F SEN1 (B1)     |                                  |                        |
| A/F SEN1 (B2)     |                                  |                        |

On Board Diagnosis Logic

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1278</td>
<td>Air fuel ratio (A/F) sensor 1 circuit slow response</td>
<td>• The response (from RICH to LEAN) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.</td>
<td>• Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</td>
</tr>
<tr>
<td>1278</td>
<td></td>
<td></td>
<td>• Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>(Bank 1)</td>
<td></td>
<td></td>
<td>• Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td>P1288</td>
<td></td>
<td></td>
<td>• Fuel pressure</td>
</tr>
<tr>
<td>1288</td>
<td></td>
<td></td>
<td>• Injector</td>
</tr>
<tr>
<td>(Bank 2)</td>
<td></td>
<td></td>
<td>• Intake air leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Exhaust gas leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• PCV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Mass air flow sensor</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.
   a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
   b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-122, “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”.
8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.
9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-122, “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-477, “Diagnostic Procedure”.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select “MODE 1” with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, go to the following step.
DTC P1278, P1288 A/F SENSOR 1

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Injectors
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select “MODE 7” with GST.
   If the 1st trip DTC is displayed, go to EC-477, "Diagnostic Procedure".
Wiring Diagram
BANK 1

DTC P1278, P1288 A/F SENSOR 1

IGNITION SWITCH ON OR START

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

REFER TO “PG-POWER”.

- DETECTABLE LINE FOR DTC
- NON-DETECTABLE LINE FOR DTC

AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)

AF-H1  AF-IA1  AF-VM1  AF-UN1  AF-IP1

Revision: July 2007

EC-474
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>BR/R</td>
<td>[Engine is running]</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>35</td>
<td>BR/G</td>
<td>Warm-up condition</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>56</td>
<td>LG/B</td>
<td>Idle speed</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>75</td>
<td>P/B</td>
<td></td>
<td>A/F sensor 1 (Bank 1)</td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

Revision: July 2007

EC-475

2004 Titan
DTC P1278, P1288 A/F SENSOR 1

BANK 2

REFER TO "PG-POWER".

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

AF-H2
AF-IA2
AF-VM2
AF-UN2
AF-IP2

ECM

EC-AF1B2-01

Revision: July 2007
DTC P1278, P1288 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running]</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td>Warm-up condition</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td>Idle speed</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

1. **CHECK GROUND CONNECTIONS**
   1. Turn ignition switch OFF.
   2. Loosen and retighten three ground screws on the body.

Refer to [EC-132, "Ground Inspection"](https://example.com).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. **RETIGHTEN A/F SENSOR 1**

Loosen and retighten the A/F sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.
3. **CHECK EXHAUST GAS LEAK**

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).

![Diagram of exhaust system](image)

**OK or NG**
- **OK**  >> GO TO 4.
- **NG**  >> Repair or replace.

4. **CHECK FOR INTAKE AIR LEAK**

Listen for an intake air leak after the mass air flow sensor.

**OK or NG**
- **OK**  >> GO TO 5.
- **NG**  >> Repair or replace.
5. CLEAR THE SELF-LEARNING DATA

**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

   **Yes or No**
   
   Yes  >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-207 or EC-216.
   
   No   >> GO TO 6.
6. **CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.

3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.
   
   **Voltage: Battery voltage**
   
<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 8.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; GO TO 7.</td>
</tr>
</tbody>
</table>

5. **DETECT MALFUNCTIONING PART**

   Check the following.
   - Harness connectors E5, F14
   - IPDM E/R harness connector E119
   - 10A fuse
   - Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
8. **CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows.
   Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
<th>Bank 2</th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>16</td>
<td></td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.
   OK or NG
   OK  >> GO TO 9.
   NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

9. **CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER**

Refer to EC-359, "Component Inspection".

OK or NG
OK  >> GO TO 10.
NG  >> Replace A/F sensor 1.

10. **CHECK MASS AIR FLOW SENSOR**

Refer to EC-152, "Component Inspection".

OK or NG
OK  >> GO TO 11.
NG  >> Replace mass air flow sensor.
11. CHECK PCV VALVE

Refer to EC-617, "POSITIVE CRANKCASE VENTILATION".

OK or NG

OK  >> GO TO 12.
NG  >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

OK or NG

OK  >> Replace A/F sensor 1.
NG  >> Repair or replace.

Removal and Installation
AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1279, P1289 A/F SENSOR 1

Component Description

The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda < \text{air}$).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F SEN1 (B1)</td>
<td>- Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
<tr>
<td>A/F SEN1 (B2)</td>
<td>- Engine: After warming up</td>
<td>Maintaining engine speed at 2,000 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fluctuates around 1.5V</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1279</td>
<td>Air fuel ratio (A/F) sensor 1 circuit slow response</td>
<td>- The response (from LEAN to RICH) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.</td>
<td>- Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</td>
</tr>
<tr>
<td>1279</td>
<td>(Bank 1)</td>
<td></td>
<td>- Air fuel ratio (A/F) sensor 1</td>
</tr>
<tr>
<td>P1289</td>
<td>Air fuel ratio (A/F) sensor 1 circuit slow response</td>
<td></td>
<td>- Air fuel ratio (A/F) sensor 1 heater</td>
</tr>
<tr>
<td>1289</td>
<td>(Bank 2)</td>
<td></td>
<td>- Fuel pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Injector</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Intake air leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Exhaust gas leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- PCV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Mass air flow sensor</td>
</tr>
</tbody>
</table>
DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.
   a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
   b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-122, “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”.
8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.
9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-122, “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-489, “Diagnostic Procedure”.

WITH GST
1. Start engine and warm it up to normal operating temperature.
2. Select “MODE 1” with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.
DTC P1279, P1289 A/F SENSOR 1

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Injectors
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select “MODE 7” with GST.
   If the 1st trip DTC is displayed, go to EC-489, "Diagnostic Procedure".
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>BR/R</td>
<td>A/F sensor 1 (Bank 1)</td>
<td>[Engine is running]</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>35</td>
<td>BR/G</td>
<td></td>
<td>Warm-up condition</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>56</td>
<td>LG/B</td>
<td></td>
<td>Idle speed</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>75</td>
<td>P/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>
DTC P1279, P1289 A/F SENSOR 1

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>L/P</td>
<td>A/F sensor 1 (Bank 2)</td>
<td>[Engine is running]</td>
<td>Approximately 2.6V</td>
</tr>
<tr>
<td>58</td>
<td>GR/G</td>
<td></td>
<td>Warm-up condition</td>
<td>Approximately 2.3V</td>
</tr>
<tr>
<td>76</td>
<td>G/L</td>
<td></td>
<td>Idle speed</td>
<td>Approximately 3.1V</td>
</tr>
<tr>
<td>77</td>
<td>BR/B</td>
<td></td>
<td></td>
<td>Approximately 2.3V</td>
</tr>
</tbody>
</table>

**Diagnostic Procedure**

**1. CHECK GROUND CONNECTIONS**

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-132, "Ground Inspection".

**OK or NG**

**OK** >> GO TO 2.

**NG** >> Repair or replace ground connections.

**2. RETIGHTEN A/F SENSOR 1**

Loosen and retighten the A/F sensor 1.

**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.
3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).

OK or NG
- OK >> GO TO 4.
- NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG
- OK >> GO TO 5.
- NG >> Repair or replace.
5. CLEAR THE SELF-LEARNING DATA

⚠️ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**

⚠️ Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-62, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**

Yes or No

Yes   >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-207 or EC-216.

No    >> GO TO 6.
6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.

3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**

   OK or NG
   OK  >> GO TO 8.
   NG  >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- IPDM E/R harness connector E119
- 10A fuse
- Harness for open or short between A/F sensor 1 and fuse

   >> Repair or replace harness or connectors.
8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th></th>
<th>A/F sensor 1 terminal</th>
<th>ECM terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank 1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>Bank 2</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Bank 1</th>
<th></th>
<th>Bank 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A/F sensor 1 terminal</td>
<td>ECM terminal</td>
<td>A/F sensor 1 terminal</td>
<td>ECM terminal</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>56</td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

**Continuity should not exist.**

5. Also check harness for short to power.
   OK or NG
   OK    >> GO TO 9.
   NG    >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-359, "Component Inspection".

OK or NG
   OK    >> GO TO 10.
   NG    >> Replace A/F sensor 1.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-152, "Component Inspection".

OK or NG
   OK    >> GO TO 11.
   NG    >> Replace mass air flow sensor.
11. CHECK PCV VALVE

Refer to EC-617, "POSITIVE CRANKCASE VENTILATION".  
OK or NG
OK >> GO TO 12.  
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-126, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".  
OK or NG
OK >> Replace A/F sensor 1.  
NG >> Repair or replace.

Removal and Installation
AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-19, "EXHAUST MANIFOLD AND THREE WAY CATALYST".
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**Description**

**SYSTEM DESCRIPTION**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input signal to ECM</th>
<th>ECM function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor (POS)</td>
<td>Engine speed*1</td>
<td>EVAP canister purge flow control</td>
<td>EVAP canister purge volume control solenoid valve</td>
</tr>
<tr>
<td>Camshaft position sensor (PHASE)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>Battery voltage*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throttle position sensor</td>
<td>Throttle position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/F sensor 1</td>
<td>Density of oxygen in exhaust gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Mixture ratio feedback signal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel tank temperature sensor</td>
<td>Fuel temperature in fuel tank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel sensor*2</td>
<td>Vehicle speed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

**COMPONENT DESCRIPTION**

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
</table>
| PURG VOL C/V | ● Engine: After warming up  
● Air conditioner switch: OFF  
● Shift lever: N  
● No load  
Idle (Accelerator pedal is not depressed even slightly, after starting engine)  
2,000 rpm | 0%  
— |
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1444 1444 | EVAP canister purge volume control solenoid valve | The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed. | ● EVAP control system pressure sensor
● EVAP canister purge volume control solenoid valve (The valve is stuck open.)
● EVAP canister vent control valve
● EVAP canister
● Hoses (Hoses are connected incorrectly or clogged.) |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.

6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-499, “Diagnostic Procedure”.

WITH GST
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select MODE 7 with GST.
5. If 1st trip DTC is detected, go to EC-499, "Diagnostic Procedure".
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Wiring Diagram

EC-PGC/V-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

REFER TO "PG-POWER".

Revision: July 2007 2004 Titan
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

**CAUTION:**
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Voltage)</th>
</tr>
</thead>
</table>
| 45           | L/Y        | EVAP canister purge volume control solenoid valve | [Engine is running]  
  • Idle speed  
  • Accelerator pedal is not depressed even slightly, after starting engine | BATTERY VOLTAGE  
  (11 - 14V)★ |
| 111          | W/B        | ECM relay (Self shut-off) | [Engine is running]  
  [Ignition switch: OFF]  
  • For a few seconds after turning ignition switch OFF | BATTERY VOLTAGE  
  (11 - 14V)  
  0 - 1.5V |
| 119          | BR         | Power supply for ECM | [Ignition switch: ON] | BATTERY VOLTAGE  
  (11 - 14V) |
| 120          | BR         | Power supply for ECM | [Ignition switch: ON] | BATTERY VOLTAGE  
  (11 - 14V) |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
Diagnostic Procedure

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

View with engine cover removed
EVAP canister
purge volume
control solenoid valve

Front

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG
OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- IPDM E/R harness connector E119
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.
4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

   Water should not exist.

OK or NG
OK  >> GO TO 5.
NG  >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-300, "Component Inspection".

OK or NG
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG  >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

   With CONSULT-II
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG
OK  >> GO TO 8.
NG  >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-502, "Component Inspection".

OK or NG
OK  >> GO TO 8.
NG  >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG
OK  >> GO TO 9.
NG  >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-296, "Component Inspection".

OK or NG
OK  >> GO TO 10.
NG  >> Replace EVAP canister vent control valve.