DTC P1130 SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Description
If DTC P1130 is displayed with P1165, first perform trouble diagnosis for DTC P1165. See: ALL Diagnostic Trouble Codes (DTC) > P Code Charts > P1165

SYSTEM DESCRIPTION
This system has a swirl control valve in the intake passage of each cylinder.

While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.

The solenoid valve controls swirl control valves shut/open condition. This solenoid valve is operated by the ECM.

When engine coolant temperature is below 10 °C (50 °F) and above 55 °C (131 °F), swirl control valve is kept open regardless of condition.
COMPONENT DESCRIPTION

Swirl Control Valve Control Solenoid Valve
The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWIRL CONT SV</td>
<td>Engine speed: Idle</td>
<td>Engine coolant temperature is between 16°C (61°F) to 59°C (132°F).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine coolant temperature is above 55°C (131°F).</td>
</tr>
</tbody>
</table>

ECM Terminals and Reference Value

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>WIRE COLOR</th>
<th>ITEM</th>
<th>CONDITION</th>
<th>DATA (DC Volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>G</td>
<td>Swirl control valve control solenoid valve</td>
<td>[Engine is running] - Idle speed; Engine coolant temperature is between 15 to 59°C (59 to 132°F).</td>
<td>0 - 1.0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[Engine is running] - Idle speed; Engine coolant temperature is above 59°C (132°F).</td>
<td>BATTERY VOLTAGE (11 - 14V)</td>
</tr>
</tbody>
</table>

Consult-II Reference Value In Data Monitor
On Board Diagnosis Logic

DTC Confirmation Procedure
Perform "Procedure for malfunction A" first. If the 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B". If the 1st trip DTC is not confirmed 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. Wait at least **5 seconds**.
   If 1st trip DTC is detected, go to "Diagnostic Procedure" below.

**With GST**
Follow the procedure "With CONSULT-II".

**PROCEDURE FOR MALFUNCTION B**

**TESTING CONDITION:**
- For best results, perform the test at a temperature above **5 °C (41 °F)**.
- Before performing the following procedure, confirm that battery voltage is more than **10 V** at idle, then stop engine immediately.

**With CONSULT-II**
1. Turn ignition switch "OFF" and wait at least **10 seconds**.
2. Turn ignition switch "ON".
3. Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.

4. Confirm COOLAN TEMP/S value is **40 °C (104 °F)** or less.
   If the value is more than **40 °C (104 °F)**, park the vehicle in a cool place and retry from step 1.
5. Start engine and wait until COOLAN TEMP/S value increases to more than **55 °C (131 °F)**.
   If 1st trip DTC is detected, go to "Diagnostic Procedure" below.

**With GST**
Follow the procedure "With CONSULT-II".

**PROCEDURE FOR MALFUNCTION C**

**TESTING CONDITION:**
- For best results, perform the test at a temperature above **5 °C (41 °F)**.
- Before performing the following procedure, confirm that battery voltage is more than **10 V** 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" again and select "DATA MONITOR" mode with CONSULT-II.
4. Start engine and let it idle for at least 20 seconds. If 1st trip DTC is detected, go to "Diagnostic Procedure" below.

With GST
Follow the procedure "With CONSULT-II".
Diagnostic Procedure A

Wiring Diagram

Refer to EL-POWER.

EC-SWL/V-01

EC-SWL/V-01
Diagnostic Procedure

PROCEDURE A

1  INSPECTION START
Do you have CONSULT-II?

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

2  CHECK SWRVL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT
   ① With CONSULT-II
   1. Turn ignition switch “ON”.
   2. Select “SWRL CONT SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
   3. Touch “ON” and “OFF” on CONSULT-II screen.

   ![ACTIVE TEST](image)

   ② Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

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

Diagnostic Procedure Step 1 - 2
### CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.

   ![Voltage: Battery voltage](image)

   OK or NG

   OK ➔ GO TO 5.
   NG ➔ GO TO 4.

### DETECT MALFUNCTIONING PART

Check the following:
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

### CHECK SWIRL CONTROL VALVE 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 27 and swirl control valve control solenoid valve terminal 2. Refer to Wiring Diagram.
4. Also check harness for short to ground and short to power.

   OK or NG

   OK ➔ GO TO 6.
   NG ➔ Repair open circuit or short to ground or short to power in harness connectors.

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http://repair.alldata.com/alldata/article/display.action?componentId=392...
**Diagnostic Procedure Step 6 - 7**

**CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE**

**With CONSULT-II**
1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.

<table>
<thead>
<tr>
<th>SWIRL CONT SOL VALVE</th>
<th>Vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Should exist.</td>
</tr>
<tr>
<td>OFF</td>
<td>Should not exist.</td>
</tr>
</tbody>
</table>

Operation takes less than 1 second.

**Without CONSULT-II**
1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V direct current supply</td>
<td>Should exist.</td>
</tr>
<tr>
<td>No supply</td>
<td>Should not exist.</td>
</tr>
</tbody>
</table>

Operation takes less than 1 second.

OK or NG

OK ➤ GO TO 7

NG ➤ Replace intake manifold collector assembly.

**Diagnostic Procedure Step 6 - 7**

**Diagnostic Procedure B**
1. Start engine and let it idle.
2. Check intake air system for air leaks.

   **OK or NG**

   - **OK (With CONSULT-II)** ▶ **GO TO 2**
   - **OK (Without CONSULT-II)** ▶ **GO TO 3**
   - **NG** ▶ Repair intake system

2. **CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT**
   - **With CONSULT-II**
     1. Select “SWIRL CONT SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
     2. Touch “ON” and “OFF” on CONSULT-II screen.

     ![ACTIVE TEST Diagram]

     3. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

     **OK or NG**

     - **OK** ▶ **GO TO 6**
     - **NG** ▶ **GO TO 3**
3 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK ➔ GO TO 6.
NG ➔ GO TO 4.

4 DETECT MALFUNCTIONING PART
Check the following:
- Harness connectors E1, M1
- Harness connectors M33, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5 CHECK SWIRL CONTROL VALVE 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 27 and swirl control valve 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 6.
NG ➔ Repair open circuit or short to ground or short to power in harness connectors.

Diagnostic Procedure Step 3 - 5

6 CHECK HOSES
Check hoses and tubes between intake manifold, and swirl control valve actuator for crack, clogging, improper connection or disconnection.

OK or NG

OK ➔ GO TO 7.
NG ➔ Repair hoses or tubes.

Diagnostic Procedure Step 6
Diagnostic Procedure Step 7

7 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

**With CONSULT-II**
1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWRL CONF SOLV" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.

```
<table>
<thead>
<tr>
<th>SWRL CONF SOLV VALVE</th>
<th>Vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
</tbody>
</table>
```

Operation takes less than 1 second.

**Without CONSULT-II**
1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.

```
<table>
<thead>
<tr>
<th>Condition</th>
<th>Vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V direct current</td>
<td>Should exist.</td>
</tr>
<tr>
<td>No supply</td>
<td>Should not exist.</td>
</tr>
</tbody>
</table>
```

Operation takes less than 1 second.

**OK or NG**
- OK ➤ GO TO 8.
- NG ➤ Replace intake manifold collector assembly.

http://repair.alldata.com/alldata/article/display.action?componentId=392...
Diagnostic Procedure Step 8

**CHECK SWIRL CONTROL VALVE ACTUATOR**

**With CONSULT-II**
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Select “SWIRL CONT SOLV” in “ACTIVE TEST” mode.
4. Touch “ON” and “OFF” on CONSULT-II screen.
5. Make sure that swirl control valve actuator rod moves according to “SWIRL CONT SOLV” indication.

**Without CONSULT-II**
1. Reconnect vacuum hose between swirl control valve actuator and swirl control valve control solenoid valve.
2. Start engine and let it idle.
3. Apply 12V direct current between swirl control valve control solenoid valve terminals 1 and 2.
4. Make sure that swirl control valve actuator rod moves according to 12V direct current being applied.

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>GO TO 9.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace swirl control valve actuator.</td>
</tr>
</tbody>
</table>

Diagnostic Procedure Step 9

**CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH**

1. Turn ignition switch “OFF”.
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch “ON”.
5. Check voltage between ECM terminal 59 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Applied Pressure (kPa)</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than ~50 kPa (-150 mmHg, &lt;50 inHg)</td>
<td>Engine ground</td>
</tr>
<tr>
<td>29.3 to 39.8 kPa (110 to 150 mmHg, 5.59 to 57.9 inHg)</td>
<td>Engine ground or approx. 4.8</td>
</tr>
<tr>
<td>Less than ~10 kPa (-127 mmHg, -6.77 inHg)</td>
<td>approx. 4.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>GO TO 10.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace swirl control valve control vacuum check switch.</td>
</tr>
</tbody>
</table>
Diagnostic Procedure Step 10 - 13

10. **CHECK MASS AIR FLOW SENSOR**

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 31 (Mass Air Flow sensor signal) and ground.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition switch off (Engine stopped)</td>
<td>4.0</td>
</tr>
<tr>
<td>Idle (Engine is warmed up to normal operating temperature)</td>
<td>1.2 - 1.6</td>
</tr>
<tr>
<td>2,000 rpm (Engine is warmed up to normal operating temperature)</td>
<td>1.6 - 2.2</td>
</tr>
<tr>
<td>Idle to about 4,000 rpm*</td>
<td>1.3 - 1.8</td>
</tr>
</tbody>
</table>

* Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, disconnect MAF sensor harness connector and connect it again. Then repeat above check.

   OK or NG

   OK  ➔  GO TO 11.

   NG  ➔  Replace mass air flow sensor.

11. **CHECK ACCELERATOR PEDAL POSITION SENSOR**

Refer to "Component Inspection".

OK or NG

OK  ➔  GO TO 12.

NG  ➔  Replace accelerator pedal assembly.

12. **CHECK THROTTLE POSITION SENSOR**

Refer to "Component Inspection".

OK or NG

OK  ➔  GO TO 13.

NG  ➔  Replace electric throttle control actuator.

13. **CHECK CAMSHAFT POSITION SENSOR (PHASE)**

Refer to "Component Inspection".

OK or NG

OK  ➔  GO TO 14.

NG  ➔  Replace crankshaft position sensor (PHASE).

Diagnostic Procedure Step 10 - 13

Diagnostic Procedure Step 14

Diagnostic Procedure C
### Diagnostic Procedure 1 - 2

#### PROCEDURE C

<table>
<thead>
<tr>
<th></th>
<th>INSPECTION START</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do you have CONSULT-II?</td>
<td>Yes or No</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>GO TO 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>GO TO 3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 2 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE CIRCUIT

1. **With CONSULT-II**
   1. Turn ignition switch "OFF".
   2. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
   3. Touch "ON" and "OFF" on CONSULT-II screen.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIV TEST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWIRL CONTOL VALVE</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>MOUNT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG SPEED</td>
<td>XX5 rpm</td>
<td></td>
</tr>
<tr>
<td>MOP-FMCY</td>
<td>XX5 seg</td>
<td></td>
</tr>
</tbody>
</table>

4. Make sure that clicking sound is heard from the swirl control valve control solenoid valve.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OK or NG

GO TO 6.

GO TO 3.
3 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
1. Turn ignition switch "OFF".
2. Disconnect swirl control valve control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between swirl control valve control solenoid 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 E1, W1
- Harness connectors M10, F22
- Harness for open or short between swirl control valve control solenoid valve and ECM relay

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

5 CHECK SWIRL CONTROL VALVE 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 27 and swirl control valve 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 6.
NG ➤ Repair open circuit or short to ground or short to power in harness connectors.

Diagnostic Procedure Step 3 - 5

6 CHECK HOSES
Check hoses and tubes between air cleaner and swirl control valve vacuum check switch for clogging or improper connection.

OK or NG

OK ➤ GO TO 7.
NG ➤ Repair hoses or tubes.

Diagnostic Procedure Step 6
Diagnostic Procedure Step 7

**CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE**

- **With CONSULT-II**
  1. Reconnect the disconnected harness connectors.
  2. Start engine and let it idle.
  3. Remove vacuum hose connected to swirl control valve actuator.
  4. Select "SWIRL CONT SOL/IV" in "ACTIVE TEST" mode with CONSULT-II.
  5. Touch "ON" and "OFF" on CONSULT-II screen.
  6. Check vacuum existence and operation delay time under the following conditions.

- **Without CONSULT-II**
  1. Reconnect ECM harness connector.
  2. Remove vacuum hose connected to swirl control valve actuator.
  3. Start engine and let it idle.
  4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
  5. Check vacuum existence and operation delay time under the following conditions.

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![Diagram of swirl control valve control solenoid valve](http://repair.alldata.com/alldata/article/display.action?componentId=392...)

OK of NG

OK ▶️ GO TO 8.

NG ▶️ Replace intake manifold collector assembly.
8 CHECK SWIRL CONTROL VALVE CONTROL VACUUM CHECK SWITCH

1. Turn ignition switch “OFF”.
2. Disconnect vacuum hose connected to swirl control valve control vacuum check switch.
3. Attach vacuum pump to swirl control valve control vacuum check switch.
4. Turn ignition switch “ON”.
5. Check voltage between ECM terminal 59 and ground under the following conditions.

<table>
<thead>
<tr>
<th>Applied pressure</th>
<th>Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. run: -20.3 kPa (-150 mmHg, -5.91 inHg)</td>
<td>Engine ground</td>
</tr>
<tr>
<td>20.4 to 20.6 kPa (-150 to -152 mmHg, 5.91 to 5.77 inHg)</td>
<td>Engine coolant Approx. 48</td>
</tr>
<tr>
<td>Less than -20.3 kPa (+150 mmHg, +5.91 inHg)</td>
<td>Engine coolant Approx. 48</td>
</tr>
</tbody>
</table>

OK or NG

OK ➤ GO TO 9.
NG ➤ Replace swirl control valve control vacuum check switch.

9 CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to “Component Inspection”.

OK or NG

OK ➤ GO TO 10.
NG ➤ Replace camshaft position sensor (PHASE).

10 CHECK THROTTLE POSITION SENSOR

Refer to “Component Inspection”.

OK or NG

OK ➤ GO TO 11.
NG ➤ Replace electric throttle control actuator.

11 CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to “Component Inspection”.

OK or NG

OK ➤ GO TO 12.
NG ➤ Replace accelerator pedal assembly.

Diagnostic Procedure Step 8 - 11

12 CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”.

INSPECTION END

Diagnostic Procedure Step 12