

## DTC P0135, P0141, P0155, or P0161 (w/LR4 and LM7 w/ Delphi HO2S)

### Circuit Description

This diagnostic applies only to vehicles built with Delphi heated oxygen sensors. To identify the heated oxygen sensor refer to [Oxygen Sensor Identification \(4.8L/5.3L/6.0L\)](#) in Engine Controls Component Views.

The powertrain control module (PCM) supplies a bias voltage of approximately 450 mV on the heated oxygen sensor (HO2S) signal high and low circuits. When you turn the ignition to the ON position, battery voltage is supplied to the HO2S heater. As the heater reaches the operating temperature, the HO2S voltage responds by changing from a bias voltage range to the normal operation. Typically, as the HO2S reaches the operating temperature, the HO2S voltage goes from a bias voltage to a voltage below 300 mV. Depending on the exhaust gas content, it is possible for the HO2S voltage to go above 450 mV.

The PCM runs the heater test only on a cold start (depends on the cumulative air flow) and only once an ignition cycle. When you start the engine the PCM monitors the HO2S voltage. When the HO2S voltage goes above or below the bias range threshold, the PCM determines how much time it took. If the PCM detects that the process took too much time for the HO2S to enter into normal operating range, a DTC sets. The time the process takes the HO2S to reach operating temperature is based on the amount of air that flows into the engine.

### Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0134, P0137, P0138, P0140, P0151, P0152, P0154, P0157, P0158, P0160, P0200, P0300, P0401, P0404, P0405, P0410, P0440, P0442, P0446, P0452, P0453, P1120, P1125, P1220, P1221, P1258, P1404, P1415, P0416, P1514, P1515, P1516, P1517, or P1518 are not set.
- The HO2S voltage is between 425-475 mV at engine start-up.
- The intake air temperature (IAT) and the engine coolant temperature (ECT) are less than 50°C (122°F) and are within 8°C (14.5°F) of each other at engine start-up.
- The ignition 1 signal is between 9-18 volts.
- Intrusive tests are not in progress.
- The scan tool output controls are not active.
- The scan tool is disconnected.

### Conditions for Setting the DTC

The HO2S voltage remains within 150 mV of the start-up voltage for a predetermined amount of time, based on ECT and air flow.

### Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition

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cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

### Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

### Diagnostic Aids

**Important:** Remove any debris from the PCM connector surfaces before servicing the PCM. Inspect the PCM connector gaskets when diagnosing or replacing the PCM. Ensure that the gaskets are installed correctly. The gaskets prevent water intrusion into the PCM.

- Using the Freeze Frame/Failure Records data may aid in locating an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records can help determine how many miles since the DTC set. The Fail Counter and Pass Counter can also help determine how many ignition cycles the diagnostic reported a pass or a fail. Operate the vehicle within the same Freeze Frame conditions such as RPM, load, vehicle speed, and temperature that you observed. This will isolate when the DTC failed. For an intermittent condition, refer to [Intermittent Conditions](#) .
- The heater diagnostic will only run on a cold start and run once per ignition cycle.
- An oxygen supply inside the HO2S is necessary for proper operation. The HO2S wires provide the supply of oxygen. Inspect the HO2S wires and connections for breaks or contamination. Refer to [Heated Oxygen Sensor Wiring Repairs](#) in Wiring Systems.

### Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. Allow the engine to cool before performing this test. If the sensor is at the operating temperature, the HO2S voltage will stay high or low. If the HO2S voltage stays between 300-700 mV this indicates the HO2S heater is inoperative.
3. If more than one HO2S DTC is set, this is a good indication that the HO2S fuse is open. Test all the related circuits going to all the heated oxygen sensors for a short to ground. If you cannot locate a shorted circuit, it may be necessary to disconnect each HO2S one at a time to locate a shorted sensor.
4. This step determines if an ignition positive voltage supply is available at the sensor.
5. This step determines if a ground is available at the sensor.
6. This step determines if the HO2S heater element is internally open.
7. Inspect the ignition positive voltage circuits at the underhood electrical center for poor connections.
8. Test the ground circuits for an open if more than one heater DTC sets.

Step	Action	Values	Yes	No
<p><i>Schematic Reference:</i> <a href="#">Engine Controls Schematics</a></p> <p><b>Important:</b> This diagnostic applies only to vehicles built with Delphi heated oxygen sensors. To identify the heated oxygen sensor, refer to <a href="#">Oxygen Sensor Identification (4.8L/5.3L/6.0L)</a> in Engine Controls Component Views.</p>				
1	Did you perform the Diagnostic System Check- Engine Controls?	--	Go to <a href="#">Step 2</a>	Go to <a href="#">Diagnostic System Check - Engine Controls</a>
2	<p><b>Important:</b> Allow the engine to cool for about one half hour before proceeding with this diagnosis.</p> <p><b>Important:</b> If DTC P0300 is set, diagnose that DTC first. Refer to <a href="#">Diagnostic Trouble Code (DTC) List</a></p> <ul style="list-style-type: none"> <li>• Turn OFF the ignition.</li> <li>• Install the scan tool.</li> <li>• Turn ON the ignition, with the engine OFF.</li> <li>• Monitor the HO2S signal voltage on the scan tool for 2 minutes.</li> </ul> <p>Does the HO2S voltage go from a bias voltage to more than or less than the specified range?</p>	300-700 mV	Go to Diagnostic Aids	Go to <a href="#">Step 3</a>
3	Inspect the HO2S fuse for an open. Is the HO2S fuse open?	--	Go to <a href="#">Step 11</a>	Go to <a href="#">Step 4</a>
4	<ul style="list-style-type: none"> <li>• Raise the vehicle. Refer to <a href="#">Lifting and Jacking the Vehicle</a> in General Information.</li> <li>• Disconnect the HO2S electrical connector.</li> <li>• Probe the ignition 1 voltage circuit at the PCM side of the HO2S electrical connector using a test lamp connected to a known good ground. Do not use the HO2S heater ground or the HO2S low signal circuits.</li> </ul> <p>Does the test lamp illuminate?</p>	--	Go to <a href="#">Step 5</a>	Go to <a href="#">Step 7</a>

5	<p>Connect the test lamp between the HO2S ignition 1 voltage and the HO2S heater ground.</p> <p>Does the test lamp illuminate?</p>	--	Go to <a href="#">Step 6</a>	Go to <a href="#">Step 8</a>
6	<p>Use a digital multimeter (DMM) in order to measure the resistance between the HO2S ignition 1 voltage and the HO2S heater ground at the HO2S pigtail.</p> <p>Is the resistance within the specified range?</p>	3.5-14.0 Ω	Go to <a href="#">Step 9</a>	Go to <a href="#">Step 10</a>
7	<p>Repair the open in the HO2S ignition 1 voltage circuit to the HO2S. Refer to <a href="#">Heated Oxygen Sensor Wiring Repairs</a> in Wiring Systems.</p> <p>Did you complete the repair?</p>	--	Go to <a href="#">Step 12</a>	--
8	<p>Repair the open in the HO2S heater ground circuit. Refer to <a href="#">Heated Oxygen Sensor Wiring Repairs</a> in Wiring Systems.</p> <p>Did you complete the repair?</p>	--	Go to <a href="#">Step 12</a>	--
9	<ul style="list-style-type: none"> <li>• Test for a poor connection at the HO2S harness terminals. Refer to <a href="#">Testing for Intermittent Conditions and Poor Connections</a> in Wiring Systems.</li> <li>• If you find a poor connection, repair the terminal as necessary. Refer to <a href="#">Connector Repairs</a> in Wiring Systems.</li> </ul> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 12</a>	Go to <a href="#">Step 10</a>
10	<p>Replace the affected HO2S. Refer to the following procedures:</p> <ul style="list-style-type: none"> <li>• <a href="#">Heated Oxygen Sensor Replacement - Bank 1 Sensor 1</a></li> <li>• <a href="#">Heated Oxygen Sensor Replacement - Bank 1 Sensor 2</a></li> <li>• <a href="#">Heated Oxygen Sensor Replacement - Bank 2 Sensor 1</a></li> <li>• <a href="#">Heated Oxygen Sensor Replacement - Bank 2 Sensor 2</a></li> </ul> <p>Did you complete the repair?</p>	--	Go to <a href="#">Step 12</a>	--

11	<ul style="list-style-type: none"> <li>• Locate and repair the short to ground in the HO2S ignition positive voltage circuit. Refer to <a href="#">Heated Oxygen Sensor Wiring Repairs</a> in Wiring Systems.</li> <li>• Replace the faulty fuse.</li> </ul> <p>Did you complete the repair?</p>	--	Go to <a href="#">Step 12</a>	--
12	<ul style="list-style-type: none"> <li>• Use the scan tool in order to clear the DTCs.</li> <li>• Disconnect the scan tool.</li> <li>• Turn OFF the ignition for 30 seconds.</li> <li>• Start the engine.</li> <li>• Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.</li> <li>• Install the scan tool.</li> </ul> <p>Does the DTC run and pass?</p>	--	Go to <a href="#">Step 13</a>	Go to <a href="#">Step 2</a>
13	<p>With a scan tool, observe the stored information, Capture Info.</p> <p>Does the scan tool display any DTCs that you have not diagnosed?</p>	--	Go to <a href="#">Diagnostic Trouble Code (DTC) List</a>	System OK