P0141 or P0161 HO2S Heater Performance

Circuit Description

The heated oxygen sensor (HO2S) heater reduces the time required for the oxygen sensor to reach operating temperature and maintains the operating temperature during extended idle periods. When the ignition is turned to the ON position, ignition voltage is supplied directly to the sensor heater. The engine control module (ECM) controls the heater operation by first modulating the control circuit to ground when the sensors are cold. This prevents the possibility of thermal shock to the sensor, from condensation build-up on the sensor, by controlling the sensors rate of heating. After a predetermined amount of time, the ECM commands the heaters ON continuously. Once the sensor reaches operating temperature, the ECM may modulate the heater control circuit to ground, to maintain a desired temperature.

The ECM controls the heater by grounding the control circuit with a solid state device called a driver. The driver is equipped with a feedback circuit that is pulled-up to voltage. The ECM can determine if the control circuit is open, shorted to ground, or shorted to a voltage by monitoring the feedback voltage. The ECM measures the internal resistance of the sensing element to determine if there is an HO2S condition. If the internal resistance is too high, this DTC sets.

DTC Descriptors

This diagnostic procedure supports the following DTCs:

- DTC P0141 HO2S Heater Performance Bank 1 Sensor 2
- DTC P0161 HO2S Heater Performance Bank 2 Sensor 2

Conditions for Running the DTC

- Before the ECM can report DTC P0141 or P0161 failed, DTCs P0036, P0037, P0038, P0056,P0057, and P0058 must run and pass.
- DTCs P0137, P0138, P0140, P0157, P0158, orP0160 are not set.
- The engine is operating.
- The ignition 1 voltage is between 10.5–18 volts.
- The ECM internal sensing element resistance is valid.

- The fuel system is not in a decel fuel shut-off.
- The intake air temperature (IAT) is more than 7°C (20°F).
- If the engine is operating and then the ignition is turned OFF, the engine must be OFF for at least 2 minutes before the next start-up for thediagnostic to run.
- The calculated exhaust temperature is between360–500°C (680–932°F).
- DTC P0141 and P0161 run continuously once the above conditions are met.

Conditions for Setting the DTC

- The ECM detects that the HO2S internal resistance is not within the expected range.
- The condition exists for more than 6 seconds.

Action Taken When the DTC Sets

- The control module illuminates the malfunctionindicator 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 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 4 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

- Use the J 35616-C Connector Test Adapter Kit for any test that requires

probing the ECM harness connector or a component harness connector.

- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views on page 6-1209.
- The rear HO2S will not go into closed loop when the engine is idling. Once the HO2S are at operating temperature, and the vehicle is moving, the rear HO2S will go into closed loop.
- For an intermittent condition, refer to IntermittentConditions on page 6-1587.

Test Description

The numbers below refer to the step numbers on the diagnostic table.
2. This step determines if the condition exists.
4. This step tests the signal circuit of the HO2S for high resistance.

DTC P0141 or P0161

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Control Module (ECM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check–Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check -Engine Controls
2	**Important: DTC P0141 is for bank 1 sensor 2 and** DTC P0161 is for bank 2 sensor 2 1. Allow the engine to reach operating temperature. 2. Operate the vehicle within the parameters specified in Conditions for Running the DTC. 3. Observe the diagnostic trouble code (DTC) information with a scan tool. Did DTC P0141 or DTC P0161 fail this ignition?	—	Go to Step 4	Go to Step 3

Step	Action	Values	Yes	No
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 4	Go to Diagnostic Aids
4	1. Turn OFF the ignition. 2. Disconnect the heated oxygen sensor (HO2S). 3. Connect a 3-amp fused jumper wire between the signal circuit of the HO2S and a good ground. 4. Turn ON the ignition, with the engine OFF. 5. Observe the HO2S voltage parameter with a scan tool. Is the voltage less than the specified value?	25 mV	Go to Step 5	Go to Step 8
5	1. Connect a 3-amp fused jumper wire between the signal circuit and the low reference circuit of the HO2S. 2. Observe the HO2S voltage parameter with a scan tool. Is the voltage less than the specified value?	25 mV	Go to Step 6	Go to Step 9

Step	Action	Values	Yes	No
6	**Important: Use the J 35616-200 Test Lamp Kit for this** test. If the J 35616-200 is not available, use a test lamp that measures more than 20 ohms. 1. Connect a test lamp between the ignition 1 voltage circuit of the HO2S and a good ground. 2. Measure the voltage between the probe of the test lamp and a good ground with a DMM. Refer to Measuring Voltage Drop in Wiring Systems. Is the voltage at the specified value?	B+	Go to Step 7	Go to Step 12
7	1. Disconnect the engine control module (ECM). 2. Measure the resistance of the heater control circuit of the HO2S, with a DMM. Is the resistance less than the specified value?	5 W	Go to Step 10	Go to Step 13
8	Test the signal circuit of the HO2S for an open or for high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 11
9	Test the low reference circuit of the HO2S for an open or for high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 11
10	Test for shorted terminals and poor connections at the HO2S. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 16	Go to Step 14

Step	Action	Values	Yes	No
11	Test for shorted terminals and poor connections at the ECM.. Did you find and correct the condition?	—	Go to Step 16	Go to Step 15
12	Repair the open or the high resistance in the ignition 1 voltage circuit of the HO2S heater. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	—	Go to Step 16	—
13	Repair the open or the high resistance in the heater control circuit of the HO2S. Refer to Wiring Repairsin Wiring Systems. Did you complete the repair?	—	Go to Step 16	—
14	Replace the HO2S. Refer to the appropriate procedure: • Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2 • Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2 Did you complete the replacement?	—	Go to Step 16	—
15	Replace the ECM. Refer to Engine Control Module (ECM) Replacement. Did you complete the replacement?	—	Go to Step 16	—
16	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 17
17	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code List	System OK