P0140 or P0160 HO2S Circuit Insufficient Activity

Circuit Description

The engine control module (ECM) supplies a voltage near 450 mV between the heated oxygen sensor (HO2S) high signal circuit and the low reference circuit. The HO2S varies the voltage over a range from about 1,000 mV when the exhaust is rich, down through about 10 mV when the exhaust is lean.

The ECM monitors and stores the HO2S voltage information. The ECM evaluates the HO2S voltage samples in order to determine the amount of time that the HO2S voltage was out of range. The ECM compares the stored HO2S voltage samples taken within each sample period and determines if the majority of the samples are out of the operating range. The ECM monitors the HO2S voltage and detects if the voltage goes out of the bias range. If the ECM does not detect the voltage went out of the bias range, this DTC sets.

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DTC Descriptors

This diagnostic procedure supports the following DTCs.

- DTC P0140 HO2S Circuit Insufficient Activity Bank 1 Sensor 2
- DTC P0160 HO2S Circuit Insufficient Activity Bank 2 Sensor 2

Conditions for Running the DTC

- The engine is operating.
- The ignition 1 voltage is more than 10.5 volts.
- The calculated exhaust temperature is between 250–800°C (482–1,472°F).
- DTC P0140 and P0160 run continuously once the above conditions are met for more than 90 seconds.

Conditions for Setting the DTC

- The ECM detects that the HO2S voltage is between 400–500 mV for more than 600 seconds.

OR

- The ECM detects that the measured internal resistance of the HO2S is more than 40,000 ohms, when the calculated exhaust temperature is more than 600°C (1,112°F).

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 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.

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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.
- 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 Intermittent Conditions.

Test Description

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

2. This step determines if the condition exists. The HO2S voltage parameter should react immediately to the changes in throttle position when performing this test.
4. This step tests the HO2S signal circuit for an open. If a bias voltage is not available, there is a condition with the circuit.
5. This step tests the HO2S low reference circuit for an open. If the HO2S voltage does not go below the specified value, there is a condition with the circuit.

DTC P0140 or P0160

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 P0140 is for bank 1 sensor 2 and DTC P0160 is for bank 2 sensor 2 • Ensure the heated oxygen sensor (HO2S) is secure before proceeding with this DTC. A loose sensor could cause this DTC to set. 1. Allow the engine to reach operating temperature. 2. Cycle the throttle from idle to wide open throttle 3 times within 5 seconds. 3. Observe the appropriate HO2S voltage parameter with a scan tool. Does the voltage go above or below the specified range?	350–550 mV	Go to Step 3	Go to Step 4

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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 Intermittent Conditions
4	1. Turn OFF the ignition. 2. Disconnect the appropriate HO2S connector. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage between the signal circuit of the HO2S and a good ground with a DMM. Is the voltage within the specified range?	350–550 mV	Go to Step 5	Go to Step 6
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?	10 mV	Go to Step 8	Go to Step 7
6	Test the HO2S signal circuit for an open or high resistance. Refer to Circuit Testingand Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 12	Go to Step 9

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Step	Action	Values	Yes	No
7	Test the HO2S low reference circuit for an open or high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 12	Go to Step 9
8	Test for an intermittent and for a poor connection 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 12	Go to Step 10
9	Test for an intermittent and for a poor connection at the engine control module (ECM). Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 12	Go to Step 11
10	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 12	—
11	Replace the ECM. Refer to Engine Control Module (ECM) Replacement on page 6-1648. Did you complete the replacement?	—	Go to Step 12	—

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Step	Action	Values	Yes	No
12	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 13
13	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK

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