

P064D: INTERNAL CONTROL MODULE O2 SENSOR PROCESSOR PERFORMANCE BANK 1

OVERVIEW

Severity	:	Medium
DIY Difficulty Level	:	Intermediate
Repair Cost	:	\$100-\$300
Can I Still Drive?	:	Yes

What Does The P064D Code Mean?

When a code P064D is stored, it means that the powertrain control module (PCM) has detected an internal processor performance error with the heated oxygen sensor (HO2S) circuit for engine bank one. Other controllers may also detect an internal PCM performance error (with the HO2S circuit for bank one)) and cause a P064D to be stored.

Bank 1 denotes the bank of the engine which contains the number one cylinder.

The HO2S is composed of a zirconium dioxide sensing element and a tiny sample chamber enclosed within a vented steel housing. The sensing element is connected to wire leads in the HO2S wiring harness with small platinum electrodes.

The HO2S wiring harness is connected to the engine control harness which provides the PCM with data pertaining to the percentage of oxygen in the engine exhaust compared to the oxygen content of ambient air.

The upstream HO2S sensor is located in the exhaust downpipe (between the exhaust manifold and the catalytic converter). The most common method of accomplishing this is by inserting the sensor directly into a threaded boss that is welded into the exhaust pipe. The threaded boss is placed in the downpipe at the most convenient position and angle for access and optimum sensor functionality.

Removal and installation of threaded oxygen sensors will require specially designed wrenches or sockets, depending upon vehicle application. The HO2S may also be secured using threaded studs (and nuts) welded to the exhaust pipe.

Exhaust gases are pushed through the exhaust manifold and into the downpipe where they pass over the upstream HO2S. Exhaust gases flow through specially designed vent holes in the steel HO2S housing and across the sensing element. Ambient air is drawn into a small sample chamber in the center of the sensor, through the wire lead openings.

In this chamber the air is heated, forcing the ions to produce (energy) voltage. Variations between the concentration of oxygen molecules in the exhaust and the ambient air (drawn into the HO2S) create fluctuations in the concentration of oxygen ions (inside the sensor). These fluctuations cause the oxygen ions (inside the HO2S) to bounce (rapidly and repetitiously) from one platinum layer to the other.

As the surging ions of oxygen move between platinum layers it causes changes in voltage. These changes in voltage are recognized by the PCM as variations in exhaust oxygen concentration and reflect whether the engine is running lean (too little fuel) or rich (too much fuel). When more oxygen is present in the exhaust (lean condition) the voltage signal output from the HO2S is lower.

When less oxygen is present in the exhaust (rich condition) the voltage signal output is higher. This data is used by the PCM to calculate fuel delivery strategy and ignition timing, among other things.

The upstream HO2S usually fluctuates between 100 and 900 millivolts (0.1 and 0.9 volts), when the engine is idling and the PCM is in closed loop operation. In closed loop operation, the PCM considers input signals from upstream HO2S sensors to regulate fuel injector pulse width and (ultimately) fuel delivery.

When the engine enters open loop operation (during cold start conditions and wide open throttle), fuel delivery strategy is preprogrammed.

Internal control module monitoring processors are responsible for various controller self-test duties and overall internal control module accountability. HO2S input and output signals are subject to self-test and are monitored constantly by the PCM and other related controllers. The transmission control module (TCM), traction control module (TCSM), and other controllers also interact with the HO2S.

Whenever the ignition is on and the PCM is energized, HO2S self-tests are initiated. In addition to running internal controller self-tests, the controller area network (CAN) also compares signals from each individual module to ensure that each controller is functioning properly. These tests are performed simultaneously.

If the PCM detects an internal discrepancy in HO2S functionality, a code P064D will be stored and a

malfunction indicator lamp (MIL) may be illuminated.

Additionally, if the PCM detects a problem between any of the on-board controllers, which would indicate an internal HO2S error, a code P064D will be stored and a malfunction indicator lamp (MIL) may be illuminated. Multiple failure cycles may be necessary for MIL illumination, depending upon the perceived severity of the malfunction.

What Are The Symptoms Of The P064D Code?

Symptoms of a P064D trouble code may include:

- Diminished fuel efficiency
- A general lack of engine performance
- A variety of engine drivability symptoms
- Other stored diagnostic trouble codes

What Are The Potential Causes Of The P064D Code?

Causes for this P064D DTC code may include:

- Defective controller or programming error
- Faulty HO2S
- Rich or lean exhaust conditions
- Burnt, chafed, broken, or disconnected wiring and/or connectors
- Engine exhaust leaks
- A bad controller power relay or blown fuse
- Open or shorted circuit or connectors in the CAN harness
- Insufficient control module ground

How Can You Fix The P064D Code?

Even to the most experienced and well-equipped professional technician, diagnosing a code P064D can prove to be quite a challenge. There is also the issue of reprogramming. Without the necessary reprogramming equipment, it will be impossible to replace a defective controller and complete a successful repair.

If there are ECM/PCM power supply codes present, they will obviously need to be rectified before attempting to diagnose a P064D.

There are several preliminary tests that can be performed prior to declaring any controller defective. A diagnostic scanner, a digital volt/ohmmeter (DVOM), and a source of reliable vehicle information will be required.

Step 1

Connect the scanner to the vehicle diagnostic port and retrieve all stored codes and freeze frame data. You will want to write this information down, just in case the code proves to be an intermittent one. After recording all pertinent information, clear the codes and test drive the vehicle until the code is reset or the PCM enters readiness mode.

If the PCM enters readiness mode, the code is intermittent and will be more difficult to diagnose. The condition, which caused the P064D to be stored, may even need to worsen before a diagnosis can be made. If the code is reset, continue with this short list of preliminary tests.

Step 2

When attempting to diagnose a P064D, information may be your greatest tool. Search your vehicle information source for technical service bulletins (TSB) that parallel the code stored, vehicle (year, make, model, and engine), and symptoms exhibited. If you find the right TSB, it may yield diagnostic information that will aid you in a major way.

Step 3

Use your source of vehicle information to obtain connector face views, connector pin-out charts, component locators, wiring diagrams, and diagnostic flow charts related to the code and vehicle in question.

Use the DVOM to test controller power supply fuses and relays. Test and replace blown fuses as required. Fuses should be tested with the circuit loaded.

Step 4

If all fuses and relays appear to be functioning as intended, a visual inspection of controller related wiring and harnesses is in order. You will also want to check chassis and engine ground junctions. Use your vehicle information source to obtain ground locations for related circuits. Use the DVOM to test ground integrity.

Step 5

Visually inspect system controllers for signs of water, heat, or collision damage. Any controller that is damaged, especially by water, should be considered defective.

Step 6

If controller power and ground circuits are intact, suspect a defective controller or a controller programming error. Controller replacement will require reprogramming. In some cases, you may

purchase reprogrammed controllers through aftermarket sources. Other vehicles/controllers will require on-board reprogramming that may only be done through a dealership or other qualified source.

HO2S Testing

Make sure that the engine is running efficiently before attempting to diagnose the HO2S. Ignition misfire codes, throttle position sensor codes, manifold air pressure code, and mass air flow sensor codes should be addressed before attempting to diagnose any HO2S or lean/rich exhaust codes.

Some automakers utilize a fused circuit to supply the HO2S system with voltage. Test these fuses using the DVOM.

If all fuses are in good working order, locate the HO2S for engine bank one. The vehicle will need to be raised on a suitable hoist or jacked up and secured on safety stands. Once you have gained access to the sensor in question, unplug the harness connector and place the key in the ON position.

You are looking for battery voltage at the HO2S connector. Use the wiring diagram to establish which circuit is used to supply battery voltage. Check for a system ground at this time, too.

If HO2S voltage and ground are present, reconnect the HO2S. Start the engine and test drive the vehicle. After a test drive, allow the engine to idle (with the transmission in neutral or park). Use the scanner to observe HO2S input data.

Narrow the scope of the data stream to include only pertinent data and you will get a faster data response. Assuming that the engine is running efficiently, the upstream HO2S should cycle from rich to lean (and vice versa) regularly with the PCM in closed loop.

- Unlike most other codes, the P064D is likely caused by a defective controller or a controller programming error
- Test system ground integrity by connecting the negative test lead of the DVOM to ground and the positive test lead to battery voltage

Severity Description

Internal control module processor codes should be categorized as severe. A stored code P064D could result in a variety of drivability concerns, including diminished fuel efficiency.

Reference Sources

[Diagnostic Trouble Code \(DTC\) Charts and Descriptions for P064D](#) - Page 96.