

P2245: O2 SENSOR REFERENCE VOLTAGE CIRCUIT LOW BANK 1 SENSOR 1

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	\$150-\$500
Can I Still Drive?	:	Yes (Short-term only)

What Does The P2245 Code Mean?

A stored code P2245 means that the powertrain control module (PCM) has detected a low reference voltage for the upstream O2 sensor for engine bank one. Sensor 1 refers to an upstream sensor and Bank 1 refers to the bank of the engine which contains the number one cylinder.

The engine air to fuel ratio for each engine bank is monitored by the PCM using data input from heated exhaust oxygen sensors. Each oxygen sensor is constructed using a zirconium dioxide sensing element situated in the center of a vented steel housing. Tiny electrodes (usually of platinum) attach the sensing element to wire leads in the oxygen sensor harness connector and the connector plugs into the controller area network (CAN) which connects the oxygen sensor wiring harness to the PCM connector.

Each oxygen sensor is threaded (or studded) into an exhaust pipe. It is situated so that the sensing element is near the center of the pipe. As spent exhaust gases exit the combustion chamber (via the exhaust manifold) and continue through the exhaust system (including catalytic converters), they flow over the oxygen sensors.

Exhaust gases enter the oxygen sensor through specially designed vent holes in the steel housing and swirl around the sensing element. Swirling ambient air is drawn through wire lead cavities in the sensor housing where they fill a tiny chamber in the middle. The air (in the tiny chamber) is then heated. This forces the oxygen ions to produce energy that is recognized by the PCM as voltage.

Variations between the number of oxygen ions in ambient air (drawn into the O2 sensor), and the number of oxygen molecules in the exhaust, cause the oxygen ions inside the O2 sensor to bounce from one platinum layer to the other, very swiftly and repetitively. As the surging oxygen ions shift between platinum layers, variations in oxygen sensor output voltage occur.

The PCM sees these variations in oxygen sensor output voltage as changes in exhaust oxygen concentration. Voltage signal outputs from the oxygen sensors are lower when more oxygen is present in the exhaust (lean condition) and higher when less oxygen is present in the exhaust (rich condition).

If the PCM detects a low electrical value in oxygen sensor reference voltage, a code P2245 will be stored and a malfunction indicator lamp (MIL) may be illuminated. Most vehicles will require multiple ignition cycles (with a failure) for MIL illumination.

What Are The Symptoms Of The P2245 Code?

Symptoms of a P2245 trouble code may include:

- Diminished fuel efficiency
- Reduced engine performance
- Stored misfire codes or lean/rich exhaust codes
- Service engine soon lamp illumination

What Are The Potential Causes Of The P2245 Code?

Causes for this code may include:

- Blown O2 sensor fuse
- Defective oxygen sensor/s
- Burnt, chafed, broken, or disconnected wiring and/or connectors

How Can You Fix The P2245 Code?

You will need a diagnostic scanner, a digital volt/ohmmeter (DVOM), and a source of reliable vehicle information in order to accurately diagnose a code P2245.

You may save yourself time by searching for technical service bulletins (TSB) that replicate the code stored, vehicle (year, make, model, and engine), and symptoms exhibited. This information may be found in your vehicle information source. If you find the right TSB, it could yield a speedy solution to your diagnosis.

Step 1

After you connect the scanner to the vehicle diagnostic port and retrieve all stored codes and

pertinent freeze frame data, write the information down (in case the code proves to be an intermittent one). After that, clear the codes and test drive the vehicle until one of two things happens; the code is restored or the PCM enters readiness mode.

The code may be more difficult to diagnose if the PCM enters readiness mode at this point, because the code is intermittent. The condition which caused the P2245 to be stored may need to worsen before an accurate diagnosis can be made. If the code is restored, continue with the diagnosis.

Step 2

You may obtain connector face views, connector pinout charts, component locator charts, wiring diagrams, and diagnostic flow charts (pertaining to the code and vehicle in question) using your source of vehicle information.

Perform a visual inspection of related wiring and connectors. Repair or replace wiring that has been cut, burned, or damaged.

Step 3

Use the DVOM to test O2 sensor voltage at the appropriate connector pin (near the sensor). If no voltage is detected, check system fuses. Replace blown or otherwise defective fuses as required.

Step 4

If voltage is detected, test the corresponding circuit at the PCM connector. If no voltage is detected there, suspect an open circuit between the sensor in question and the PCM. If voltage is discovered there, suspect a defective PCM or PCM programming error.

To test O2 sensors: Start the engine and allow it to reach normal operating temperature. Allow the engine to idle (with the transmission in neutral or park). With the scanner connected to the vehicle diagnostic port, observe oxygen sensor input data on the data stream. Narrow the scope of the data stream to include only pertinent data and you will get a faster response.

Step 5

If the oxygen sensors are functioning normally, voltage on pre-cat oxygen sensors will cycle continuously between 1 and 900-millivolts once the PCM enters closed loop operation. Post-cat sensors will cycle between 1 and 900-millivolts as well but they will settle at a certain point and remain relatively stable) compared to the pre-cat sensors). Oxygen sensors which fail to cycle adequately should be considered defective if the engine is in good working order.

Note: A blown O2 sensor fuse is not the cause of a stored code P2245, but a reaction to some type of short in the circuit

Severity Description

An insufficient voltage in the O2 sensor reference voltage circuit may lead to diminished fuel efficiency and a reduction in engine performance. A code P2245 should be categorized as severe and rectified as quickly as possible.

Reference Sources

[P2245 O2 Sensor Reference Voltage Circuit Low Bank 1 Sensor 1](#), OBD-Codes.