P2000: NOX TRAP EFFICIENCY BELOW THRESHOLD BANK 1

OVERVIEW

Severity	:	Medium
DIY Difficulty Level	:	Advanced
Repair Cost	:	**$50-$1700**
Can I Still Drive?	:	**Yes** (Short-term only)

What Does The P2000 Code Mean?

A stored P2000 means that the powertrain control module (PCM) has detected a level of nitric oxide (NOx) that is higher than a programmed limit. Bank 1 refers to the side of the engine which contains the number one cylinder.

The internal combustion engine produces NOx as an exhaust emission. Catalytic converter systems that are used to reduce NOx in gas burning engines are less than effective in diesel engines. This is because of the higher oxygen content of spent exhaust gases in diesels. As a secondary method of NOx reduction, a NOx trap or NOx adsorption system must be used in diesel engines. Vehicles that are equipped with diesel engines utilize selective catalytic reduction (SCR) systems, of which the NOx trap is a part.

Zeolite is used to trap the NOx molecules to prevent them from being released into the atmosphere. A web of zeolite compounds is secured inside a housing that looks like a catalytic converter. Exhaust passes through the web and NOx is trapped inside.

To refresh the zeolite structure a combustible or flammable chemical is introduced through an electronically controlled injection system. Different chemicals have been used for this purpose but diesel fuel is the most practical.

In the SCR, NOx sensors are used the way oxygen sensors are used in gasoline engines but they

have no effect on fuel delivery adaptation strategy. They monitor NOx particles instead of oxygen levels. The PCM monitors pre catalyst and post catalyst NOx sensor data to calculate NOx trap efficiency. This data is also used in NOx reductant fluid delivery strategy.

Reductant injection is accomplished with an injector that is electronically controlled by either the PCM or the SCR module. A remote reservoir contains NOx reductant fluid/diesel fuel; it resembles a small fuel tank. Reductant pressure is generated using an electronically controlled fuel pump.

If the PCM detects a level of NOx that is higher than a programmed limit, a P2000 code will be stored and a malfunction indicator lamp may be illuminated.

What Are The Symptoms Of The P2000 Code?

Symptoms of a P2000 code may include:

- Excessive smoke from the engine exhaust
- Reduced overall engine performance
- Increased engine temperatures
- Diminished fuel efficiency

What Are The Potential Causes Of The P2000 Code?

Possible causes for this engine code include:

- A defective or overloaded NOx trap or NOx trap element
- Faulty diesel exhaust fluid injection system
- Inadequate or improper NOx reductant fluid
- Inoperable exhaust gas recirculation system
- Severe exhaust leak upstream of the NOx trap

How Can You Fix The P2000 Code?

Step 1

A good starting point is always to check for technical service bulletins (TSB) for your particular vehicle. Your issue may be a known issue with a known fix put out by the manufacturer and can save you time and money during diagnosis.

To diagnose a code P2000, a diagnostic scanner, a digital volt/ohmmeter (DVOM), and a vehicle information source like All Data (DIY) will be needed.

Step 2

I would start with a visual inspection of all system wiring harnesses and connectors. Focus on wiring

that is routed near hot exhaust components and sharp exhaust shields.

Step 3

Check the exhaust system for leaks and make repairs as needed.

Make sure that there is reductant in the SCR reservoir and that it is of a suitable quality. Follow manufacturer's recommendations when adding reductant fluid.

Step 4

Check exhaust gas recirculation (EGR) operation using the scanner. Repair any stored EGR codes before attempting to diagnose this code.

Retrieve all stored trouble codes and freeze frame data by connecting the scanner to the vehicle diagnostic port. Write this information down; it may be helpful in diagnosing an intermittent code.

Clear the codes from the system and start the engine. I would allow the engine to reach normal operating temperature and test drive the vehicle to see if the code is reset.

Step 5

If it is reset, connect the scanner and observe NOx sensor data. Narrow the data stream to include only pertinent data and it will provide you with much more accurate information.

If either of the NOx sensors are inactive, check for a blown fuse in the engine bay or under the dash. Most NOx sensors are of a 4-wire design with a power wire, ground wire, and 2-signal wires.

Use the DVOM and the service manual (or All Data) to test for battery voltage and ground signals. Test sensor output with the engine at normal operating temperature and the engine idling.

Additional diagnostic notes:

- Incorrect or absent rejuvenation fluid is the most common cause of a code P2000 being stored
- EGR valve elimination is often the cause of NOx trap inefficiency
- High performance aftermarket exhaust components can also lead to a stored P2000

Reference Sources

P2000 NOx Trap Efficiency Below Threshold Bank 1, OBD-Codes.