P0189: FUEL TEMPERATURE SENSOR B CIRCUIT INTERMITTENT

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$250-$300**
Can I Still Drive?	:	**Yes** (Short-term only)

What Does The P0189 Code Mean?

Simply stated, a stored code P0189 means that the powertrain control module (PCM) has detected a voltage signal from the fuel temperature sensor (or circuit) that is intermittent or erratic. “B” refers to an area of circuitry as opposed to a particular circuit or component.

Fuel temperature sensors, in OBD II equipped vehicles, are typically integrated into the fuel composition sensor housing. The fuel composition sensor provides an accurate fuel composition and fuel temperature analysis to the PCM. A small, computerized mechanism, the fuel composition sensor is found in-line between the fuel tank and the fuel rail.

Fuel passing through the fuel composition sensor, is evaluated to determine the percentage of ethanol, water, and other contaminants. Square waveform patterns (representing voltage) are input to the PCM according to the level of contamination in the fuel. High concentrations of fuel contamination are indicated by shorter waveform frequencies. Waveform frequency could also be explained as the vertical posting of the pattern.

Flex fuel vehicles typically function well with fuel composition levels that are as high as eighty-five-percent ethanol. The horizontal portion of the waveform represents fuel temperature and is recognized by the PCM as pulse width.

The broader the pulse width of the waveform, the higher the temperature of the fuel passing

through the fuel composition sensor. Between one and five-milliseconds (hundredths-of-a-second) is the usual pulse width variation in OBD II vehicles.

If the fuel temperature signal appears intermittent or erratic, a P0189 code will be stored and a malfunction indicator lamp (MIL) may be illuminated. The majority of OBD II equipped vehicles will require multiple ignition cycles (with a failure) for MIL illumination.

What Are The Symptoms Of The P0189 Code?

Symptoms of a P0189 code may include:

- Other fuel composition codes may be present
- Possible MIL illumination
- There may be no obvious symptoms

What Are The Potential Causes Of The P0189 Code?

Potential causes for this code to set are:

- Open, shorted, or damaged wiring or connectors
- Defective fuel temperature/composition sensor
- Faulty intake air temperature sensor
- A bad ambient temperature sensor
- PCM or a PCM programing error

How Can You Fix The P0189 Code?

Preparation

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.

A diagnostic scanner, with an integrated DVOM and an oscilloscope, is possibly the best tool for diagnosing a code P0189. A vehicle information source (like All Data DIY) and an infrared thermometer can also be very beneficial.

Step 1

An appropriate beginning to any diagnosis is a visual inspection of all related wiring harnesses and connectors. Damaged, burnt, or corroded wiring and connectors must be repaired or replaced. Next, you will want to clear the codes and retest the system. I like to utilize the OBD II readiness mode when multiple failure cycles are required for MIL illumination.

When the repairs are completed, clear the codes then drive the vehicle normally. Your repairs were successful if the PCM enters readiness mode. The malfunction still exists if the code is reset. A five-volt reference signal and a ground are supplied to the fuel composition sensor which is of the variable resistance variety.

The fuel composition sensor completes the circuit and provides the PCM with a fluctuating fuel temperature voltage signal. Test reference voltage and ground at the fuel temp sensor connector using the DVOM. If you don't find reference voltage at the fuel temperature sensor connector, use the DVOM to test corresponding circuits at the PCM connector.

If no reference voltage is discovered at the PCM connector, suspect a defective PCM or a PCM programming error. Contemplate PCM failure only as a last resort.

Step 2

Using the oscilloscope, you can monitor live data in waveform patterns if the reference and ground are both present at the fuel temperature sensor connector. Use the infrared thermometer to obtain actual fuel temperature and compare it with the temperature revealed by the waveform patterns on the oscilloscope. If the fuel temperature, revealed by the waveform voltage patterns, fails to coincide with that of the thermometer, suspect that the fuel temperature sensor is bad.

Additional diagnostic notes:

- Use the DVOM to test fuel temperature sensor resistance according to manufacturer's recommendations
- NOTE: Disconnect all related controllers prior to testing circuit resistance with the DVOM

Severity Description

This code should be treated as severe because fuel temperature is used to calculate fuel delivery strategy in flex fuel vehicles.

Reference Sources

P0189: Fuel Temperature Sensor B Circuit Intermittent, OBD-Codes.