

P0651: SENSOR REFERENCE VOLTAGE "B" CIRCUIT OPEN

OVERVIEW

Severity	:	<div><div>High</div></div>
DIY Difficulty Level	:	<div><div>Intermediate</div></div>
Repair Cost	:	\$100-\$300
Can I Still Drive?	:	No

What Does The P0651 Code Mean?

When I find a stored P0651 code, it means that the powertrain control module (PCM) has detected an open circuit for a particular sensor; designated in this case as "B". When diagnosing an OBD-II code, the term open could be substituted for absent.

The sensor in question is typically associated with the automatic transmission, transfer case, or one of the differentials. This code will almost always be accompanied by a more specific sensor code. The P0651 adds that the circuit is open. Consult a reliable vehicle information source (All Data DIY is a great choice) to determine the sensor location (and function) as it pertains to the vehicle in question.

If the P0651 is stored alone, suspect that a PCM programming error has occurred. Obviously, you will need to diagnose and repair any other sensor codes prior to diagnosing and repairing the P0651 – but keep the open "B" circuit in mind.

Reference voltage (typically five-volts) is applied to the sensor in question via a switched (energized with the key on) circuit. There should also be a ground signal. The sensor is probably of either the variable resistance or electromagnetic variety and completes a particular circuit. Sensor resistance decreases as pressure, temperature, or speed is increased and vice versa.

As the sensor resistance changes with conditions it provides the PCM with an input voltage signal. If

this input voltage signal is not received by the PCM, the circuit is considered open and a P0651 will be stored.

A malfunction indicator lamp (MIL) may also be illuminated but keep in mind that some vehicles will require multiple drive cycles (with a failure) for a MIL to be illuminated.

For this reason, you should allow the PCM to enter readiness mode before considering any repair successful. Simply clear the code, after repairs are performed, and drive the vehicle normally.

If the PCM enters readiness mode, the repair was successful. If the code is reset, the PCM will not enter readiness mode and you will know that you still have a problem.

What Are The Symptoms Of The P0651 Code?

Symptoms of a P0651 code may include:

- Failure of the transmission to shift between sport and economy modes
- Transmission shifting malfunctions
- Delayed (or no) transmission engagement
- Failure of the transmission to switch between all-wheel and two-wheel drive modes
- Failure of the transfer case to shift from low to high gear
- Lack of front differential engagement
- Lack of front hub engagement
- Erratic or inoperative speedometer/odometer

What Are The Potential Causes Of The P0651 Code?

Possible causes for this engine code include:

- Open circuits and/or connectors
- Defective or blown fuses and/or fusible links
- Faulty system power relay
- Bad sensor

How Can You Fix The P0651 Code?

To diagnose a stored code P0651, I would need access to a diagnostic scanner, a digital volt/ohmmeter (DVOM), and a trustworthy vehicle information source (like All Data DIY). A portable oscilloscope may also be helpful under certain circumstances.

Use your vehicle information source to determine the location and function of the sensor in question, as it relates to your particular vehicle. Check system fuses and fusible links with the circuit under a full load. Fuses that may appear normal when there is very little load on the circuit often fail when the circuit is fully loaded. Blown fuses should be replaced, keeping in mind that a shorted

circuit is likely the cause of the spent fuse.

Visually Inspect The Related Wiring And Harnesses

Perform a visual inspection of sensor system related wiring harnesses and connectors. Repair or replace damaged or burned wiring, connectors, and components as required.

Retrieve All Stored Codes

Next, I would connect the scanner to the vehicle diagnostic connector and retrieve all stored trouble codes. I like to write them down, along with any related freeze frame data, as this information may prove helpful if the code turns out to be intermittent. After that I would go ahead and clear the code and test drive the vehicle to see if it is immediately reset.

Use The DVOM To Test Reference Voltage And Ground Signals

Should all system fuses be intact, and the code is immediately reset, use the DVOM to test reference voltage and ground signals at the sensor in question. Typically, you should expect to find five-volts and a common ground at the sensor connector.

If the voltage and ground signals are present on the sensor connector, continue by testing sensor resistance and continuity levels. Use your vehicle information source to obtain testing specs and compare your actual findings to them. Sensors that fail to comply with these specs should be replaced.

Disconnect all related controllers from the system circuits before testing resistance with the DVOM. If there is no reference voltage signal at the sensor, disconnect all related controllers and use the DVOM to check circuit resistance and continuity between the sensor and the PCM.

Replace open or shorted circuits as required. If an electromagnetic sensor is used, with a reciprocating signal, use the oscilloscope to monitor live data; paying particular attention to glitches and completely open circuits.

Additional diagnostic notes:

- This type of code is generally provided as support for a more specific code
- A stored code P0651 is normally associated with the drivetrain

Severity Description

The severity of a stored P0651 depends upon which sensor circuit is experiencing an open condition. One must consider other stored codes before a determination of severity can be made.

Reference Sources

[P0651 Sensor Reference Voltage B Circuit Open](#), OBD-Codes.