

GENERIC · POWERTRAIN

P0651

OBD-II TROUBLE CODE

P0651

Sensor Reference Voltage 'B' Circuit/Open

P0651 indicates that the engine control module (ECM) has detected an open circuit or abnormal voltage on the sensor reference voltage 'B' circuit, which is a regulated 5-volt supply shared by multiple sensors. The ECM monitors this line and sets the code when the voltage falls outside the expected range, typically because a sensor or wiring on that circuit is drawing too much current or the line is broken.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Computer and output circuits

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms
- Rough running or stalling if the affected sensors include throttle position or manifold pressure
- Reduced engine performance or limp mode due to lost sensor data
- Poor fuel economy or increased emissions from incorrect sensor readings
- Intermittent misfire or hesitation if the reference voltage drops under load
- Multiple sensor-related codes stored alongside P0651

Common causes, most likely first

- 1 A faulty sensor on the reference voltage 'B' circuit internally shorted or drawing excessive current
- 2 Damaged wiring harness such as chafed, corroded, or broken wires on the reference voltage line
- 3 Poor electrical connection at a sensor or ECM connector, including loose pins or corrosion
- 4 Failed ECM driver for the reference voltage 'B' output
- 5 Aftermarket accessories or improper repairs tapping into the reference voltage circuit
- 6 Moisture intrusion into a connector causing a partial short to ground



How to diagnose and fix it

- 1 Connect a scan tool and record all stored codes and freeze-frame data to identify which sensors share the reference voltage 'B' circuit
- 2 Inspect the wiring harness and connectors for the affected sensors and the ECM for obvious damage, corrosion, or loose pins
- 3 Measure the reference voltage at each sensor connector with the key on and engine off, comparing to the specified 5 volts
- 4 Disconnect sensors one at a time on the 'B' circuit to see if the voltage returns to normal, isolating a faulty sensor
- 5 Perform a voltage drop test on the reference voltage wire and ground circuit to check for excessive resistance
- 6 If the circuit is intact and all sensors are good, test the ECM output or substitute a known-good ECM to confirm internal failure
- 7 Repair or replace the faulty component, clear the codes, and verify the reference voltage is stable with the engine running

What P0651 really tells you about shared sensors

- P0651 often appears with codes for multiple sensors on the same reference circuit, such as throttle position, accelerator pedal, or manifold absolute pressure, because one faulty sensor can drag down the entire 5-volt supply.
- A common misdiagnosis is replacing the ECM first; the majority of P0651 cases trace back to a shorted sensor or a rubbed-through wire in the harness, not the computer itself.
- The reference voltage 'B' circuit may power sensors that are not obviously related, so checking a wiring diagram for all components on that line is essential before condemning any single part.
- Intermittent P0651 codes can be caused by water intrusion into a connector that dries out, so a visual inspection after a rainstorm or car wash can reveal the root cause.
- Aftermarket electrical accessories improperly spliced into a 5-volt reference wire can overload the circuit and set P0651 without any factory component being defective.

Can I keep driving with P0651?

You can usually drive the vehicle to a repair shop, but avoid heavy acceleration or long trips because the fault can cause poor running or stalling if critical sensors lose their reference voltage. If the engine is in limp mode or runs very poorly, stop driving and have it towed.



Tools that help

- OBD-II scan tool with live data capability
- Digital multimeter
- Wiring diagram for the specific vehicle
- Test light or jumper wires
- Contact cleaner and dielectric grease

Reading P0651

- P** Powertrain: engine, transmission and emissions.
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- 0** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
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- 6** Computer and output circuits.
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- 51** The exact fault within that area.

Often seen with

P0121 Throttle Position Sensor A Circuit Range/Performance · **P0641** Sensor Reference Voltage 'A' Circuit/Open · **P0652** Sensor Reference Voltage 'B' Circuit Low · **P0653** Sensor Reference Voltage 'B' Circuit High · **P2135** Throttle/Pedal Position Sensor A/B Voltage Correlation

See it working

Watch the animated explainer [How Airbags Work: A 50 km/h Crash in Slow Motion](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p0651/>

