

GENERIC · POWERTRAIN

P2C5B

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P2C5B

Cylinder 5 Fuel Injector B Offset Learning At Max Limit

P2C5B indicates that the engine control module (ECM) has learned a fuel injector offset correction for cylinder 5 that has reached its maximum allowed limit. The ECM uses this offset to fine-tune injector pulse width and maintain balanced fuel delivery, and hitting the limit means the correction can no longer compensate for the underlying condition.

SYSTEM

Powertrain

CODE TYPE

Generic (all makes)

SEVERITY

Medium

FIX DIFFICULTY

Professional

AREA

Hybrid propulsion

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- Rough idle or noticeable vibration, especially when the engine is cold
- Slight misfire or hesitation during acceleration
- Decreased fuel economy compared to normal
- Occasional hard starting or extended cranking
- Fuel odor or black smoke from the exhaust in severe cases

Common causes, most likely first

- 1 Clogged, restricted, or failing fuel injector on cylinder 5
- 2 Carbon buildup on the injector nozzle or intake valve for cylinder 5
- 3 Low fuel pressure or volume from a weak fuel pump or restricted filter
- 4 Vacuum leak near cylinder 5 intake runner or intake manifold gasket
- 5 Faulty injector wiring, connector, or driver circuit in the ECM
- 6 Mechanical issue such as low compression or valve train problem on cylinder 5



How to diagnose and fix it

- 1 Connect a scan tool and record freeze-frame data and fuel trim values to confirm the code and operating conditions
- 2 Inspect the cylinder 5 injector connector and wiring for corrosion, damage, or loose pins
- 3 Perform a fuel pressure and volume test to rule out a weak pump or restricted filter
- 4 Run a cylinder balance or injector contribution test to compare cylinder 5 to the others
- 5 Remove and flow-test the cylinder 5 injector, or swap it with a known-good injector to see if the code follows
- 6 Check for vacuum leaks at the intake manifold and cylinder 5 runner using a smoke machine
- 7 If electrical and fuel delivery checks pass, perform a compression test on cylinder 5 to rule out mechanical faults

What the offset limit really tells you

- The ECM has already been compensating for a rich or lean condition on cylinder 5 for some time, so the code often appears long after the original problem began.
A dirty injector that still flows but has a poor spray pattern can trigger this code without setting a misfire code, making it easy to overlook.
- Fuel pressure that is marginally low across all cylinders can push one weak injector to its learning limit first, so always check system pressure before condemning the injector.
- The offset learning limit can be reached by a vacuum leak that affects only one intake runner, which is common on engines with individual runner gaskets.
Replacing the injector without clearing the learned values may leave the code stored until the ECM completes a new learning cycle.

Can I keep driving with P2C5B?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy acceleration, towing, or long trips because the uncorrected fuel imbalance can lead to misfires and potential catalytic converter damage. If the check engine light begins flashing, stop driving and have the vehicle towed.

Tools that help

- OBD-II scan tool with live data and bidirectional control
- Fuel pressure gauge
- Injector flow tester or known-good injector for swapping
- Smoke machine for vacuum leak detection
- Compression tester
- Digital multimeter for circuit testing



Reading P2C5B

- P** Powertrain: engine, transmission and emissions.
- 2** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- C** Hybrid propulsion.
- 5B** The exact fault within that area.

Often seen with

P0171 System Too Lean (Bank 1) · **P0172** System Too Rich (Bank 1) · **P0305** Cylinder 5 Misfire Detected · **P2C5A** Cylinder 5 Fuel Injector B Offset Learning At Min Limit · **P2C5C** Cylinder 6 Fuel Injector B Offset Learning At Min Limit

See it working

Watch the animated explainer [Engine Cooling System Trainer: How Engines Stay Cool](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2c5b/>

