

GENERIC · POWERTRAIN

P2B10

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P2B10

Cylinder 1 Injection Pulse Offset Not Learned

P2B10 means the engine control module (ECM) has not successfully learned the injection pulse offset for cylinder 1, which is the small fuel-delivery correction it applies to that cylinder's injector to keep combustion balanced. The ECM runs a learn routine during specific operating conditions and stores this code when the adaptation value cannot be written or verified within the allowed time or range.

SYSTEM

Powertrain

CODE TYPE

Generic (all makes)

SEVERITY

Medium

FIX DIFFICULTY

Professional

AREA

Hybrid propulsion

Symptoms you may notice

- Malfunction indicator lamp (MIL) illuminated, often with no other noticeable symptoms
- Slight rough idle or uneven engine operation when the fault is active
- Momentary hesitation or stumble during light acceleration
- Poor fuel economy if the ECM defaults to a rich or unbalanced injection strategy
- In rare cases, a pending misfire code for cylinder 1 may accompany the warning light

Common causes, most likely first

- 1 Faulty or contaminated cylinder 1 fuel injector preventing a stable pulse offset from being learned
- 2 Wiring damage or poor terminal tension at the cylinder 1 injector connector
- 3 Engine mechanical issue on cylinder 1, such as low compression or a sticking valve, that skews the learn value
- 4 Intake or vacuum leak affecting cylinder 1 airflow and making the offset unlearnable
- 5 ECM software calibration issue or corrupted adaptive memory
- 6 Low fuel pressure or a restricted fuel supply that prevents the learn routine from completing
- 7 Aftermarket or incorrect injector installed on cylinder 1 with different flow characteristics



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data to confirm when and under what conditions the learn routine failed
- 2 Inspect the cylinder 1 injector connector and harness for corrosion, chafing, or loose terminals
- 3 Perform a fuel pressure and injector balance test to compare cylinder 1 delivery against the others
- 4 Run a compression test and cylinder leak-down test on cylinder 1 to rule out mechanical causes
- 5 Check for intake and vacuum leaks near cylinder 1 using a smoke machine or propane enrichment
- 6 Verify the ECM calibration is current and, if required, perform the manufacturer's injector offset relearn procedure
- 7 Replace the cylinder 1 injector only after electrical and mechanical checks pass, then clear the code and complete a drive cycle to confirm the learn completes

Why the offset learn fails without a misfire

- A P2B10 can set with no driveability complaint because the ECM may substitute a default offset that keeps the engine running acceptably while the learn remains incomplete.
- Technicians often replace the cylinder 1 injector first, but a dirty or worn injector is only one cause; a marginal compression reading on that cylinder will also prevent the offset from learning.
- The learn routine typically requires a specific coolant temperature window and steady load, so short-trip driving or a thermostat stuck open can block the learn from ever running.
- An aftermarket injector with a different spray pattern or flow rate on cylinder 1 will produce an offset outside the learnable range even though the part is new.
- Corrupted adaptive memory in the ECM can mimic a hardware fault, so a software update or adaptive memory reset should be attempted before condemning injectors or wiring.

Can I keep driving with P2B10?

The vehicle is generally safe to drive because the ECM falls back to a default injection offset, but prolonged driving with an unlearned offset can cause rough running, higher fuel consumption, and eventual misfire damage. Avoid heavy towing or sustained high-load driving until the fault is repaired and the learn routine completes.

Tools that help

- OBD-II scan tool with bidirectional control and live data
- Fuel pressure gauge
- Compression tester
- Smoke machine for intake leak detection
- Digital multimeter and back-probe kit
- Manufacturer-level diagnostic software for injector offset relearn



Reading P2B10

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

Often seen with

P0171 System Too Lean (Bank 1) · **P0201** Injector Circuit Malfunction - Cylinder 1 · **P0301** Cylinder 1 Misfire Detected · **P2B11** Cylinder 1 Injection Pulse Offset Exceeded Learning Limit · **P2B12** Cylinder 2 Injection Pulse Offset Not Learned

See it working

Watch the animated explainer [How the PCV System Works: Crankcase Ventilation](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2b10/>

