

GENERIC · POWERTRAIN

P2B1B

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P2B1B

Cylinder 6 Injection Pulse Offset Exceeded Learning Limit

P2B1B means the engine control module (ECM) has learned that cylinder 6 needs an injection pulse offset beyond the allowed learning limit to keep combustion balanced. The ECM monitors crankshaft speed fluctuations and adjusts individual cylinder fuel delivery, but the required correction for cylinder 6 has exceeded its programmed threshold.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Professional	Hybrid propulsion

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- Slight engine misfire or rough idle, especially when cold
- Reduced fuel economy due to unbalanced fuel delivery
- Hesitation or stumble during acceleration
- Possible vibration felt through the steering wheel or seat

Common causes, most likely first

- 1 Faulty fuel injector on cylinder 6 (clogged, leaking, or electrically degraded)
- 2 Carbon buildup on intake valves or injector tip restricting flow
- 3 Worn or misadjusted spark plug for cylinder 6 causing incomplete combustion
- 4 Vacuum leak near cylinder 6 intake runner affecting air/fuel mixture
- 5 Low fuel pressure or restricted fuel filter affecting all cylinders but most noticeable on one
- 6 Mechanical issue such as low compression or valve train wear on cylinder 6
- 7 ECM software calibration issue or corrupted adaptive learning memory

How to diagnose and fix it

- 1 Scan all modules for stored codes and freeze-frame data to confirm P2B1B and check for related misfire or fuel trim codes
- 2 Inspect spark plug and ignition coil for cylinder 6; replace if worn or faulty
- 3 Perform a fuel injector balance test or swap injector 6 with another cylinder to see if the code follows
- 4 Check fuel pressure and volume against manufacturer specifications
- 5 Run a compression test and cylinder leak-down test on cylinder 6 to rule out mechanical faults
- 6 Clean or replace the fuel injector for cylinder 6 if tests indicate restriction or imbalance
- 7 Clear adaptive learning and perform a relearn drive cycle, then verify the code does not return



Why cylinder 6 offset learning fails

- A dirty mass airflow sensor or intake leak can skew all cylinder offsets, but cylinder 6 often triggers the limit first due to its position in the intake manifold.
- The code can set intermittently from a single tank of poor-quality fuel, so avoid replacing parts before running a fresh tank and clearing the code.
- Injector balance testing is more reliable than resistance checks because a coil can test good while the injector remains partially clogged.
- Adaptive learning limits are often reached gradually, so a marginal injector may only trigger the code after thousands of miles of driving.
- Always check for technical service bulletins (TSBs) for the specific vehicle, as some ECM calibrations address false offset limits.

Can I keep driving with P2B1B?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy acceleration or towing until the fault is diagnosed. Prolonged driving with an uncorrected cylinder imbalance can damage the catalytic converter and worsen fuel economy.

Tools that help

- OBD-II scan tool with live data and bidirectional control
- Fuel pressure gauge
- Compression tester
- Digital multimeter
- Mechanic's stethoscope or listening device

Reading P2B1B

P	Powertrain: engine, transmission and emissions.
2	Generic (SAE) code: it means the same thing on every OBD-II vehicle.
B	Hybrid propulsion.
1B	The exact fault within that area.

Often seen with

P0171 System Too Lean (Bank 1) · **P0172** System Too Rich (Bank 1) · **P0206** Injector Circuit/Open - Cylinder 6
 · **P0306** Cylinder 6 Misfire Detected · **P2B1A** Cylinder 6 Injection Pulse Offset Not Learned



See it working

Watch the animated explainer [How a Six-Speed Manual Gearbox Works](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2b1b/>

