



P2B1F

Cylinder 8 Injection Pulse Offset Exceeded Learning Limit

P2B1F means the engine control module has learned that the fuel injector for cylinder 8 needs a pulse-width correction beyond the allowed limit to keep that cylinder's power contribution balanced with the rest of the engine. The computer stores this code when the adaptive learning value for cylinder 8 injection timing or duration exceeds its calibrated threshold, indicating a mechanical or electrical imbalance that the software can no longer compensate for.

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
- Rough idle or a noticeable shake that is more pronounced when the engine is cold
- Slight hesitation or stumble during acceleration from a stop
- Reduced fuel economy as the engine compensates for the imbalance
- In rare cases, a flashing check engine light if the misfire becomes severe enough to damage the catalytic converter

Common causes, most likely first

- 1 Faulty or clogged fuel injector on cylinder 8, causing uneven fuel delivery
- 2 Worn or misadjusted ignition components specific to cylinder 8, such as a spark plug or coil pack
- 3 Vacuum leak or intake manifold gasket failure near cylinder 8 that leans out that cylinder
- 4 Low compression on cylinder 8 due to worn rings, valves, or a head gasket issue
- 5 Carbon buildup on the intake valve or injector tip for cylinder 8, restricting flow
- 6 Engine control module software calibration issue or corrupted adaptive memory
- 7 Wiring or connector fault in the cylinder 8 injector circuit causing intermittent signal



How to diagnose and fix it

- 1 Connect a scan tool and record the cylinder 8 injection pulse offset and misfire counters to confirm the fault is active and not a stored history code
- 2 Perform a visual inspection of the cylinder 8 injector connector, wiring harness, and ignition components for damage or corrosion
- 3 Swap the cylinder 8 ignition coil and spark plug with a known-good cylinder to see if the misfire or offset follows the component
- 4 Run a compression test and a cylinder leak-down test on cylinder 8 to rule out mechanical faults
- 5 Use a fuel injector balance test or remove and flow-test the cylinder 8 injector to check for clogging or uneven spray pattern
- 6 Check for vacuum leaks around the intake manifold runner for cylinder 8 using a smoke machine or carburetor cleaner
- 7 After repairs, clear the adaptive memory and perform a relearn drive cycle so the engine control module can recalculate the injection pulse offset

What the offset learning limit really means

- The injection pulse offset is an adaptive correction value, so a code can set even when the engine runs smoothly because the computer has simply reached the end of its adjustment range.
- A dirty mass airflow sensor or a failing upstream oxygen sensor can skew fuel trims across all cylinders and push cylinder 8's offset past its limit without any fault in cylinder 8 itself.
- Technicians often replace the cylinder 8 injector only to find the real cause is a worn camshaft lobe or a sticking valve that changes airflow into that cylinder.
- This code can be set by a low battery or a recent engine control module reflash that wiped adaptive memory, causing the module to relearn offsets from scratch and temporarily exceed limits.
- Always check for technical service bulletins for the specific vehicle because some manufacturers have updated software calibrations that raise the offset learning limit to prevent false setting.

Can I keep driving with P2B1F?

You can usually drive the vehicle short distances at moderate speeds, but avoid heavy acceleration or towing until the fault is diagnosed because a persistent imbalance can overheat the catalytic converter. If the check engine light flashes, stop driving and have the vehicle towed to prevent converter damage.



Tools that help

- OBD-II scan tool with live data and bidirectional control capabilities
- Compression tester and cylinder leak-down tester
- Fuel injector balance tester or flow bench
- Smoke machine for vacuum leak detection
- Digital multimeter for circuit testing
- Mechanic's stethoscope for isolating mechanical noises

Reading P2B1F

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

Often seen with

P0171 System Too Lean (Bank 1) · **P0174** System Too Lean (Bank 2) · **P0208** Injector Circuit/Open - Cylinder 8 · **P0308** Cylinder 8 Misfire Detected · **P2B1E** Cylinder 8 Injection Pulse Offset Not Learned

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/p2b1f/>

