



P2B13

Cylinder 2 Injection Pulse Offset Exceeded Learning Limit

P2B13 means the engine control module (ECM) has learned that the fuel injector for cylinder 2 needs a pulse-width correction that is outside the allowed learning window. In plain English, the ECM has been trimming the injector's opening time to keep combustion balanced, and that trim has hit its limit, so the ECM cannot compensate any further.

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

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- A slight rough idle or vibration that may be more noticeable when the engine is cold
- Intermittent misfire sensation or hesitation during light acceleration
- Slightly reduced fuel economy over time as the ECM struggles to balance the cylinder
- In rare cases, a faint fuel odor or black smoke if the injector is over-fuelling
- No drivability complaints at all, with the code found only during a scan

Common causes, most likely first

- 1 Clogged, restricted, or dirty fuel injector on cylinder 2
- 2 Carbon buildup on the intake valve or in the combustion chamber of cylinder 2
- 3 Aging or contaminated engine oil affecting the variable valve timing or injector pulse adaptation
- 4 Low fuel pressure or a weak fuel pump that affects cylinder 2 more than others
- 5 A failing fuel injector with a partially stuck pintle or solenoid
- 6 Intake manifold leak or vacuum leak near cylinder 2 that skews the learned offset
- 7 A software calibration issue in the ECM that misinterprets normal injector drift



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data for P2B13, then check for related misfire or fuel trim codes
- 2 Verify fuel pressure and volume at the rail, comparing against the manufacturer's specification
- 3 Perform a cylinder balance or injector cut-off test to confirm cylinder 2 is the weakest contributor
- 4 Run a fuel injector cleaning service or use a quality injector cleaner through the fuel system
- 5 Inspect the intake tract and vacuum lines near cylinder 2 for leaks or loose clamps
- 6 Swap the cylinder 2 injector with another cylinder and re-learn the offset to see if the fault follows the injector
- 7 If the offset still exceeds the limit after cleaning and swapping, replace the cylinder 2 injector and perform the ECM injector learning procedure

What the injector offset really tells you

- This code is often set by a perfectly healthy injector that has simply aged and drifted beyond the ECM's learned window, so cleaning and re-learning may be all that is needed.
- A dirty mass airflow sensor or a small vacuum leak can skew the learned offset for one cylinder without setting a lean or rich code, so check those before condemning the injector.
- Many technicians replace the cylinder 2 injector without first performing the ECM injector learning reset, which leaves the new part outside the learned window and the code returns.
- Carbon buildup on the back of the intake valve can mimic a failing injector because the ECM adds pulse width to compensate for the restricted airflow, so a borescope inspection is worthwhile.
- P2B13 can appear after a battery replacement or ECM reflash if the injector learning values were not properly transferred or re-learned.

Can I keep driving with P2B13?

You can usually drive the vehicle with P2B13, but avoid heavy acceleration and towing until the fault is diagnosed, because a lean or rich cylinder can damage the catalytic converter over time. If the check engine light begins flashing or you feel a strong misfire, stop driving and have it inspected promptly.

Tools that help

- OBD-II scan tool with live data and freeze-frame capability
- Fuel pressure gauge
- Cylinder balance or injector cut-off tester
- Vacuum gauge and smoke machine for intake leak testing
- Borescope for intake valve and combustion chamber inspection
- Basic hand tools for injector removal and swap



Reading P2B13

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

Often seen with

P0171 System Too Lean (Bank 1) · **P0172** System Too Rich (Bank 1) · **P0302** Cylinder 2 Misfire Detected · **P2B12** Cylinder 2 Injection Pulse Offset Not Learned · **P2B14** Cylinder 3 Injection Pulse Offset Not Learned

See it working

Watch the animated explainer **V6 Engine Explained: 60° Bank and Firing Order** on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2b13/>

