



P2B1D

Cylinder 7 Injection Pulse Offset Exceeded Learning Limit

This code means the engine computer has learned that cylinder 7 needs an injection pulse correction beyond the factory-allowed limit to keep the air-fuel mixture balanced. In plain terms, the fuel injector for cylinder 7 is not delivering the expected fuel for the commanded pulse width, and the computer can no longer compensate.

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

Symptoms you may notice

- Often no symptoms besides the warning light, especially if the misfire is mild or intermittent.
- A noticeable engine misfire or rough idle that may be worse when cold or under light load.
- Slight loss of power or hesitation during acceleration.
- A flashing check engine light if the misfire becomes severe enough to risk catalytic converter damage.
- Poor fuel economy or a rich exhaust smell from unburned fuel.
- Occasionally a stumble or shake felt through the steering wheel or seat at idle.

Common causes, most likely first

- 1 A clogged, restricted, or failing fuel injector on cylinder 7.
- 2 Carbon buildup on the injector nozzle or intake valve for cylinder 7 altering fuel delivery.
- 3 A weak or failing ignition coil or spark plug on cylinder 7 causing incomplete combustion that skews the learned offset.
- 4 An intake manifold gasket leak or vacuum leak near cylinder 7 that leans the mixture and forces the computer to overcorrect.
- 5 Low fuel pressure or a restricted fuel line affecting one cylinder more than others.
- 6 A faulty engine coolant temperature sensor or mass airflow sensor sending skewed data that the computer misapplies to cylinder 7.
- 7 Mechanical wear such as a sticking valve or worn cam lobe on cylinder 7 changing airflow and fuel demand.



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data for P2B1D, then check for related misfire or fuel trim codes before touching any parts.
- 2 Inspect the spark plug and ignition coil on cylinder 7 for fouling, wear, or carbon tracking, and swap the coil to another cylinder to see if the fault follows.
- 3 Perform a fuel injector balance test or cylinder contribution test to compare cylinder 7 against the others and confirm the injector is the weak point.
- 4 Check fuel pressure and volume at the rail, and inspect for vacuum leaks near cylinder 7 with a smoke machine or propane enrichment test.
- 5 Run a compression test and, if needed, a cylinder leak-down test on cylinder 7 to rule out mechanical causes before replacing the injector.
- 6 If the injector is confirmed restricted or electrically faulty, replace it and clear the learned adaptations so the computer can relearn the offset.
- 7 After repair, road-test the vehicle through several drive cycles to confirm the offset relearns within limits and the code does not return.

Why cylinder 7 injector offset fails

- A dirty injector that still clicks and ohms out correctly can set this code because the computer measures fuel delivery indirectly through crankshaft speed, not by watching the injector itself.
- Technicians often replace the injector only to find a small vacuum leak at the intake runner for cylinder 7 was leaning the mixture and forcing the offset beyond its limit.
- A misfire from a weak coil or plug on cylinder 7 can corrupt the learned injection offset because the computer interprets the uneven crank speed as a fuel delivery error.
- This code does not always mean the injector is bad; low fuel pressure, a restricted filter, or a skewed mass airflow sensor reading can push one cylinder's offset out of range.
- Clearing the code without repairing the cause lets the computer relearn the same bad offset, so the light often returns after a few drive cycles rather than immediately.

Can I keep driving with P2B1D?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy acceleration and towing because a worsening misfire on cylinder 7 can overheat and damage the catalytic converter. If the check engine light starts flashing, stop driving and have the vehicle towed.



Tools that help

- OBD-II scan tool with live data and bidirectional control
- Fuel injector balance tester or cylinder contribution tester
- Fuel pressure gauge
- Smoke machine for vacuum leak detection
- Compression tester and cylinder leak-down tester
- Basic hand tools and a torque wrench

Reading P2B1D

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

Often seen with

P0171 System Too Lean (Bank 1) · **P0172** System Too Rich (Bank 1) · **P0207** Injector Circuit/Open - Cylinder 7
 · **P0307** Cylinder 7 Misfire Detected · **P2B1C** Cylinder 7 Injection Pulse Offset Not Learned

See it working

Watch the animated explainer [Inline-Four Engine X-Ray: Firing Order 1-3-4-2](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2b1d/>

