

GENERIC · POWERTRAIN

P02DB

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P02DB

Cylinder 8 Fuel Injector A Offset Learning At Max Limit

P02DB indicates that the engine control module has learned a fuel injector offset correction for cylinder 8 that has reached its maximum allowable limit, meaning the injector is flowing outside the expected range and cannot be compensated further. The computer detects this when the short-term fuel trim or injector pulse-width adaptation for that specific cylinder stays pinned at the extreme end of its adjustment window during closed-loop operation.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Fuel and air metering (injector circuits)

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- Rough idle or a noticeable vibration that is worse when the engine is cold
- Slight misfire or hesitation during acceleration, especially under light load
- Decreased fuel economy as the engine compensates for the rich or lean condition
- A faint fuel odor from the exhaust or around the engine bay in severe cases
- Intermittent stumble that may not trigger a misfire code but is felt by the driver

Common causes, most likely first

- 1 Clogged, restricted, or failing cylinder 8 fuel injector
- 2 Electrical fault in the injector circuit, such as a chafed wire or corroded connector
- 3 Intake manifold vacuum leak near cylinder 8, including a failed intake gasket
- 4 Low fuel pressure or volume caused by a weak pump or restricted filter
- 5 Mechanical issue with cylinder 8, such as low compression or a faulty spark plug
- 6 Contaminated fuel or deposits on the injector nozzle affecting spray pattern
- 7 Engine control module software calibration that is overly sensitive to injector drift



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data to confirm the code is current and not history
- 2 Inspect the cylinder 8 injector connector and harness for corrosion, chafing, or loose pins
- 3 Perform a fuel pressure and volume test to rule out a supply-side restriction
- 4 Use a scan tool to run an injector balance test or compare cylinder contribution values
- 5 Check for intake vacuum leaks near cylinder 8 with a smoke machine or propane enrichment
- 6 Swap the cylinder 8 injector with a known-good injector from another cylinder and recheck the offset learning
- 7 If the offset returns to normal after swapping, replace the faulty injector and clear adaptations

What the offset limit really tells you

- A maxed-out offset learning value does not automatically condemn the injector; a vacuum leak or low fuel pressure can force the same adaptation on a healthy injector.
- Many technicians replace the injector without first checking fuel pressure, only to find the code returns because the pump was weak all along.
- The offset learning for cylinder 8 is stored in non-volatile memory, so clearing the code without repairing the root cause will usually result in the code returning after a few drive cycles.
- A failing spark plug or coil on cylinder 8 can mimic an injector offset problem by causing misfire counts that the ECM misinterprets as a fueling correction.
- On some engines, a dirty mass airflow sensor skews global fuel trim enough that a single cylinder offset hits its limit even though the injector is fine.

Can I keep driving with P02DB?

You can usually continue driving short distances at moderate speeds, but avoid heavy acceleration or towing until the fault is diagnosed. Prolonged driving with a maxed-out injector offset can lead to catalytic converter damage from unburned fuel, so schedule service promptly.

Tools that help

- OBD-II scan tool with live data and bidirectional control
- Fuel pressure gauge
- Smoke machine for vacuum leak detection
- Digital multimeter for injector circuit testing
- Noid light or injector pulse tester
- Mechanic's stethoscope for listening to injector operation



Reading P02DB

- P** Powertrain: engine, transmission and emissions.
- 0** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- 2** Fuel and air metering (injector circuits).
- DB** The exact fault within that area.

Often seen with

P0171 System Too Lean (Bank 1) · **P0172** System Too Rich (Bank 1) · **P02D6** Cylinder 6 Fuel Injector A Offset Learning At Min Limit · **P02D7** Cylinder 6 Fuel Injector A Offset Learning At Max Limit · **P0308** Cylinder 8 Misfire Detected

See it working

Watch the animated explainer [How Crank and Cam Position Sensors Work](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p02db/>

