

GENERIC · POWERTRAIN

P2197

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P2197

O2 Sensor Signal Stuck Lean (Bank 2 Sensor 1)

P2197 means the upstream oxygen sensor on bank 2 is reporting a lean exhaust mixture that never corrects, so the engine computer has stopped trusting that sensor's signal. The computer expects the sensor voltage to swing rich and lean as fuel delivery is adjusted, but it has stayed below the lean threshold for too long, indicating a stuck lean signal rather than a normal switching pattern.

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

Symptoms you may notice

- Often no symptoms besides the warning light, especially if the sensor is lazy rather than dead.
- Rough idle or hesitation when the engine is cold, because fuel trim is being driven rich to compensate.
- A noticeable drop in fuel economy as the computer adds extra fuel trying to correct the lean reading.
- Occasional misfire or surging under light throttle if the false lean signal pushes fuel trim to its limit.
- A rotten-egg or sulfur smell from the exhaust if the rich correction overheats the catalytic converter.
- Failed emissions inspection due to the check engine light and stored oxygen sensor monitor failure.

Common causes, most likely first

- A failed or contaminated bank 2 upstream oxygen sensor that is stuck at a lean voltage.
- A vacuum leak on the bank 2 side of the intake, such as a cracked intake gasket or broken vacuum hose.
- An exhaust leak upstream of the sensor, letting outside air pulse past the sensing element.
- Wiring damage or corroded connector pins between the sensor and the engine computer causing a biased signal.
- A leaking fuel injector or low fuel pressure on bank 2 that genuinely leans that cylinder bank.
- A stuck-open purge valve or evaporative emissions fault that leans the mixture on one bank.
- Oil or coolant contamination from an internal engine leak coating the sensor element and skewing its reading.



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data to confirm the code set at the reported engine speed and load.
- 2 Inspect the bank 2 upstream sensor wiring and connector for chafing, corrosion, or pushed pins before condemning the sensor.
- 3 Check live oxygen sensor voltage and short-term fuel trim on bank 2 to see whether the sensor is truly stuck lean or just lazy.
- 4 Smoke-test the intake and exhaust on the bank 2 side to rule out vacuum and exhaust leaks that mimic a bad sensor.
- 5 Verify fuel pressure and injector balance on bank 2 to rule out a genuine lean condition before replacing parts.
- 6 Replace the bank 2 upstream oxygen sensor only after electrical and mechanical checks pass, then clear codes and verify the monitor runs.
- 7 Road-test through a complete drive cycle to confirm the oxygen sensor monitor passes and fuel trim returns to normal.

Why a lean code is not always the sensor

- A vacuum leak on only one bank will set a single-bank lean code like P2197, so technicians who replace the sensor without smoke-testing often see the code return within a few days.
- An exhaust leak just ahead of the sensor pulls in outside air on the overrun and can hold the sensor voltage lean at idle, mimicking a failed sensor perfectly.
- A contaminated sensor from silicone sealant, coolant, or oil burning will read lean while the actual mixture is correct, so inspect the old sensor tip for deposits before discarding it.
- Fuel trim data is the fastest way to separate a sensor fault from a real lean condition: if long-term trim on bank 2 is far positive, the engine is genuinely lean and the sensor may be telling the truth.
- The bank 2 upstream sensor is often harder to reach than bank 1, so a lazy diagnosis that skips the wiring check frequently results in a repeat repair after the new sensor is fitted.

Can I keep driving with P2197?

You can usually drive short distances to a repair shop, but avoid heavy throttle and long trips because the computer is adding fuel to compensate and may overheat the catalytic converter. If the check engine light starts flashing or the engine misfires, stop driving and have it towed.

Tools that help

- OBD-II scan tool with live data and freeze-frame capability
- Digital multimeter for sensor signal and wiring checks
- Smoke machine for intake and exhaust leak testing
- Fuel pressure gauge
- Oxygen sensor socket and breaker bar
- Infrared thermometer or scan tool graphing function to compare bank 1 and bank 2 sensor activity



Reading P2197

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

Often seen with

P0130 O2 Sensor Circuit Malfunction (Bank 1 Sensor 1) · **P0171** System Too Lean (Bank 1) · **P0174** System Too Lean (Bank 2) · **P2195** O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1) · **P2196** O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)

See it working

Watch the animated explainer [How Drive-by-Wire Works: Electronic Throttle Body](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p2197/>

