

GENERIC · POWERTRAIN

P221B

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P221B

NOx Sensor 1/2 Correlation (Bank 2)

P221B indicates that the powertrain control module (PCM) has detected a correlation error between the two NOx (oxides of nitrogen) sensors on bank 2, meaning the upstream and downstream sensor readings do not agree within the expected range. The PCM compares the signals from the pre-catalyst and post-catalyst NOx sensors and sets this code when their values deviate beyond a calibrated threshold for a set period.

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

Symptoms you may notice

- Illumination of the check engine light (malfunction indicator lamp) with no other noticeable symptoms.
- Reduced engine performance or power, often accompanied by a lack of throttle response.
- Decreased fuel efficiency as the PCM may alter injection timing to compensate for perceived sensor errors.
- In some cases, the vehicle may enter limp mode, limiting speed and engine RPM.
- A noticeable increase in diesel exhaust fluid (DEF) consumption if the system attempts to correct for incorrect NOx readings.
- Occasional rough idle or hesitation during acceleration, though these are less common.

Common causes, most likely first

- 1 Faulty NOx sensor 1 or sensor 2 on bank 2, due to contamination, age, or internal failure.
- 2 Wiring or connector issues in the NOx sensor circuits, such as corrosion, chafing, or loose pins.
- 3 Exhaust leaks between the two sensors or upstream of the sensors, causing false readings.
- 4 A failing selective catalytic reduction (SCR) catalyst or diesel particulate filter (DPF) that alters NOx levels.
- 5 Software calibration issues in the PCM that affect sensor correlation logic.
- 6 Contaminated DEF (diesel exhaust fluid) or a DEF injection system fault that skews NOx levels.
- 7 Excessive soot buildup on the sensor tips due to engine operating conditions or a faulty DPF regeneration process.



How to diagnose and fix it

- 1 Perform a visual inspection of the NOx sensors, wiring, and connectors on bank 2 for damage, corrosion, or loose connections.
- 2 Use a scan tool to check for other stored codes and freeze-frame data, and verify live NOx sensor readings to see if they are plausible and correlate.
- 3 Check the exhaust system for leaks between the sensors and upstream components using a smoke machine or visual inspection.
- 4 Test the NOx sensor circuits for continuity, short circuits, and proper voltage according to the manufacturer's service information.
- 5 If sensor readings are erratic or stuck, swap the NOx sensors from bank 2 to bank 1 (if accessible) to see if the code follows the sensor.
- 6 Replace the faulty NOx sensor(s) with a quality OEM or equivalent part, then clear codes and perform a road test to verify the repair.
- 7 If the code persists, check for PCM software updates and perform a relearn or calibration procedure as required.

Before you replace both NOx sensors

- A correlation code does not automatically mean both sensors are bad; often one sensor is lazy or contaminated, and replacing both without testing wastes money.
- Exhaust leaks upstream of the sensors can cause correlation errors that mimic sensor failure, so always inspect the exhaust system first.
- On many vehicles, the NOx sensors are covered by an extended emissions warranty; check coverage before authorizing repairs.
- The PCM may set this code due to a software glitch, and a simple reflash can resolve it without any hardware replacement.
- Contaminated DEF or a failing DEF injector can skew NOx readings and trigger correlation codes, so verify DEF quality and injection quantity.

Can I keep driving with P221B?

You can generally continue driving with this code, but avoid heavy loads and long trips until diagnosed, as continued driving may increase emissions and lead to more severe system damage. If the vehicle enters limp mode, seek service promptly.



Tools that help

- OBD-II scan tool with live data and graphing capabilities
- Digital multimeter for circuit testing
- Smoke machine for exhaust leak detection
- Manufacturer-specific diagnostic software for NOx sensor activation tests
- Basic hand tools for sensor removal and installation

Reading P221B

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

Often seen with

P207F Reductant Quality Performance · **P2200** NOx Sensor Circuit (Bank 1 Sensor 1) · **P2201** NOx Sensor Circuit Range/Performance (Bank 1 Sensor 1) · **P221A** NOx Sensor 1/2 Correlation (Bank 1) · **P221C** Reductant Heater B Current Too Low

See it working

Watch the animated explainer [Helicopter Simulator: Take Off, Hover and Land](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p221b/>

