

GENERIC · POWERTRAIN

P0412

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P0412

Secondary Air Injection System Switching Valve 'A' Circuit

P0412 indicates that the powertrain control module has detected an electrical fault in the control circuit for the secondary air injection system's switching valve 'A', which is responsible for directing air into the exhaust stream during cold starts. The computer monitors the circuit for expected voltage or current and sets this code when the signal is out of range, indicating an open, short, or excessive resistance in the wiring or valve solenoid.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Low	Intermediate	Auxiliary emission controls

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms.
- A slight hesitation or stumble during the first few seconds after a cold start, as the secondary air system fails to operate.
- Increased tailpipe emissions during warm-up, which may be undetectable without emissions testing.
- In some vehicles, a faint hissing or clicking noise from the engine bay may be absent because the valve is not actuating.
- Rough idle or poor driveability only if the valve is stuck open, allowing exhaust gases to back up into the air pump or intake tract.

Common causes, most likely first

- 1 Failed secondary air injection switching valve solenoid, often due to internal coil failure or corrosion.
- 2 Damaged, disconnected, or corroded electrical connector at the switching valve.
- 3 Open or shorted wire in the control circuit between the powertrain control module and the switching valve.
- 4 Blown fuse or faulty relay that supplies power to the switching valve circuit.
- 5 Faulty powertrain control module driver, though this is less common and should be confirmed last.
- 6 Carbon buildup or mechanical binding inside the switching valve, preventing proper movement and causing circuit feedback.
- 7 Engine vacuum leak or missing vacuum supply line to a vacuum-operated switching valve, leading to incorrect circuit feedback.



How to diagnose and fix it

- 1 Inspect the switching valve connector and wiring for corrosion, loose pins, or physical damage, and repair as needed.
- 2 Check the fuse and relay that supply power to the secondary air injection system, replacing any failed components.
- 3 Measure resistance across the switching valve solenoid and compare to the manufacturer's specification to confirm the valve is within range.
- 4 Test the control circuit for continuity and voltage drop between the powertrain control module and the valve, repairing open or shorted wires.
- 5 Command the switching valve on and off with a scan tool to verify that it actuates and that the circuit responds correctly.
- 6 If the valve fails electrical or mechanical tests, replace the secondary air injection switching valve and clear the code.
- 7 After repairs, perform a cold-start drive cycle to confirm the code does not return and that the monitor completes.

What the switching valve code really means

- A P0412 is often set by a simple blown fuse or a corroded connector pin, so always check power and ground at the valve before condemning the valve itself.
- The switching valve may be vacuum-operated on some engines, and a missing or cracked vacuum line can cause the same circuit code because the valve does not move as expected.
- This code does not always mean the secondary air pump is bad; the pump and valve are separate components, and testing the valve circuit independently prevents unnecessary pump replacement.
- Intermittent codes can be caused by a wire chafing against a bracket or heat shield, so wiggle-test the harness while watching live data to catch a fault that only appears under vibration.
- Some vehicles use the switching valve to divert air between the exhaust manifold and the catalytic converter, and a stuck valve can cause a P0412 along with catalyst efficiency codes if not addressed.

Can I keep driving with P0412?

The vehicle remains safe to drive with P0412 because the secondary air injection system only operates briefly during cold starts and does not affect engine power or safety. Avoid long periods of idling from a cold start and schedule diagnosis soon to prevent increased emissions and potential damage to the air pump or catalytic converter.



Tools that help

- OBD-II scan tool with bidirectional control capability
- Digital multimeter
- Hand tools for connector and component access
- Vacuum pump and gauge if the valve is vacuum-operated
- Wiring diagram for the specific vehicle

Reading P0412

P	Powertrain: engine, transmission and emissions.
0	Generic (SAE) code: it means the same thing on every OBD-II vehicle.
4	Auxiliary emission controls.
12	The exact fault within that area.

Often seen with

P0410 Secondary Air Injection System Malfunction · **P0411** Secondary Air Injection System Incorrect Flow · **P0413** Secondary Air Injection System Switching Valve 'A' Circuit O · **P0414** Secondary Air Injection System Switching Valve 'A' Circuit S · **P0415** Secondary Air Injection System Switching Valve 'B' Circuit

See it working

Watch the animated explainer **Four-Stroke Engine Cutaway: Intake to Exhaust** on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p0412/>

