

GENERIC · POWERTRAIN

P002A

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P002A

B Camshaft Profile Actuator A Control Circuit/Open Bank 1

P002A indicates that the powertrain control module has detected an open circuit in the control wiring for the Bank 1 B camshaft profile actuator, which is the solenoid or motor that changes valve lift or duration on that bank. The computer commands the actuator to move, but the electrical feedback on the control circuit does not match the expected voltage or current, so it flags the circuit as open.

SYSTEM

Powertrain

CODE TYPE

Generic (all makes)

SEVERITY

Medium

FIX DIFFICULTY

Intermediate

AREA

Fuel and air metering and auxiliary emission controls

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms
- Rough idle or unstable engine operation when the actuator is commanded to change profile
- Reduced engine power or a limp-home mode triggered by the control module
- Poor fuel economy or increased emissions due to incorrect valve timing
- In rare cases, a no-start condition if the actuator circuit fault disables the variable valve timing system entirely

Common causes, most likely first

- 1 Broken or chafed wire in the actuator control circuit, often near the connector or where the harness flexes
- 2 Corroded, loose, or disconnected electrical connector at the camshaft profile actuator
- 3 Failed camshaft profile actuator solenoid or motor winding (open internal circuit)
- 4 Open circuit inside the powertrain control module driver for that actuator
- 5 Rodent damage or pinched harness causing an open in the control wire
- 6 Poor ground connection for the actuator circuit, though less common than a positive-side open



How to diagnose and fix it

- 1 Connect a scan tool and verify P002A is current, then command the Bank 1 B camshaft profile actuator on and off while watching live data for circuit status or actuator position
- 2 Visually inspect the actuator connector and the harness routing for corrosion, loose pins, or obvious damage, and repair any connector issue first
- 3 Measure resistance across the actuator solenoid or motor terminals and compare to the manufacturer's specification to rule out an open winding
- 4 Backprobe the control circuit at the actuator and at the powertrain control module to check for continuity and identify where the open exists
- 5 Check for voltage on the control wire with the key on and the actuator commanded, confirming the driver is outputting a signal
- 6 Repair the open wire or replace the actuator as indicated by the tests, then clear the code and verify the circuit passes a full drive cycle
- 7 If the circuit is intact to the module but no output is present, diagnose the powertrain control module driver or internal fault

What the open circuit really means

- An open circuit code does not automatically mean the actuator has failed; a broken wire or backed-out terminal in the connector is just as common and far cheaper to fix.
- The camshaft profile actuator on some engines is a two-wire solenoid while on others it is a three-phase motor, so resistance and voltage tests must follow the specific service information for that design.
- A loose or corroded ground for the actuator circuit can mimic an open on the control side, so always verify the ground path before condemning the module or the actuator.
- This code can set intermittently from a harness that rubs only during certain engine movements, so a wiggle test of the harness while watching live data often reveals the fault location.
- Do not replace the powertrain control module until every wire and connector in the circuit has been proven good, because module drivers rarely fail without a short or external damage.

Can I keep driving with P002A?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy acceleration or sustained high speeds because the engine may enter limp mode or run with incorrect valve timing. If the engine runs very poorly or stalls, stop driving and have it towed.



Tools that help

- OBD-II scan tool with live data and bidirectional control capability
- Digital multimeter with backprobe pins
- Wiring diagram and service information for the specific vehicle
- Basic hand tools for connector and harness access
- Test light or logic probe for quick circuit checks

Reading P002A

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

Often seen with

P0010 'A' Camshaft Position Actuator Circuit (Bank 1) · **P0011** 'A' Camshaft Position - Timing Over-Advanced or System Perfo · **P0020** 'A' Camshaft Position Actuator Circuit (Bank 2) · **P002B** B Camshaft Profile Actuator A Control Circuit Low Bank 1 · **P002C** B Camshaft Profile Actuator A Control Circuit High Bank 1

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/p002a/>

