P0239: TURBOCHARGER BOOST SENSOR B CIRCUIT MALFUNCTION

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$100-$400**
Can I Still Drive?	:	**Yes** (Short-term only)

What Does The P0239 Code Mean?

Code P0239 is a generic code in as much as it refers to a problem in the turbocharger boost sensor A circuit. Although generic in nature, never assume it is identical for all vehicles.

OBD codes do not necessarily point to a specific item, but rather to an area for the technician to search for possible causes for a problem within this circuit, which could include multiple possibilities.

All vehicles with code P0239 have a singular point in common. It refers to an unacceptable variance between the ECM (electronic control module) programmed percentage of turbo boost at a specific RPM and the sensor's signal value. These two values must coincide within close limits.

How Turbocharging (forced induction) Increases Performance

Turbochargers force a great deal more air into the engine than the engine is capable of under normally aspirated conditions. The higher the volume of air forced into the cylinders in addition to the increased fuel equals greater power.

Typically a turbocharger can increase horsepower by 35 to 50 percent in an engine designed specifically for turbocharging. A conventional engine's components will not withstand the stress placed on it by forced induction.

Turbochargers offer high horsepower gains with little or no adverse effect on fuel economy. They use exhaust velocity to propel the turbocharger, so in essence, it is free horsepower. That is the upside. The downside is that they take a beating and tend to fail at unpredictable times for a host of reasons. When an indication that a problem with the turbocharger has occurred, address it as soon as possible. A turbocharged engine greatly exaggerates engine problems due to the compressed air mass.

Never tighten the wastegate or attempt to install any modification to a stock turbocharged engine in an effort to increase boost pressures. The fuel and timing curve on most engines will not adapt to higher than normal boost pressures and engine damage will occur.

Note: *This DTC is basically identical to P0235 which refers to the "A" turbocharger.*

What Are The Symptoms Of The P0239 Code?

Symptoms of a P0239 diagnostic trouble code may include:

- The code P0239 will be set which simply means that a problem exists somewhere within this circuit preventing proper boost control. Additional codes in progression may be set regarding this malfunction, each of which pertains to a section of the circuit.
- The engine may lack acceleration.
- The boost pressure gauge will indicate less than 9 pounds of boost or over 14 pounds of boost. Both are out of range.
- Unusual whining noises or rattling from the turbocharger or piping.
- Engine knock sensor code may appear indicating detonation is occurring due to high cylinder head temperatures.
- Engine may exhibit an overall lack of power.
- Smoke from the exhaust.
- Fouled spark plugs.
- Engine temperature unusually high at cruise speeds.
- Hissing noises at the wastegate.

What Are The Potential Causes Of The P0239 Code?

Turbos typically spin at an incredible 100,000 to 150,000 RPM. They are not the least tolerant to out of balance conditions or lack of clean oil to the bearing. Potential causes for this DTC include:

- Vacuum leak at the intake manifold
- Dirty air cleaner
- Defective wastegate- either stuck open, closed or leaking
- Insufficient oil supply to main shaft bearing-obstruction in the oil feed or return line.
- Bearing failure causing low spin-up due to drag.
- Wobble in the bearing causing the turbine blades to strike the turbo housing.

- Nicked, bent or missing turbine blades causing an out-of-balance situation.
- Oil seal leak on the compressor side of the turbo as seen by oil in the turbo and fouled plugs.
- Excessive end play in the turbo shaft
- Defective intercooler
- Loose connections at intake pipe to throttle body
- Cracks in the turbo housing
- Loose exhaust manifold to turbo bolts.
- Poor electrical connection at Turbo boost sensor.
- Short or open in the sensor harness between the sensor and ECM.
- Defective sensor or ECM 5 volt reference driver.

How Can You Fix The P0239 Code?

It's been my experience that the flow of diagnosis begins with the most common turbo problems and working systematically down the line too the least likely. Simple tools are needed such as a vacuum gauge and dial indicator.

Step 1: Confirm that the engine is running properly with no misfiring plugs and no codes relating to a failed knock sensor.

Step 2: On a cold engine, inspect the hose clamps at the turbo outlet, intercooler and throttle body for tightness.

Step 3: Attempt to rock the turbo on the exhaust flange to see if it is tight.

Step 4: Inspect the intake manifold for leaks of any kind including vacuum hoses.

Step 5: Remove the actuating arm from the wastegate. Operate the valve manually while looking for a sticking valve causing a drop in boost.

Step 6: Locate a non-ported vacuum in the intake manifold and install a vacuum gauge. Start the engine. At an idle the engine must have between 16 to 22-inches of vacuum. If it has less than 16 the catalytic converter is bad and will not allow boost to build.

Step 7: Rev the engine quickly to 5000 RPM and release the throttle while watching the vacuum gauge as it displays boost pressure. If boost pressure rises above 19-pounds of boost you have a bad wastegate. If boost fails to rise between 14 to 19-pounds of boost a problem exists with the turbo itself.

Step 8: Shut the engine down and allow it to cool. Remove the turbo outlet hose and look inside the turbo to see if the blades are striking the sides of the housing. Look for bent or missing blades or oil in the turbo. Spin the blades by hand and look for grinding or resistance indicating a faulty turbo.

Step 9: Inspect the oil lines from the engine block to the center turbo bearing and the return line

from the bearing to the oil pan for leaks.

Step 10: Install the dial indicator on the outlet turbine nose and move the turbo shaft in and out. If there is over 0.003 of endplay the center bearing is faulty.

Step 11: If the turbo passes these tests it is good. Use the service manual to test the boost sensor and harness using a volt/ohmmeter. Locate the 5 volt reference from the ECM to the sensor and confirm voltage. No voltage present is an open or short in the harness or bad ECM.

Step 12: Locate proper reference signal from the boost sensor to the ECM and confirm a varying voltage as the RPM climbs. No voltage climb indicates a bad sensor.

Reference Sources

ENGINE CONTROL SYSTEM [GASOLINE ENGINE (V-6)] SERVICE MANUAL for P0239 - Pages 498-500.