P0039: TURBO CHARGER BYPASS VALVE CONTROL CIRCUIT RANGE PERFORMANCE

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Advanced
Repair Cost	:	**$100-$400**
Can I Still Drive?	:	No

What Does The P0039 Code Mean?

A code P0039 Turbo/Super Charger Bypass Valve Control Circuit Range/Performance is stored in turbocharged and supercharged vehicles when the powertrain control module (PCM) has detected a turbocharger or supercharger boost pressure bypass valve control circuit malfunction. A service engine soon lamp may also be illuminated. If this code is exhibited in a vehicle that is not turbocharged or supercharged, suspect a PCM programming error.

The boost pressure bypass valve is an electronically controlled valve that is constructed to relieve turbo/supercharger boost pressure before it exceeds the manufacturer's specified limit (usually between nine and fourteen-pounds). This is necessary in order to relieve potentially harmful (to the engine) boost pressure levels in the event of a turbo/supercharger malfunction. The boost pressure bypass valve is controlled by the powertrain control module (PCM) or a separate boost pressure control module.

More often than not, the boost controller is an integrated part of the PCM. The boost controller gathers input signals from various engine sensors and uses them to calculate the optimum degree of turbo/supercharger boost pressure. The boost pressure bypass valve is then activated, using an electronic solenoid, electric motor, or vacuum control valve to achieve the desired amount of boost pressure. If the boost pressure sensor delivers an input signal to the PCM that indicates an inability to successfully control boost pressure, this code will be stored. Additionally, if the PCM detects an

input voltage signal that is not within programmed limits, for a specified amount of time and under certain circumstances, a P0039 Turbo/Supercharger Bypass Valve Control Circuit Range/Performance code may be stored.

Turbo/supercharger bypass control valve operation is normally accomplished using a solenoid or a small electric motor. Vacuum operated valves are used on some models but this is design is much less common. The PCM supplies a direct voltage signal in order to activate electronically controlled valves but vacuum actuated valves are controlled using a vacuum control (or vacuum service) solenoid. The vacuum service solenoid is usually supplied with constant voltage and the PCM outputs a ground signal when the valve must be opened to relieve boost pressure. The valve closes automatically when the ground signal is stopped by the PCM. The vacuum actuated bypass valve is controlled using a voltage signal from the PCM applied to a vacuum service solenoid. Opening and closing the solenoid permits engine vacuum to the reach the valve (as required) to actuate opening. Consult the manufacturer's service manual (or equivalent) for turbo/supercharger bypass control system specifications before beginning a diagnosis.

What Are The Symptoms Of The P0039 Code?

Symptoms of a P0039 engine code may include:

- A significant reduction in engine performance
- Hissing noises from the turbocharger (and/or hoses) or the supercharger
- Engine and/or transmission temperatures could be higher than normal
- Excessive exhaust system smoke
- Spark plug fouling
- Cylinder detonation, caused by hotter engine temps, are also a possibility
- Other turbocharger boost related codes, engine misfire codes, or knock sensor codes may also be stored

What Are The Potential Causes Of The P0039 Code?

Potential causes for this code include:

- A shorted/open circuit in the turbocharger bypass control sensor circuit
- The most common cause of a stored P0039 turbo/supercharger bypass valve control circuit range/performance code is probably a defective boost pressure sensor
- A defective turbo/supercharger bypass valve actuator
- Turbo/supercharger bypass valve failure is also fairly common
- Collapsed, disconnected, or split vacuum lines are a possibility (where a vacuum actuated bypass valve is used)
- Loose, corroded, or disconnected electrical wiring/connectors in the turbo/supercharger bypass control/boost pressure sensor reference circuit

- A bad PCM or boost controller

How Can You Fix The P0039 Code?

A good starting point is always to check for technical service bulletins (TSB) for your particular vehicle. Your issue may be a known issue with a known fix put out by the manufacturer and can save you time and money during diagnosis.

Pursuant to maintaining an acceptable degree of turbo/supercharger boost pressure, the boost pressure bypass control valve is designed to open and close to a calculated degree (via an electrical signal from the PCM). The desired position of the valve is one which will afford maximum engine performance and efficiency, while avoiding potentially harmful (to the engine) boost levels.

When diagnosing a P0039 turbo/supercharger bypass valve control circuit range/performance code, I would likely begin with an inspection of all wiring and vacuum hoses related to the turbo/supercharger and boost control system. I would also include an inspection of the battery, battery cables, and battery cable ends.

Proceed by retrieving and making note of all stored trouble codes and freeze-frame data (if available). Clear all stored diagnostic trouble codes from the system using a code reader or scanner. You may determine that the code is intermittent if it fails to reset. Intermittent codes can be even more difficult to diagnose. When this type of code is stored, some OBD-II systems will put the boost pressure bypass valve in the wide-open position. By clearing the stored codes, you will allow the boost pressure bypass valve system to return to a normal mode before you continue testing.

- A scanner (or code reader), digital volt/ohmmeter (DVOM), and a system wiring diagram or manufacturer's service manual (with diagnostic flow charts) will prove necessary as well
- Take care to disconnect system controllers and components from the circuit prior to testing resistance/continuity with a DVOM
- The boost control valve is often condemned in error when the boost pressure sensor is actually faulty
- To prevent misdiagnosis, which could cause unnecessary replacement of parts, perform exhaustive testing of individual circuits and components related to this code
- I utilize a (DVOM) for testing. This will allow you to determine if system circuit voltage and resistance levels are within manufacturer's specifications.

Severity Description

The conditions for causing this code to be stored can lead to major engine damage from excessive turbocharger boost pressure; therefore this code should be treated urgently.

Reference Sources

P0039: Turbo Charger Bypass Valve Control Circuit Range Performance, OBD-Codes.