

P007C: CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT LOW BANK 1

OVERVIEW

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

What Does The P007C Code Mean?

A turbocharger is basically an air pump used to force air into the engine. Inside, there are two sections: the turbine and the compressor.

The turbine is attached to the exhaust manifold, where it is driven by exhaust gases. The compressor attaches to the air intake. Both are connected by a shaft, so when the turbine spins, the compressor also spins, allowing intake air to be drawn into the engine. Cooler air provides denser intake charge to the engine and therefore more power.

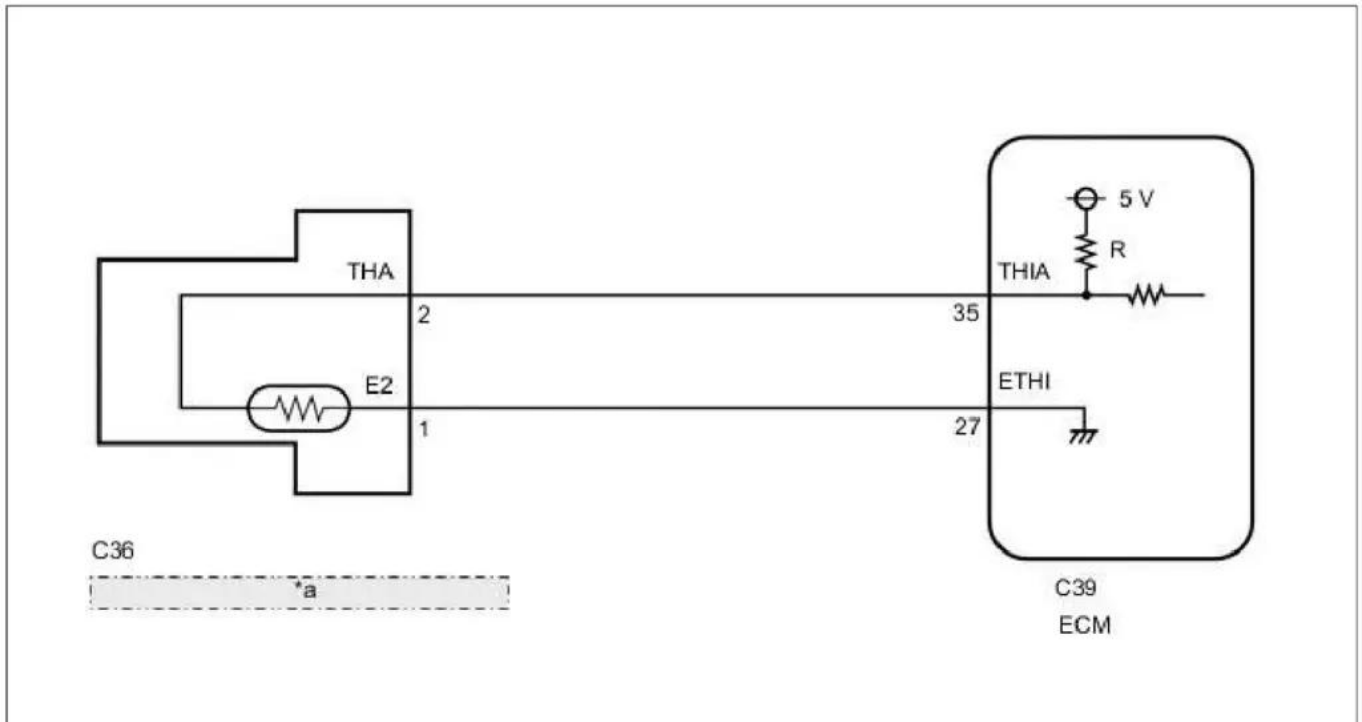
Because of this, many engines are equipped with a charge air cooler, also known as an intercooler. Charge air coolers can be either air-to-liquid or air-to-air coolers, but the function is the same – to cool air entering the intake.

A charge air cooler temperature sensor (CACT), is used to measure the temperature and therefore the density, of air entering exiting the charge air cooler. This information is sent to the powertrain control module (PCM) where it is compared to intake air temperature (and in some cases engine coolant temperature and exhaust gas recirculation temperature) to determine charge air cooler performance.

The PCM sends a reference voltage (usually 5 volts) through an internal resistor. It then measures the voltage to determine charge air cooler temperature.

Note: Sometimes the CACT is part of the boost pressure sensor.

Code P007C is set when the PCM detects a low charge air cooler temperature sensor signal on bank 1. This usually indicates the circuit is shorted. On multiple bank engines, bank 1 refers to the bank of cylinders that has the #1 cylinder.



P007C wiring diagram

What Are The Symptoms Of The P007C Code?

Symptoms of a P007C engine code may include:

- Illuminated check engine light
- Poor engine performance
- Decreased fuel economy
- Vehicle stuck in "limp" mode
- Diesel particulate filter regeneration inhibited (if equipped)

What Are The Potential Causes Of The P007C Code?

Possible causes for this P007C code include:

- Faulty sensor
- Wiring problems
- Failed or restricted charge air cooler

- Faulty PCM

How Can You Fix The P007C Code?

Begin by visually inspecting the charge air cooler temperature sensor and the corresponding wiring. Look for loose connections, damaged wiring, etc. Also, visually inspect the charge air cooler and ducting. If damage is found, repair as necessary, clear the code and see if it returns.

Next, check for technical service bulletins (TSBs) regarding the issue. If nothing is found, you will need to move forward to step by step diagnosis of the system.

The following is a generalized procedure, as testing for this code varies between vehicles. To accurately test the system, you'll want to refer to the manufacture's diagnostic flow chart.

Do some preliminary circuit testing

Use a scan tool to monitor the charge air coolant temperature sensor data parameter. Disconnect the CACT sensor; the scan tool value should drop to a very low value. Next, connect a jumper wire across the terminals. If the scan tool now displays a very high temperature, the connections are sound and the ECM can recognize the input. This means the problem is most like the sensor and not a circuit or PCM problem.

Test the sensor

Disconnect the charge air cooler temperature sensor connector. Next, measure the resistance between the two sensor terminals using a digital multimeter set to ohms. Start the engine and watch the meter value; the values should decrease smoothly as the engine warms up (check the engine temperature gauge on the dash to ensure the engine reaches operating temperature). If engine temperature increases but CACT resistance does not decrease, the sensor is faulty and should be replaced.

Check the circuit

- Check the reference voltage side of the circuit: with the ignition on, use a digital multimeter set to volts to check for a 5-volt reference from the PCM at one of the two charge air cooler temperature sensor terminals. If no reference signal is present, connect the meter set to ohms (with the ignition off) between the reference voltage pin on the CACT and the reference voltage pin on the PCM. If the meter reads out of limits (OL) there is an open circuit between the PCM and sensor that will need to be located and repaired. If the meter reads a numeric value, there is continuity.
- If everything is good up to this point, you'll want to check that there is 5-volts coming out of the PCM at the reference voltage terminal. If there is not a 5-volt reference from the PCM, the PCM is probably faulty.

- Check the ground side of the circuit: connect the meter set to ohms (with the ignition off) between the ground terminal on the charge air cooler temperature sensor and the ground terminal on the PCM. If the meter reads out of limits (OL) there is an open circuit between the PCM and sensor that will need to be located and repaired. If the meter reads a numeric value, there is continuity. Finally, check that the PCM has a good ground by attaching one meter lead to the PCM ground terminal and the other to chassis ground. Once again, If the meter reads out of limits (OL) there is an open circuit between the PCM and ground that will need to be located and repaired.

Severity Description

The severity of this moderate.

Reference Sources

[Diagnostic Trouble Code \(DTC\) Charts and Descriptions for P007C](#) - Page 16.