P0481: COOLING FAN RELAY 2 CONTROL CIRCUIT

OVERVIEW

Severity	:	Medium
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$100-$300**
Can I Still Drive?	:	**Yes**

What Does The P0481 Code Mean?

If your vehicle's check engine light comes on and after pulling the code you find a P0481 displayed, if refers to the engine cooling fan circuit. It is a generic code applying to all OBD II (on board diagnostics) vehicles.

While you are driving, air in sufficient quantity is passing through the radiator effectively cooling the engine. When you bring the car to a stop no air is passing through the radiator and the engine begins to increase in temperature.

The PCM (powertrain control module) senses the increase in engine temperature through the CTS (coolant temperature sensor) located near the thermostat. When the temperature reaches about 223-degrees F (value depends on make/model/engine), the PCM will command the cooling fan relay to turn on the fan. It does so by supplying the ground to the relay.

There is a problem within this circuit causing the fan to fail to operate allowing the engine to overheat while sitting still or driving at a slow speed. When the PCM attempts to activate the fan and senses the command and the result do not match, the code is set.

NOTE: P0481 speaks of the basic circuit, however codes P0480 and P0482 relate to the same problem with the only difference is they relate to the different fan speed relays.

What Are The Symptoms Of The P0481 Code?

Symptoms may include:

- Check engine light (malfunction indicator lamp) illumination and code P0481 set
- Engine temperature will rise when the vehicle stops and idles

What Are The Potential Causes Of The P0481 Code?

The causes for this DTC may include:

- Faulty fan control relay 2
- Fan control relay harness is open or shorted
- Circuit electrical connections poor
- Faulty cooling fan 2
- Faulty coolant temperature sensor
- Fan cooling fan harness is open or shorted
- Cooling fan circuit poor electrical connection
- Intake air temperature (IAT) failure
- A/C selector switch
- A/C refrigerant pressure sensor
- Vehicle speed sensor (VSS)

How Can You Fix The P0481 Code?

Check The TBSs

It is always a wise idea to look up the technical service bulletins (TSB) on your particular vehicle to see what type complaints have been coming in to the dealer service department related to this code. Search using your favorite search engine “technical service bulletins for .....” Look up the code and the type of manufacturer recommended repair. This is also a good idea before buying a vehicle.

Inspect The Engine Fan

Many vehicles will have two engine fans, one for engine cooling and the second for cooling the air conditioning condenser, and additional cooling for the engine.

The fan that is not in front of the air conditioning condenser is the main cooling fan and the one to concentrate on initially. Additionally, many vehicles have multi-speed fans requiring as many as three fan speed relays for low, medium and high.

Open the hood and do a visual inspection. Look at the fan and make sure there is no obstruction in

front of the radiator blocking airflow. Spin the fan with your finger (make sure the vehicle and key is off). If it will not spin the fan bearings are shot and the fan is bad.

Check the electrical connection at the fan. Pull the connector apart and look for corrosion or bent pins. Repair if necessary and use dielectric grease on the terminals.

Check The Fan Relays

Open the fuse block and inspect the cooling fan relay fuses. If they are good pull the cooling fan relays out. The bottom of the fuse block lid will usually indicate placement, but if not, look in the owner's manual.

The vehicle's PCM's function is to act as a ground to operate components, not to supply power. The fan relays are nothing but a remote light switch. The fan as well as other apparatus draws too much amperage to be safe in the cockpit, so it's kept under the hood.

A constant power supply from the battery is present on a terminal in each of the relays. This one turns on the fan when the circuit is closed. A switched terminal will be hot only when the key is on. The negative terminal in this circuit is the one used when the PCM wishes to active the relay by grounding it.

Look at the circuit diagram displayed on the side of the relay. Look for the simple open and shut circuit. Verify the battery positive terminal in the relay block with constant power. The opposite side goes to the fan. Use a test light to find the hot terminal.

Jump the battery terminal to the fan harness terminal and the fan will operate. If not, disconnect the fan connection at the fan and using an ohmmeter check the continuity between the fan side of the relay terminal and the connector at the fan, If there is continuity the fan is bad. If not the harness between the fuse block and the fan is faulty.

If the fan operated, check the relays. Look at the side of the relay for the switched power terminal or just turn the key on. Check the terminals for an additional power terminal and look where it would be on the relay.

Jump the battery plus terminal in the first test with this switched terminal and place an additional jumper from the negative terminal on the relay to ground. The switch will click on. Use an ohmmeter to test that the constant battery terminal and the fan harness terminal have continuity meaning the circuit has closed.

If the circuit has not closed or the relay has not clicked, the relay is bad. Check all the relays in the same fashion to be sure they are all working.

If there was no switched power at the relay, the ignition switch is suspect.

Check The CTS With Ohmmeter

If they prove to be good, check the CTS with an ohmmeter. Pull the connector off. Let the engine cool and put the ohmmeter on the 200,000 scale. Probe the sensor terminals.

The reading will be about 2.5. For precise readings consult a service manual. Accuracy isn't necessary since all sensors may be different. You just want to know if it's working. Reconnect it and warm the engine.

Shut the engine down and pull the CTS plug again. Check it with the ohmmeter, there should be a big change in resistance, if not the sensor is bad.

If the above procedure could not find a failure, the probability is that a poor connection to the PCM or the PCM itself is at fault. Do not go any farther without consulting your service manual. Disconnecting the PCM could cause loss of programming and the vehicle may not start unless towed to the dealer for reprogramming.

Reference Sources

DIAGNOSTIC TROUBLE CODE DIAGNOSIS - page 1F-56.