# P0685: ECM/PCM POWER RELAY CONTROL CIRCUIT OPEN

OVERVIEW

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|---|---|---|
| **Severity** | : | High |
| **DIY Difficulty Level** | : | Advanced |
| **Repair Cost** | : | **$50-$150** |
| **Can I Still Drive?** | : | No |

## What Does The P0685 Code Mean?

In my personal experience, a no-start condition will most likely accompany a code P0685. When this code is stored in the powertrain control module (PCM), it means that a low or no-voltage condition has been detected in the circuit which supplies the PCM with battery voltage.

Many OBD-II equipped vehicles utilize a relay to supply the PCM with battery voltage, while a few use only a fused circuit. Relays are typically of a five-terminal design. A constant supply of battery voltage is supplied to the primary input terminal, the ground terminal is grounded to an engine or chassis ground, the secondary input terminal is supplied with battery voltage (via a fused circuit) when the ignition switch is placed in the “ON” position. The fourth terminal is the output for the PCM and the fifth terminal is a signal wire for the controller area network (CAN).

When the ignition switch is placed in the “ON” position, a small coil inside the relay is energized. This causes the contacts inside of the relay to close; essentially completing a circuit thus providing battery voltage to the output terminal and consequently to the PCM.

## What Are The Symptoms Of The P0685 Code?

Since the code P0685 is usually accompanied by a no-start condition, ignoring it will not likely be an option. If this code is present and the engine will start and run, suspect a faulty PCM or a PCM programing error.

## What Are The Potential Causes Of The P0685 Code?

Potential causes for this code to set are:

- A defective PCM power relay
- A blown fuse or fusible link
- Corroded or damaged wiring or wiring connectors (especially near the PCM relay)
- Faulty ignition switch
- Partially or totally disconnected electrical terminal at the ignition switch
- Loose or corroded battery cable ends

## How Can You Fix The P0685 Code?

### Step 1

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.

### Step 2

As with most other codes of this nature, begin your diagnosis with a visual inspection of system wiring harnesses, connectors, and components. Pay special attention to unsecured relays that may have slipped out of their respective terminals or may have corroded blades or terminals. This is especially prominent when the relay or convenience center is located near the battery or coolant reservoir. Check the battery and battery cable ends for tightness and excessive corrosion. Repair or replace defects as required.

### Step 3

You will need a scanner (or code reader), a digital volt/ohmmeter (DVOM), and a wiring diagram. Wiring diagrams can be obtained through the manufacturer (service manual or equivalent) or through a secondary source like All Data. Before purchasing a service manual, make sure that a wiring diagram for the PCM power supply circuit is located therein.

Before continuing my diagnosis, I like to retrieve all stored trouble codes (using the scanner or code reader) and write them down for future reference, if needed. I also like to make a note of any pertinent freeze frame data. This information can be very helpful if the malfunction in question should prove to be intermittent.

### Step 4

Beginning at the power relay (for the PCM), make sure that there is battery voltage to the primary

input terminal. Consult the wiring diagram, connector view, or pin-out chart from the service manual (or equivalent) for the location of each individual terminal. If there is no voltage, suspect a fault connection at a fuse or fusible link.

## Step 5

Next, test the secondary input terminal. If no voltage is present, suspect a blown fuse or faulty ignition switch (the electrical portion).

Now, check the ground signal. If there is no ground signal, check system ground locations, harness bulkhead connectors, chassis grounds, and battery cable ends.

If all these circuits are normal, test for output voltage on the circuits that supply the PCM with voltage. If these circuits have no voltage, suspect a faulty relay.

## Step 6

If voltage output signals are present, test for system voltage at the PCM connector. If no voltage is present, begin testing system wiring. Be sure to disconnect system controllers from the harness before testing resistance with the DVOM. Repair or replace open or shorted circuits as required.

If there is voltage at the PCM, suspect that it is defective or experiencing a programming error.

**Additional Notes:**

- References to the “ignition switch” in this instance refer to the electrical portion only
- Swapping identical (matching numbers) relays for testing can be very helpful
- Always return relays to their original position, replacing the defective relay with a new relay
- When testing system fuses, make sure that the circuit is at maximum voltage

## Reference Sources

Diagnostic Trouble Code (DTC) Charts and Descriptions for P0685 - Page 98.