DTC P0685

Table 1: Relay Cavity Identification

Circuit Description

This diagnostic detects an inoperative relay. The ignition relay, or main Relay, is controlled by the powertrain control module (PCM). The PCM provides a ground for the relays coil anytime the ignition switch is ON. The MAIN relay supplies ignition positive voltage to many engine control systems and components. The following components receive power from the relay:

- The ignition coils
- The heated oxygen sensors (HO2S)
- The evaporative emission (EVAP) control system solenoids
- The camshaft and crankshaft position sensors
- The PCM

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P0685 Engine Controls Ignition Relay Control Circuit

Conditions for Running the DTC

- The engine is running.
- DTC P0685 runs continuously with the above condition met.

Conditions for Setting the DTC

The PCM detects that the MAIN Relay turned OFF before the PCM commanded the relay OFF.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) the first time the diagnostic fails.
- The PCM records the operating conditions at the time the diagnostic fails. This information is stored in the Freeze Frame buffer.

Conditions for Clearing the MIL/DTC

- The MIL turns OFF after 3 consecutively passing trips without a fault present.
- A history DTC clears after 40 consecutive warm-up cycles without a fault.
- Perform the scan tool Clear DTC Information function.

Diagnostic Aids

Check for any of the following conditions:

- Check the resistance of the relay. The resistance across the coil terminals is 75-90 ohms at 20°C (68°F). The resistance across the switched terminals is infinite.
- The relay electrical contacts may be pitted or sticking. Replace the relay if tapping gently on the relay or wiggling the relay causes a change in the relays operation.
- The performance of the relay may be affected by temperature. Test the relay after sitting outside overnight and after running the engine 30 minutes.

An intermittent malfunction may be caused by a fault in the relay electrical circuit. Inspect the wiring harness and components for an intermittent condition. Refer to Intermittent Conditions .

Use the following relay cavity table in order to locate the correct cavities to probe during diagnosis. The table layout corresponds to the cavity layout of the relay block.

Relay Cavity Identification

Front of Vehicle	
Ignition 1 voltage	Battery Power Coil
Coil Control	Battery Power Load

Test Description

The numbers below refer to the step numbers in the diagnostic table.

1. The Diagnostic System Check - Vehicle prompts the technician to complete some basic checks and store the Freeze Frame data on the scan tool if applicable. This creates an electronic copy of the data taken when the fault occurred. The information is then stored in the scan tool for later reference.

4. This step determines if there is a condition with the control circuit of the main relay. If the control circuit of the main relay is open, the relay will not click ON and OFF when you remove and install the relay.

13. After replacing the PCM a new minimum throttle position and idle speed must also be established.

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics *Connector End View Reference:* Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information
2	Inspect for an open ECM/CAM fuse.		

	Is the fuse OK?	Go to Step 3	Go to Step 10
3	1. Swap the main relay with the cooling fan relay. 2. Turn ON the ignition, with the ignition OFF. Does the scan tool communicate with the powertrain control module (PCM)?	Go to Step 12	Go to Step 4
4	Remove and install the main relay several times while listening for a clicking sound from the relay. Does the relay click when removing and installing the relay?	Go to Step 5	Go to Step 7
5	1. Remove the main relay. 2. Probe the B+ supply circuit, switch side of the relay, at the underhood fuse block with a test lamp connected to a good ground. Refer to the Relay Cavity Identification table in Diagnostic Aids. Does the test lamp illuminate?	Go to Step 6	Go to Step 11
6	Test the ignition 1 voltage supply circuit of the main relay between the ECM/CAM fuse and the PCM for an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 9
7	1. Remove the main relay. 2. Probe the B+ supply circuit, coil side of the relay, at the underhood fuse block with a test lamp connected to a good ground. Refer to the Relay Cavity Identification table in Diagnostic Aids. Does the test lamp illuminate?	Go to Step 8	Go to Step 11
8	1. Turn OFF the ignition. 2. Test the control circuit of the main relay for an open. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 9
9	Test for an intermittent and for a poor connection at PCM. Refer to Testing for Intermittent Conditions and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 14	Go to Step 13
	1. Repair the short to ground in the ignition 1		

10	voltage circuit between the ECM/CAM fuse and the PCM. Refer to Wiring Repairs in Wiring Systems. 2. Replace the fuse as necessary. Did you complete the repair?	Go to Step 14	–
11	Repair the short to ground or open in the B+ supply circuit of the main relay. Refer to Wiring Repairs in Wiring Systems. Did you complete the repair?	Go to Step 14	–
12	Replace the main relay. Did you complete the repair?	Go to Step 14	–
13	1. Replace the PCM. Refer to Control Module References in Computer/Integrating Systems for replacement, setup, and programming. 2. Perform the idle learn procedure. Refer to Idle Learn Procedure . Did you complete the replacement?	Go to Step 14	–
14	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to Step 2	Go to Step 15
15	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle in Vehicle DTC Information	System OK