

54 FLASH CODE 54 – VSS FAULT

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54.1 DESCRIPTION OF FLASH CODE 54

Flash Code 54 indicates that during engine operation the vehicle speed that is measured by the Vehicle Speed Sensor (VSS) is less than the expected value for the current engine speed/conditions.

This diagnostic condition is typically:

- Open sensor signal circuit
- Conditions
 - Code is logged (without anti-tamper) when the r/min > 1500 and PW > 15° and vehicle speed < 3 mph.
 - If code is logged (with or without anti-tamper) mph will be limited.

NOTE:

Code will not be logged for the first five hours of ECMs life (total engine hours).

54.2 SAE J1587 EQUIVALENT CODE FOR FLASH CODE 54

The SAE J1587 equivalent code for Flash Code 54 is p 084 12.

54.3 TROUBLESHOOTING FLASH CODE 54

The following procedure will troubleshoot Flash Code 54.

54.3.1 Test Drive Vehicle

Take the vehicle for a test drive with an assistant.

1. View DDR; select vehicle speed.
 - [a] If mph reads 0 (zero), or stays steady with the vehicle in motion, refer to section 54.3.2.
 - [b] If speed appears correct, refer to section 54.3.11.

54.3.2 Speed Sensor Identification

Identify the speed sensor type – type one or type two.

1. The type one sensor is a magnetic pickup and may be located in one of the following locations: transmission tail shaft, wheel rim, mechanical speedometer cable. If you have a type one sensor, refer to section 54.3.3. (Verify with DDR signal type – magnetic.)
2. The type two sensor communicates with square wave input and output signals and requires the ECM to be configured correctly. Refer to section 54.3.12. (Verify with DDR signal type – switched.)

54.3.3 Check Vehicle Speed Sensor Circuit

Perform the following steps to check the vehicle speed sensor.

1. With ignition off, disconnect the vehicle harness connector.
2. Measure resistance of VSS circuit across vehicle harness connector pins, E2 to E3. See Figure 54-1.
 - [a] If the resistance measurement is less than 50 Ω , refer to section 54.3.4.
 - [b] If the resistance measurement is greater than 3,000 Ω or open, refer to section 54.3.6.
 - [c] If the resistance measurement is between 50 and 3,000 Ω , refer to section 54.3.7.

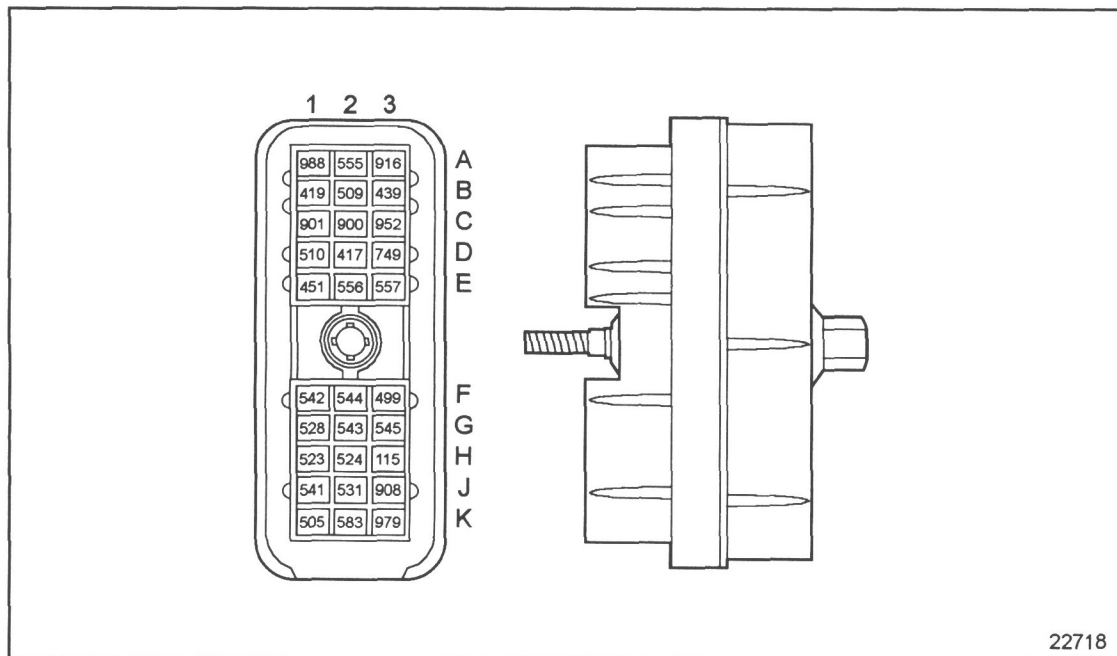


Figure 54-1 ECM Vehicle Interface Harness Connector

54.3.4 Check for Short

Perform the following steps to check for short.

1. Disconnect VSS connector.
2. Measure resistance between vehicle harness connector terminals E2 and E3. See Figure 54-1.
 - [a] If the resistance measurement is less than or equal to 1,000 Ω , the signal wire #556 or return wire #557, are shorted together. Repair the short; refer to section 54.3.13.
 - [b] If resistance measurement is greater than 1,000 Ω or open, refer to section 54.3.5.

54.3.5 Check Vehicle Speed Sensor

Perform the following steps to check the vehicle speed sensor.

1. Measure resistance of VSS across vehicle speed sensor connector pins. See Figure 54-1.
 - [a] If the resistance measurement is less than 50 Ω , refer to section 54.3.8.
 - [b] If resistance measurement is greater than 3,000 Ω or open, refer to section 54.3.8.
 - [c] If resistance measurement is between 50 and 3,000 Ω , refer to section 54.3.10.

54.3.6 Check for Open

Perform the following steps to check for open.

1. Disconnect the ECM vehicle harness connector and VSS connector.
2. Install a jumper wire between sockets A and B of the VSS harness connector.
3. Measure resistance between sockets E2 and E3 on the ECM vehicle harness connector. See Figure 54-2.
 - [a] If the resistance measurement is less than or equal to 5 Ω , refer to section 54.3.5.
 - [b] If the resistance measurement is greater than 5 Ω or open, the VSS signal line #556 or return line #557 is open. Repair open and refer to section 54.3.13.

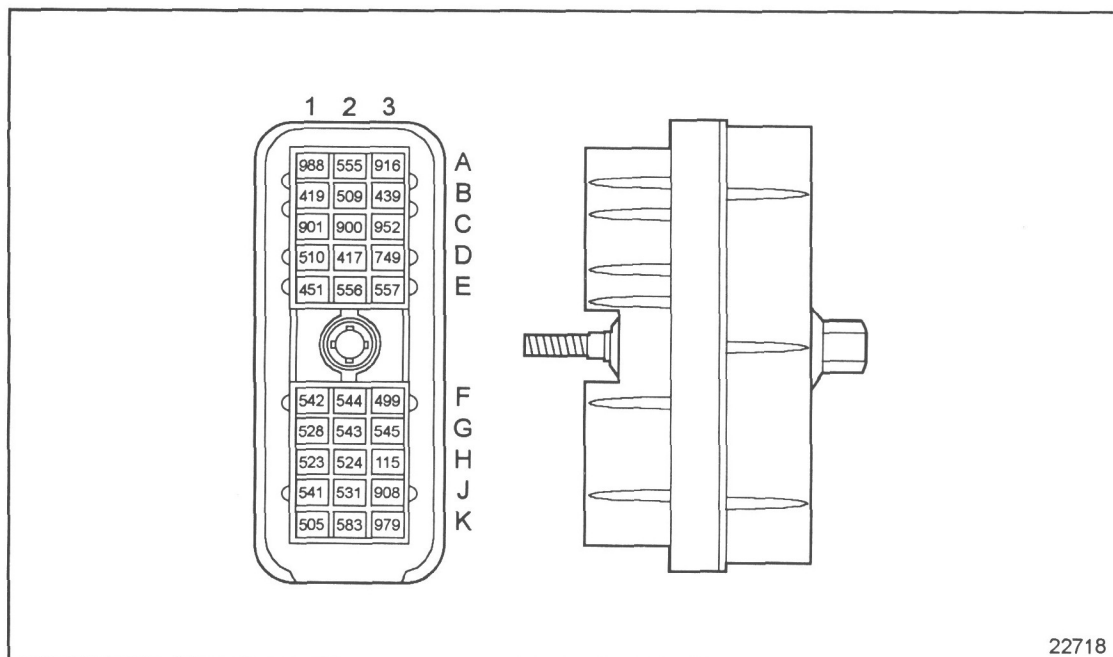


Figure 54-2 ECM Vehicle Interface Harness Connector

54.3.7 Check for Short to Ground

Perform the following steps to check for short to ground.

1. Turn ignition OFF.
2. Remove jumper wire.
3. Measure resistance between sockets E2 and E3 and a good ground. See Figure 54-3.
 - [a] If the resistance measurement is greater than 1,000 Ω or open, refer to section 54.3.9.
 - [b] If resistance measurement is less than or equal to 1,000 Ω , the signal wire #556 or return wire #557, is shorted to ground, or wired to an unauthorized device. Repair the short; refer to section 54.3.13.

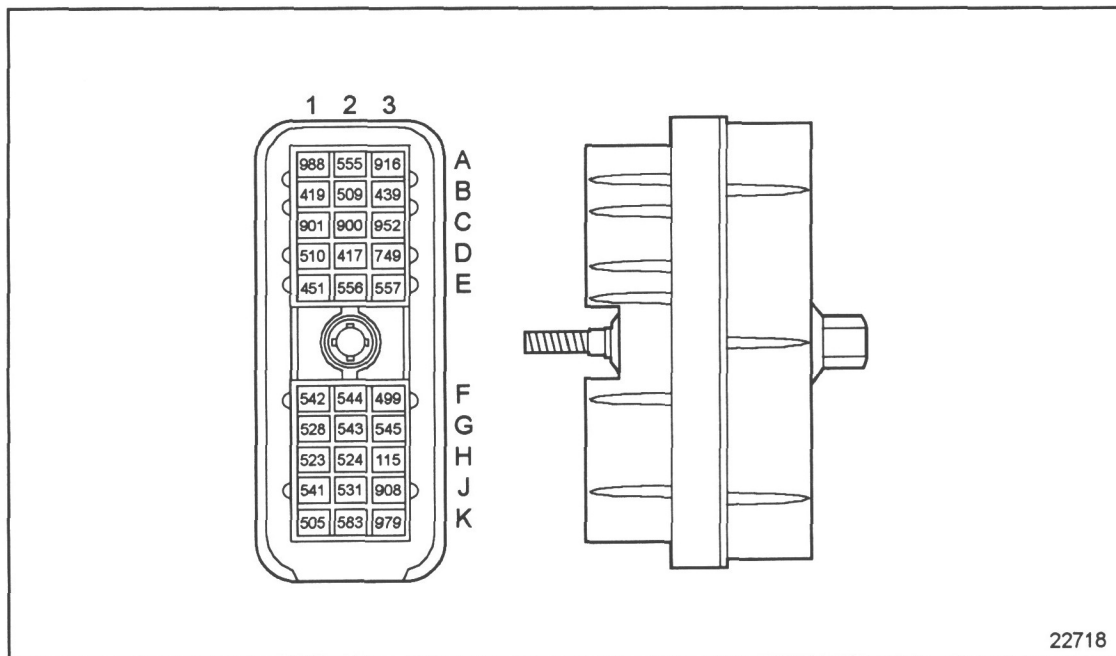


Figure 54-3 ECM Vehicle Interface Harness Connector

54.3.8 Check Vehicle Speed Sensor Connectors

Perform the following steps to check the VSS connectors.

1. Check terminals at the VSS connectors (both sensor side and harness side) for bent, corroded, and unseated pins or sockets.
 - [a] If the terminals and connectors are not damaged, replace the VSS. Refer to section 54.3.13.
 - [b] If the terminals and connectors are damaged, repair them. Refer to section 54.3.13.

54.3.9 Check for Short to Power

Perform the following steps to check for short to power.

1. Turn ignition ON.
2. Measure voltage at the ECM vehicle harness connector between socket E3 (#557) and a good ground. Also measure voltage between socket E2 (#556) and a good ground. See Figure 54-4.
 - [a] If both voltage measurements are less than 0.2 volts, refer to section 54.3.10.
 - [b] If either voltage measurement is greater than or equal to 0.2 volts, the VSS signal (#556) or VSS return line (#557) is shorted to the battery or some other source of voltage. Repair the short; refer to section 54.3.13.

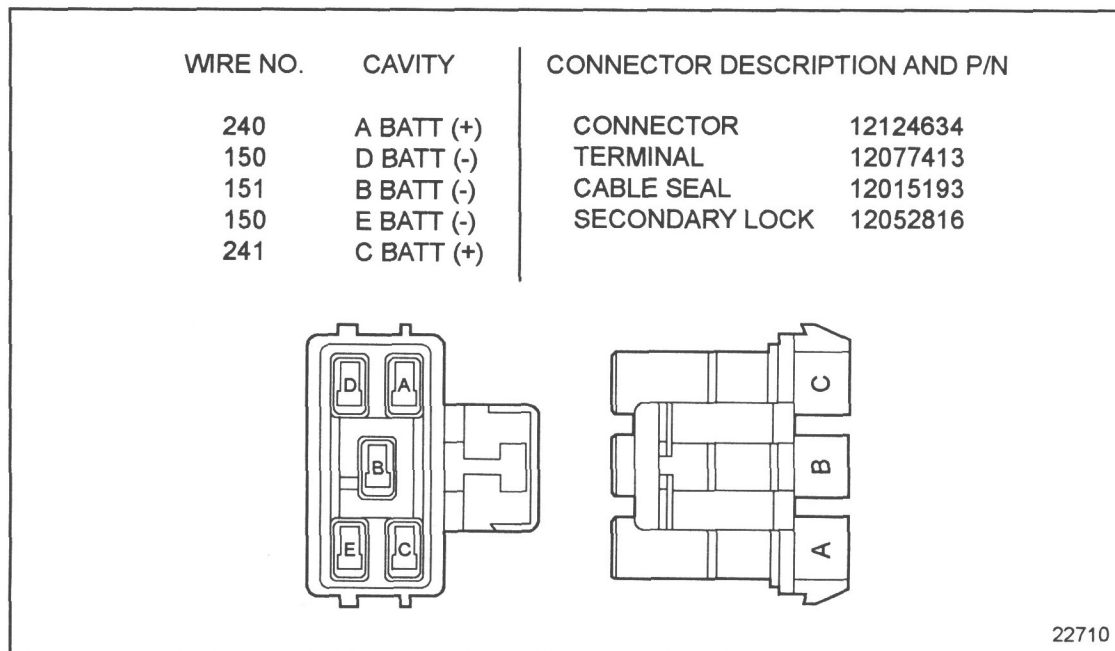


Figure 54-4 5-Way ECM Power Connector

54.3.10 Check ECM Connectors

Perform the following steps to check ECM connectors.

1. Check the terminals at the ECM engine harness connectors for bent, corroded, and unseated pins or sockets, on both the ECM and harness sides. See Figure 54-5.
 - [a] If the terminals and connectors are not damaged, refer to section 54.3.11.
 - [b] If the terminals and connectors are damaged, repair them. Refer to section 54.3.13.

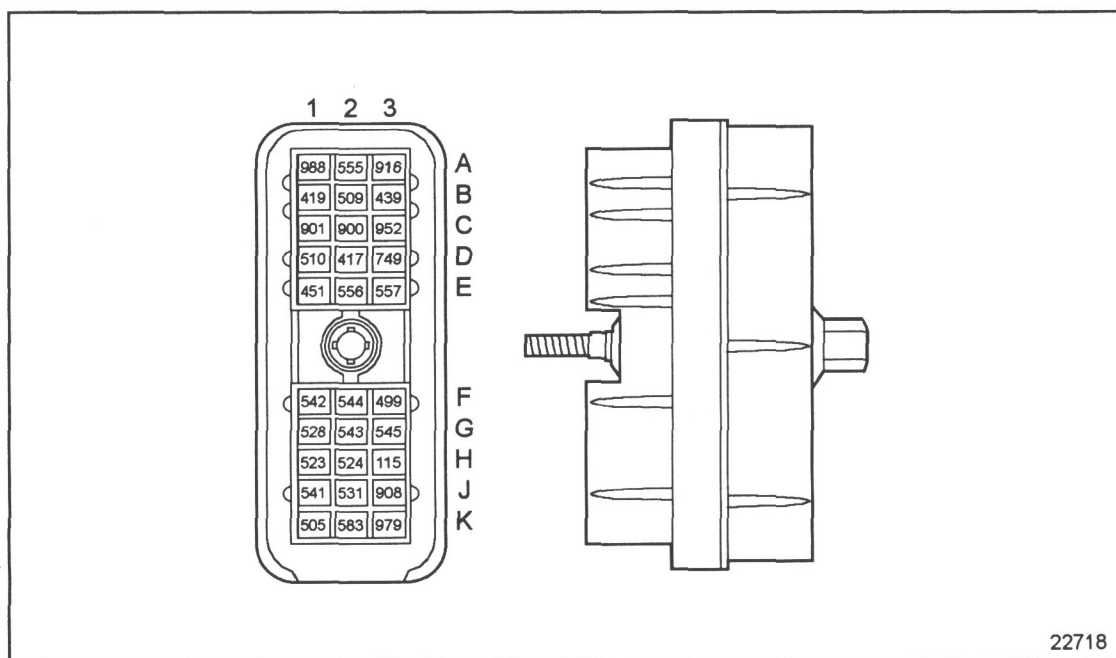


Figure 54-5 ECM Vehicle Interface Harness Connector

54.3.11 Vehicle Speed Mechanical Checks

Perform the following vehicle speed mechanical checks.

1. Check for plugged fuel filters.
2. Check if any metal or debris is lodged between the VSS and the pulse wheel.
3. Check if the sensor is loose.
4. Ensure the VSS pulse wheel is in fixed position relative to magnetic pickup.
5. Check for proper air gap between magnetic pickup and pulse wheel.
 - [a] If all mechanical checks are okay, contact Detroit Diesel Technical Service for review if anti-tamper = yes.
 - [b] If all mechanical checks are not okay, repair the mechanical failure. Refer to section 54.3.13.

54.3.12 Check for Short to Ground

Perform the following steps to check for short to ground.

1. Turn ignition OFF.
2. Disconnect the ECM vehicle harness connector.
3. Measure resistance between sockets E2 and a good ground. See Figure 54-6.
 - [a] If the resistance measurement is greater than 10,000 Ω or open, contact component supplier for instructions. The wiring is okay, but the device may be defective. Refer to section 54.3.13.
 - [b] If the resistance measurement is less than or equal to 100 Ω , the VSS signal line (#556) is shorted to ground, Repair the short; refer to section 54.3.13.

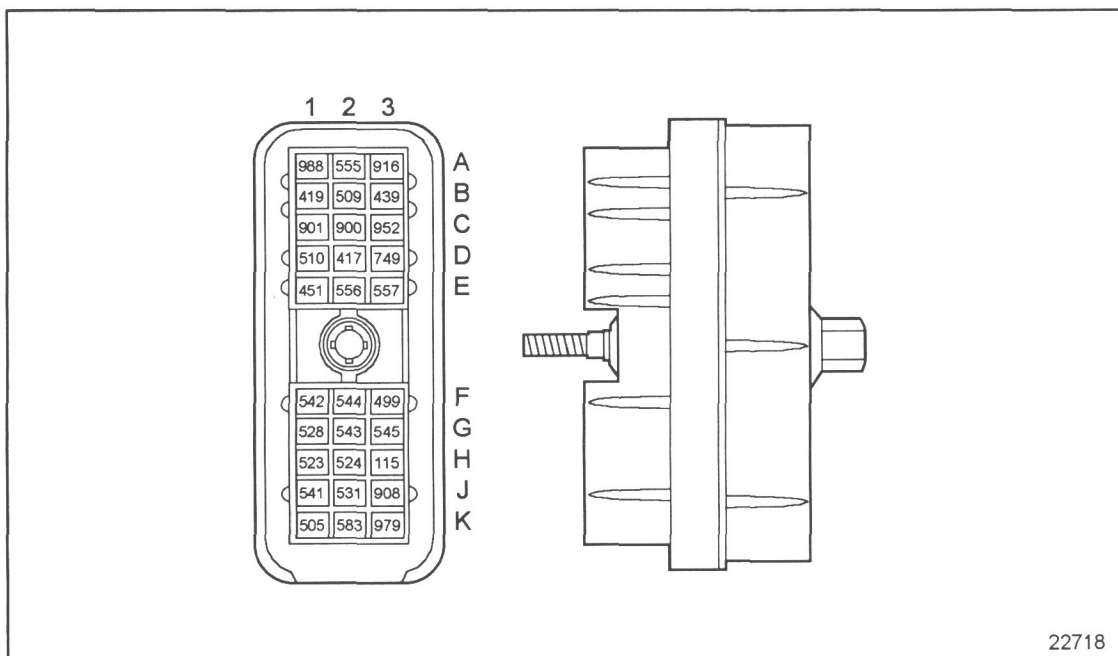


Figure 54-6 ECM Vehicle Interface Harness Connector

54.3.13 Verify Repairs

Perform the following steps to verify repairs.

1. Turn the ignition OFF.
2. Reconnect all the connectors.
3. Turn the ignition ON.
4. Clear DDR codes.
5. Perform a road test with an assistant. Ensure the vehicle is loaded.
6. Stop the engine.
7. Check DDR for codes.
 - [a] If no codes are logged, no further troubleshooting is required.
 - [b] If code 84/12 is not logged, and other codes are logged, refer to section 9.1.
 - [c] If code 84/12 is logged, and any other codes are logged, all system diagnostics are complete. To troubleshoot the error, refer to section 54.3.2 and perform tasks.