

46 FLASH CODE 46 – BATTERY VOLTAGE LOW

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46.1 DESCRIPTION OF FLASH CODE 46

Flash Code 46 indicates that the DDEC system has detected that the main battery supply voltage to the ECM has dropped below the recommended operating range.

The DDEC system will operate on 12 or 24 volts.

- Normal operating voltage of the DDEC system is 11 to 32 volts DC, measured at the ECM.
- Operating the ECM between 6 and 11 volts may result in degraded engine operation. (Transient operation in this range during engine starting is considered normal for 12-volt systems.)
- Operating the ECM over 32 volts will cause damage.
- Reversing polarity will cause damage to the ECM if the power harness is not properly fused.

46.2 SAE J1587 EQUIVALENT CODE FOR FLASH CODE 46

The SAE J1587 equivalent code for Flash Code 46 is p 168 1.

The power harness supplies 12 or 24 volts to the ECM. The system must be sourced directly from the battery.

NOTE:

Connection to reverse polarity will damage the system if not properly fused.

46.3 TROUBLESHOOTING FLASH CODE 46

The following procedure will troubleshoot Flash Code 46.

46.3.1 Battery Check

Perform the following steps to check the battery.

1. Start and run the engine for one minute.
2. Measure voltage on battery + terminal (red lead) to battery – terminal (black lead). Recommended fuse applications are listed in Table 46–1. Power harness length criteria is listed in Table 46–2.
 - [a] If the engine does not start, inspect the battery and charging/starting system, and proceed if okay. Refer to section 9.1.
 - [b] If the engine does start and the voltage measurement is less than or equal to 10.0 volts, service the discharged battery and charging/starting system.
 - [c] If the engine does start and the voltage measurement is greater than 10.0 volts, refer to section 46.3.2.

Number of Cylinders	Dual Fuse or Circuit Breaker Size	Single Fuse or Circuit Breaker Size
6	2 @ 15 amp	1 @ 30 amp
8	2 @ 20 amp	1 @ 40 amp
12	4 @ 15 amp	2 @ 30 amp
16	4 @ 20 amp	2 @ 40 amp
20	4 @ 15 amp 2 @ 20 amp	2 @ 30 amp 1 @ 40 amp

Table 46–1 Fuse Size Recommendations

Length from ECM to Battery or Bus Bar (ft)*	Minimum Wire Size (Ga)*	Total Resistance of Maximum Length (mΩ)*	Length from ECM to Battery or Bus Bar (m)†	Minimum Wire Size (Ga)†	Total Resistance of Maximum Length (mΩ)†
0 to 28‡	12	24.8	0 to 6‡	2.5	22.8
28 to 44‡	10	24.57	6 to 10‡	4	23.55
44 to 70‡	8	24.58	10 to 14‡	6	21.98
70 to 110‡	6	24.7	14 to 26‡	10	23.66
110 to 178‡	4	25.0	26 to 40‡	16	23.2
0 to 14§	12	24.8	0 to 3§	2.5	22.8
14 to 22§	10	24.57	3 to 5§	4	23.55
22 to 35§	8	24.58	5 to 7§	6	21.98
35 to 55§	6	24.7	7 to 13§	10	23.66
55 to 89§	4	25.0	13 to 20§	16	23.2

* United States

† International

‡ Dual Fuse

§ Single Fuse

Table 46–2 Maximum Resistance vs Power Harness Length

46.3.2 Voltage Check at ECM

Perform the following steps to check voltage at the ECM.

1. Keep engine running.
2. Select ECM INPUT VOLT on DDR.
3. Observe ECM voltage reading on DDR.
 - [a] If the voltage measurement is less than or equal to 10.0 volts, refer to section 46.3.3.
 - [b] If the voltage measurement is greater than 10.0 volts, refer to section 46.3.5.

46.3.3 Voltage Check at ECM Via Volt–Ohm Meter

Perform the following steps to check voltage at the ECM.

1. Turn the vehicle ignition OFF.
2. Disconnect 5-way power harness connector at the ECM.
3. Measure voltage from socket A and C (red lead) of 5-way power harness connector and a good battery ground (black lead). Don't use line (#151) as a ground reference. For 5-way ECM power harness connector, see Figure 46–1. For power harness schematic, see Figure 46–2.
 - [a] If the voltage measurement is less than or equal to 11.5 volts, refer to section 46.3.4.
 - [b] If the voltage measurement is greater than 11.5 volts, refer to section 46.3.5.

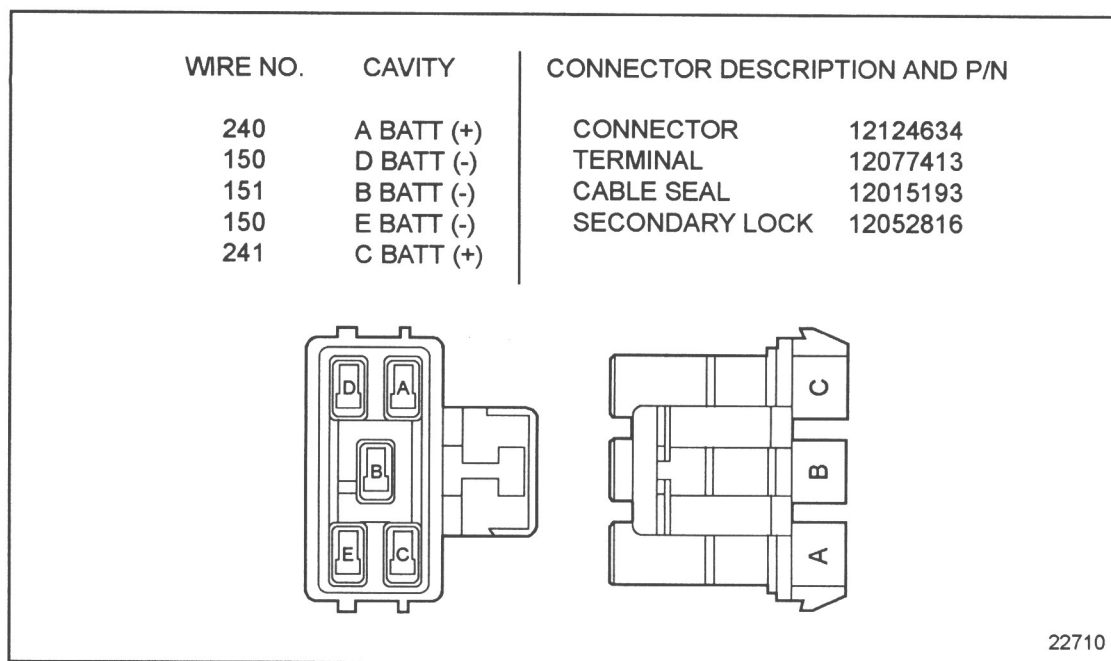


Figure 46–1 5–Way ECM Power Connector

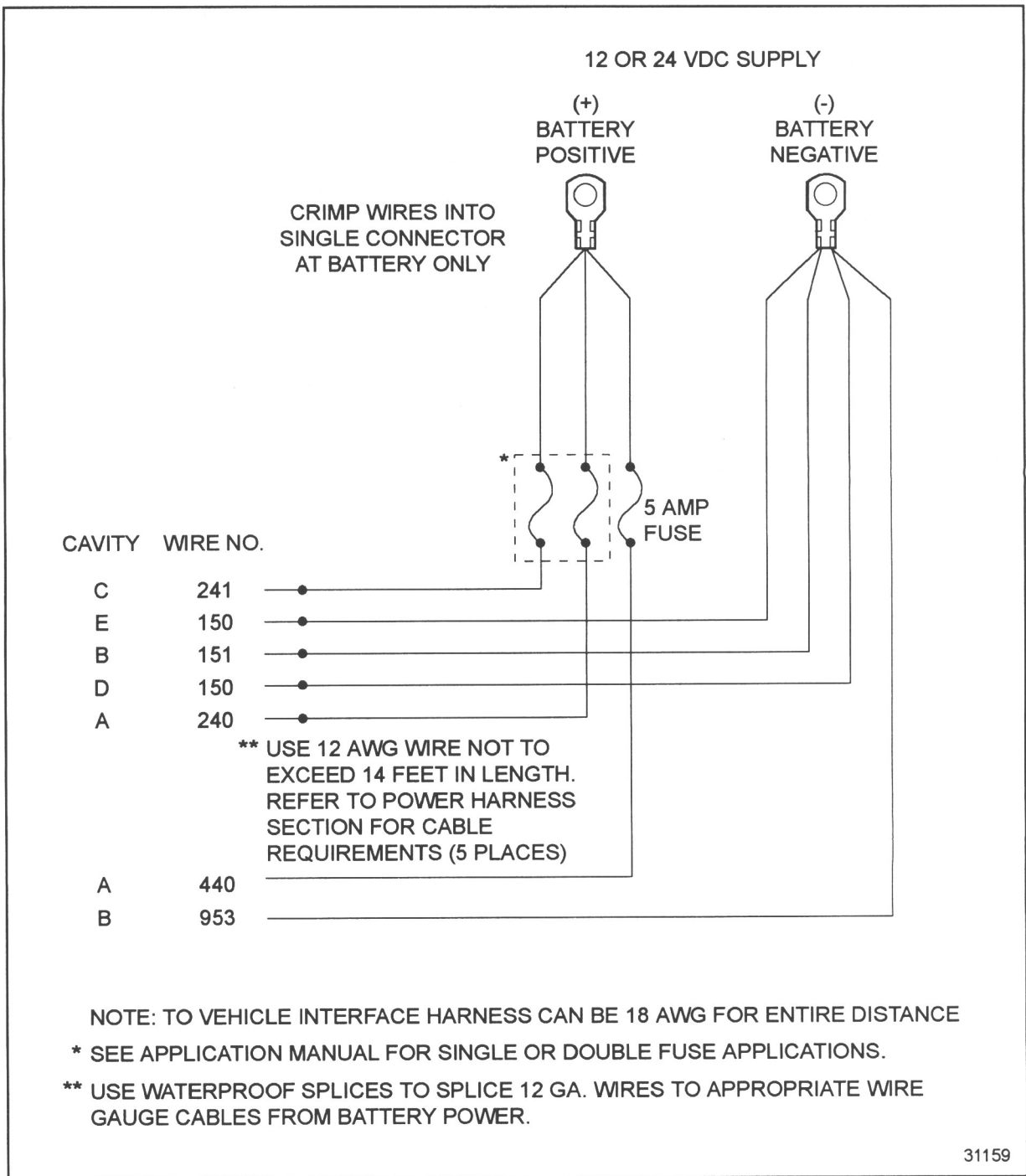


Figure 46-2 Power Harness

46.3.4 Check for Bad Battery + Line

Perform the following steps to check for a bad battery + line.

1. Remove fuse(s) to the ECM.
2. Measure voltage at socket A of one fuseholder (red lead) to a good ground (black lead). For 5-way ECM power harness, see Figure 46-3.
3. Repeat voltage measurement at other fuseholder.
 - [a] If the voltage measurement is greater than 11.5 volts on both readings, the battery + line between the fuseholder and ECM has an open, or the ECM power connector has a corroded connection. Repair the problem. Refer to section 46.3.8.
 - [b] If the voltage measurement is less than or equal to 11.5 volts on either reading, the battery + line near the battery is open, or a corroded connection exists at battery + terminal. Repair the problem. Refer to section 46.3.8.

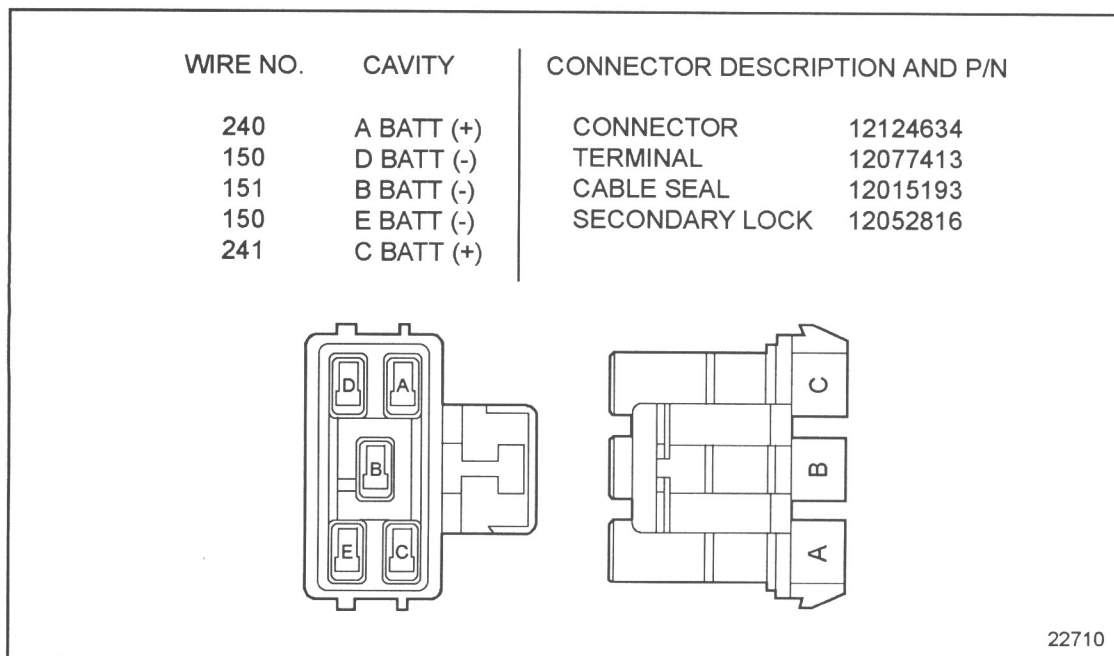


Figure 46-3 5-Way ECM Power Harness

46.3.5 Ground Check at ECM

Perform the following steps to check the ground at the ECM.

1. Disconnect the 5-way power harness connectors at the ECM. For 5-way ECM power harness, see Figure 46-3.
2. Measure voltage on socket A (red lead) to socket D (black lead) and socket C of 5-way power harness connector (red lead) to socket E, (black lead).
 - [a] If voltage measurement is greater than 11.5 volts on either reading, refer to section 46.3.6.
 - [b] If the voltage measurement is less than or equal to 11.5 volts on either reading, the ground wire (#150) is open or has a corroded connection. Repair ground wire, and refer to section 46.3.8.

46.3.6 Check ECM Connectors

Perform the following steps to check ECM connectors.

1. Check terminals at the ECM 5-way power harness connector (both ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.
 - [a] If terminals and connector are damaged, repair them. Refer to section 46.3.8.
 - [b] If terminals and connector are not damaged, verify the power and ground are wired directly to the battery. Refer to section 46.3.7.

46.3.7 Code Check

Perform the following steps to check for codes.

1. Install the vehicle interface module.
2. Turn ignition ON; plug in DDR.
3. Check for codes.
 - [a] If code reoccurs, install test ECM, then refer to section 46.3.8.
 - [b] If code does not reoccur, check power harness wires for breaks, abrasions, etc. Then refer to section 46.3.8.

46.3.8 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF.
2. Reconnect all connectors.
3. Turn ignition ON.
4. Clear codes with DDR.
5. Start and run the engine for one minute.
6. Stop engine.
7. Check DDR for codes.
 - [a] If no codes are displayed, troubleshooting is complete.
 - [b] If code 168/1 is not logged, and other codes are logged, refer to section 9.1.
 - [c] If code 168/1 is logged, and other codes are logged, all system diagnostics are complete. To troubleshoot the error, refer to section 46.3.1.