Instrument Cluster

Refer to Wiring Diagrams Cell 60 for schematic and connector information.

Special Tool(s)

| Worldwide Diagnostic System (WDS)  
| 418-F224, New Generation STAR (NGS) Tester  
| 418-F052 or equivalent diagnostic tool |

Principles of Operation

The hybrid electronic cluster (HEC) receives its input and output signals hardwired or over the ISO 9141 K bus line. The HEC carries out a display proveout to verify that warning/indicator lamps and monitored systems are functioning correctly. When the ignition switch is in the ON position with the engine off, the following warning indicators will illuminate or be displayed:

- Anti-lock Brake System (ABS)
- Air bag (if equipped)
- Charge system
- Low coolant
- Low fuel
- Low washer fluid level
- Safety belt (60 second proveout)
- Malfunction Indicator Lamp (MIL)

The HEC controls the illumination of the following indicator lamp module warning indicators:

- Maintenance interval warning indicator
- Frost warning indicator (orange)
- Ice warning indicator (red)
- Brake pad wear
- Door/liftgate ajar

The bulb warning indicator is controlled by the bulb outage module.

Hybrid Electronic Instrument Cluster (HEC) Gauges

Engine Coolant Temperature Gauge

Engine coolant temperature information is received by the HEC from the engine coolant temperature (ECT) sensor (2.0L engine) or ECT switch (2.5L engine). If the engine coolant temperature signal is missing or invalid, the HEC will move the engine coolant gauge pointer to the cold position.

Fuel Gauge

The HEC receives the fuel level information from the fuel sending unit (part of the fuel pump module). When the fuel level is low, the resistance is low. When the fuel level is high the resistance is high.

Speedometer

The HEC receives the vehicle speed signal from the vehicle speed sensor (VSS).

Tachometer

The HEC receives tachometer information from the powetrain control module (PCM). If the RPM information sent to the HEC is invalid or missing, the HEC will default the tachometer to 0.

Warning Indicators

Air Bag Warning Indicator

The air bag warning indicator is controlled by the air bag module. For additional information, refer to Section 501-20B.

ABS Indicator

The HEC anti-lock brake system (ABS) indicator is hardwired directly to the ABS module. The ABS indicator should prove out when the ignition switch is turned ON. An open, short to battery, or any ABS failure will illuminate the ABS indicator.

Brake System Warning Indicator

The brake system warning indicator has multiple functions. The brake system warning indicator proves out when the ignition switch is in the START position, thus grounding the circuit. The indicator illuminates if the brake fluid is low or if the parking brake is set. If both the ABS indicator and the brake system warning indicator are illuminated, a concern exists in the ABS module.

Charging System Indicator

The charging system is connected directly to the generator. If low voltage is detected, the charging system indicator illuminates.

Fog Lamp Indicator

The HEC fog lamp indicator is directly hardwired to the fog lamp switch. The headlamp switch must be turned ON for the fog lamps and indicator to operate.
The High Beam Indicator
The HEC high beam indicator is hardwired directly to the multifunction switch.

Left and Right Turn Signal Indicators
The HEC left and right turn signal indicators are hardwired directly to the multifunction switch.

Headlamp On Indicator
The HEC headlamp on indicator is hardwired directly to the headlamp switch.

Malfunction Indicator Lamp (MIL)
The HEC malfunction indicator lamp (MIL) is controlled by the powertrain control module (PCM). After the engine is started, the MIL remains on for a prove out duration of three seconds.

Low Oil Pressure Indicator
The HEC low oil pressure indicator is hardwired to the engine low oil pressure switch. With the ignition switch in the ON position, the low oil pressure indicator should be illuminated. After the engine is started and the oil pressure builds up, the oil pressure switch opens and turns off the oil pressure indicator.

Safety Belt Warning Indicator
The HEC safety belt indicator illuminates if the driver safety belt is not fastened when the ignition switch is turned ON. The HEC receives the safety belt status hardwired from the central timer module (CTM). The safety belt indicator will turn off after 60 seconds from when the engine was started, regardless of the driver safety belt status.

Traction Control (TC) Indicator
The HEC TC indicator is controlled by the ABS/TC module. The indicator is illuminated when the TC is active. The traction control feature can be disabled by depressing the TC OFF button.

HEC Indicator Lamp Module Warning Indicators
The bulb out warning indicator is controlled directly by the bulb outage module. With the ignition switch ON the bulb out warning indicator will illuminate for about three seconds then prove out. If the brake pedal is not depressed, the bulb out warning indicator remains on.

Brake Pad Wear Indicator
The HEC receives information directly from the:

- left front brake pad sensor
- right rear brake pad sensor
- left rear brake pad sensor

The sensors are normally closed, thus grounding the circuits to the HEC. If a sensor opens or if an open or short to battery occurs to the circuit the brake pad wear indicator illuminates.

Ice Warning Indicator
The ice warning indicator is controlled by the HEC. The ice warning sensor is hardwired directly to the HEC. When the outside temperature drops below 0°C (32°F), the HEC illuminates the indicator.

Frost Warning Indicator
The frost warning indicator is controlled by the HEC. The ice warning sensor is hardwired directly to the HEC. When the outside temperature drops below 4°C (40°F), the HEC illuminates the frost warning indicator.

Maintenance Interval Warning Indicator
The maintenance interval warning indicator is controlled by the HEC. The HEC illuminates the indicator advising a schedule maintenance (which is dependent on time or distance). The indicator is reset by placing the ignition switch in position II and depressing the SELECT and UNITS buttons simultaneously for five seconds until the maintenance light extinguishes.

Inspection and Verification
1. Verify the customer concern by operating the hybrid electronic instrument cluster (HEC) to duplicate the condition. Observe the indicators, warning displays, and gauges to determine if they are operating correctly with the ignition switch:
   - In RUN with the engine off
   - In START before the ignition switch is released
   - In RUN with engine running

2. Visually inspect for obvious signs of mechanical or electrical damage.

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. Verify the following systems are working correctly:
   - Charging

Visual Inspection Chart

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damaged engine oil filter</td>
<td>Blown fuse(s)</td>
</tr>
<tr>
<td>Damaged oil pump</td>
<td>Central junction box (CJB) fuse F30 (7.5A)</td>
</tr>
<tr>
<td>Low engine oil level</td>
<td></td>
</tr>
<tr>
<td>Stuck oil pressure gauge needle</td>
<td>Damaged miniature bulb(s)</td>
</tr>
<tr>
<td>Stuck coolant temperature gauge</td>
<td>Damaged harness</td>
</tr>
<tr>
<td>Door adjustment</td>
<td>Loose or corroded connectors</td>
</tr>
<tr>
<td>Engine coolant level</td>
<td>Damaged HEC</td>
</tr>
<tr>
<td>Damaged water thermostat</td>
<td></td>
</tr>
</tbody>
</table>

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http://www.fordtechservice.dealerconnection.com/pubs/content/~WS2U/~MUS~LEN/19/S2... 6/2/2009
5. If the system(s) is/are not working correctly, refer to the appropriate section of the workshop manual.

6. If the concerns remains after the inspection, enter Self Diagnostic Mode or scan tool diagnostics.

**Self Diagnostic Mode**

1. To enter HEC self diagnostic mode with the engine off, simultaneously depress the message center UNITs and RESET buttons. Turn the ignition switch ON.

2. To enter HEC self diagnostic mode with the engine running, simultaneously depress the message center UNITs and RESET buttons. Turn the ignition switch from ON to RUN, to start the engine.

3. Release the RESET button first, then the UNITs button.

4. The HEC will enter the gauge sweep test.

5. To navigate to the following tests while in self diagnostic mode, depress the SELECT button. Depress the RESET button to navigate to the previous test:

### Scan Tool Diagnostics

1. To enter the scan tool diagnostics connect the scan tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the scan tool menu.

2. If the scan tool does not power up, refer to the scan tool manual.

3. Perform the DATA LINK DIAGNOSTIC TEST. If the scan tool responds with:
   - OKT914, OKT915 or OKT70-ALL ECUS NO RESP/NOT EQUIP. For additional information, refer to Section 418.00.
   - NO RESP/NOT EQUIP for hybrid electronic instrument cluster (HEC), go to Pinpoint Test A.
   - System passed, retrieve and record the continuous diagnostic trouble code (DTCs) and erase the continuous DTCs and carry out self-test diagnostics for the HEC.

4. If the DTCs retrieved are related to the concern, go to the HEC diagnostic trouble code (DTC) index.

5. If no DTCs related to the concern are retrieved, proceed to the Symptom Chart to continue diagnostics.

### HEC Diagnostic Trouble Code (DTC) Index

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
<th>Source</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>I201</td>
<td>Fuel sender circuit failure</td>
<td>HEC</td>
<td>GO to Pinpoint Test B</td>
</tr>
<tr>
<td>I204</td>
<td>Fuel sender short to ground</td>
<td>HEC</td>
<td>GO to Pinpoint Test B</td>
</tr>
<tr>
<td>I257</td>
<td>Climate control</td>
<td>HEC</td>
<td>Go to Pinpoint Test H</td>
</tr>
<tr>
<td>R317</td>
<td>Battery voltage high (greater than 16)</td>
<td>HEC</td>
<td>Go to Pinpoint Test A</td>
</tr>
<tr>
<td>R318</td>
<td>Battery voltage low (less than 10)</td>
<td>HEC</td>
<td>GO to Pinpoint Test A</td>
</tr>
</tbody>
</table>

**Gauge/Indicator/Display Tested**

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gauge sweep Tachometer and speedometer All gauges go through a sweep smoothness check; five seconds up, and five seconds down.</td>
</tr>
<tr>
<td>2.</td>
<td>ROM level HEC read only memory (ROM) Checks the HEC ROM revision level.</td>
</tr>
<tr>
<td>3.</td>
<td>Indicator bulbs and display Message center displays Illuminates all the warning indicators and displays that are controlled by the HEC.</td>
</tr>
<tr>
<td>4.</td>
<td>NVM level HEC non volatile memory (NVM) Checks the HEC NVM revision.</td>
</tr>
<tr>
<td>5.</td>
<td>A/D test Battery For engineering use only.</td>
</tr>
<tr>
<td>6.</td>
<td>Port test HEC input/output For engineering use only.</td>
</tr>
<tr>
<td>7.</td>
<td>Road Speed MPH (km/h) Speedometer Checks the speed signal input. To toggle between MPH and km/h, depress the UNITs button.</td>
</tr>
<tr>
<td>8.</td>
<td>Engine speed Tachometer Checks the tachometer input signal (RPM).</td>
</tr>
<tr>
<td>9.</td>
<td>Engine coolant temperature Checks the engine coolant temperature signal input. To toggle between the degrees C and degrees F, depress the UNITs button.</td>
</tr>
<tr>
<td>10.</td>
<td>Gauge counts Engine coolant gauge (t) Checks HEC gauges and determine the gauge angle. Tachometer (r) The displayed value is a four digit hexadecimal value. Speedometer (s) Fuel gauge (f)</td>
</tr>
<tr>
<td>11.</td>
<td>Fuel pulses Fuel For engineering use only.</td>
</tr>
<tr>
<td>12.</td>
<td>DTC Diagnostic trouble codes (DTCs) To lists the DTCs stored, depress the UNITs button. REFER to the HEC Diagnostic Trouble Code (DTC) Index. The DTCs will be displayed without the first alpha letter.</td>
</tr>
</tbody>
</table>
### Symptom Chart

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Sources</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No communication with the hybrid electronic instrument cluster</td>
<td>Circuit, ISO 9141 K-line, Hybrid electronic instrument cluster (HEC).</td>
<td>GO to Pinpoint Test A.</td>
</tr>
<tr>
<td>Incorrect fuel gauge indication</td>
<td>Circuit, Fuel pump module, HEC.</td>
<td>GO to Pinpoint Test B.</td>
</tr>
<tr>
<td>The speedometer is inoperative</td>
<td>Circuit, Vehicle speed sensor, HEC.</td>
<td>GO to Pinpoint Test C.</td>
</tr>
<tr>
<td>The tachometer is inoperative</td>
<td>Circuit, HEC, Powertrain control module (PGM).</td>
<td>GO to Pinpoint Test D.</td>
</tr>
<tr>
<td>Incorrect temperature gauge indication</td>
<td>Circuit, Engine coolant temperature sensor (ECT), HEC.</td>
<td>GO to Pinpoint Test E.</td>
</tr>
<tr>
<td>An indicator is inoperative - high beam</td>
<td>Circuit, High beam indicator bulb, HEC.</td>
<td>GO to Pinpoint Test F.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - maintenance interval warning indicator</td>
<td>Circuit, Maintenance interval warning indicator bulb, Indicator lamp module.</td>
<td>GO to Pinpoint Test G.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - ice warning indicator</td>
<td>Circuit, Ice warning sensor, Indicator lamp module, Ice warning indicator bulb, HEC</td>
<td>GO to Pinpoint Test H.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - frost warning indicator</td>
<td>Circuit, Ice warning sensor, Indicator lamp module, Frost warning indicator bulb, HEC</td>
<td>GO to Pinpoint Test I.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - brake pad wear warning indicator</td>
<td>Circuit, Brake pad wear warning indicator bulb.</td>
<td>GO to Pinpoint Test J.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - low washer fluid level warning indicator</td>
<td>Circuit, Low washer fluid level sensor, Low washer fluid level warning indicator bulb, Indicator lamp module, HEC</td>
<td>GO to Pinpoint Test K.</td>
</tr>
<tr>
<td>An indicator is inoperative/always on - door ajar warning indicator</td>
<td>Circuit, Door/tailgate/decklid switch, Door ajar warning indicator bulb, Indicator lamp module, HEC</td>
<td>GO to Pinpoint Test L.</td>
</tr>
<tr>
<td>An indicator is always on - bulb out warning indicator</td>
<td>Circuit, Bulb out warning indicator bulb, Bulb outage warning module, Indicator lamp module, HEC</td>
<td>GO to Pinpoint Test M.</td>
</tr>
<tr>
<td>An indicator is inoperative - oil warning</td>
<td>Circuit, Oil pressure switch, Oil pressure warning indicator bulb, HEC.</td>
<td>GO to Pinpoint Test N.</td>
</tr>
<tr>
<td>An indicator is always on - oil warning</td>
<td>Circuit, Engine oil pressure, HEC.</td>
<td>GO to Pinpoint Test O.</td>
</tr>
<tr>
<td>The safety belt warning indicator is inoperative (chime is operative)</td>
<td>Circuit, Safety belt buckle switch, Central timer module, Safety belt warning indicator bulb, HEC</td>
<td>GO to Pinpoint Test P.</td>
</tr>
<tr>
<td>The safety belt warning indicator is always on (chime is operative)</td>
<td>Circuit, Safety belt buckle switch, Central timer module, Safety belt warning indicator bulb, HEC</td>
<td>GO to Pinpoint Test Q.</td>
</tr>
<tr>
<td>The brake warning indicator is inoperative</td>
<td>Circuit, Low brake fluid level, Low brake fluid level switch, Park brake switch.</td>
<td>GO to Pinpoint Test R.</td>
</tr>
</tbody>
</table>

For troubleshooting, REFER to the Powertrain Control/Emission Diagnosis Manual.
Pinpoint Tests

**PINPOINT TEST A: NO COMMUNICATION WITH THE HYBRID ELECTRONIC INSTRUMENT CLUSTER**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 CHECK CIRCUIT 29-GG14 (OG) FOR VOLTAGE</td>
<td>Using a digital multimeter, measure the voltage between HEC C808b (white) pin 14, circuit 29-GG14 (OG), harness side and ground.</td>
</tr>
</tbody>
</table>

- **Is the voltage greater than 10 volts?**
  - Yes<br>  **GO to A2.**

- **GO to Pinpoint Test B.**
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATOR

A2 CHECK CIRCUIT 15-GG14 (GN/RD) FOR VOLTAGE

1. Using a digital multimeter, measure the voltage between HEC C808b (white) pin 15, circuit 15-GG14 (GN/RD), harness side and ground.

2. Is the voltage greater than 10 volts?
   - Yes
     GO to A3.
   - No
     REPAIR the circuit. TEST the system for normal operation.

A3 CHECK THE GROUND CIRCUIT 91-GG14B (BK/OG) AND CIRCUIT 91-GG14A (BK/OG)

1. Using a digital multimeter, measure the resistance between HEC C808b (white) pin 2, circuit 91-GG14B (BK/OG), harness side and ground; and between HEC C808b (white) pin 16, circuit 91-GG14A (BK/OG), harness side and ground.

2. Are the resistances less than 5 ohms?
   - Yes
     For additional information, refer to Section 418-00.
   - No
     REPAIR the circuit in question. TEST the system for normal operation.

CONDITIONS DETAILS/RESULTS/ACTIONS

B1 RETRIEVE DIAGNOSTIC TROUBLE CODES - HEC

1. Retrieve diagnostic trouble codes - HEC
Clear Continuous DTCs

HEC On-Demand Self-Test

Retrieve and document continuous DTCs.

- Is DTC B1201 or B1204 retrieved?
  - Yes
    GO to B3
  - No
    GO to B2

B2 CARRY OUT THE HEC FUEL GAUGE ACTIVE COMMAND

- Select HEC FUEL LEVEL CONTROL active command. Trigger, monitor and scroll FUEL LEVEL at: 0%, 50% and 100%.
  - Is the fuel gauge at: E with 0%, half with 50% and F with 100%?
    - Yes
      GO to B3
    - No
      INSTALL a new HEC. For additional information, refer to Instrument Cluster: TEST the system for normal operation.

B3 CHECK THE FUEL SENDER UNIT CIRCUIT 8-GA7A (WH/RD)

- Using a digital multimeter, measure the resistance between HEC C808b (white) pin 21, circuit 8-GA7A (WH/RD), harness side and fuel pump module C732 pin 5, circuit 8-GA7A (WH/RD), harness side; and between HEC C808b (white) pin 21, circuit 8-GA7A (WH/RD), harness side and ground.
### PINPOINT TEST C: THE SPEEDOMETER IS INOPERATIVE

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 CARRY OUT THE HEC SPEEDOMETER ACTIVE COMMAND</td>
<td></td>
</tr>
<tr>
<td><img src="image1" alt="HEC Active Command" /></td>
<td>Select the HEC SPEEDOMETER COMMAND active command.</td>
</tr>
<tr>
<td><img src="image2" alt="HEC Active Command" /></td>
<td>Trigger SPDOMETER active command, and scroll in increments of 5%. Monitor the speedometer gauge. The speedometer should be increasing in increments of approximately 12 km/h (7.5 mph) for every 5%.</td>
</tr>
<tr>
<td><img src="image3" alt="HEC Active Command" /></td>
<td>Does the speedometer increase within specification?</td>
</tr>
<tr>
<td><img src="image4" alt="HEC Active Command" /></td>
<td>Yes. GO to C2.</td>
</tr>
<tr>
<td><img src="image5" alt="HEC Active Command" /></td>
<td>No. INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.</td>
</tr>
</tbody>
</table>

C2 MONITOR THE HEC SPEEDOMETER PID

| ![HEC PID](image6) | Monitor the VSS.HEC PID while driving the vehicle. |
| ![HEC PID](image7) | Does the km/h or mph on the scan tool vary according to speed? |
| ![HEC PID](image8) | Yes. INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation. |
| ![HEC PID](image9) | No. For 2.5L MT GO to C3. For 2.0L and 2.5L AT GO to C6. |

C3 CHECK CIRCUIT 8-RE22 (WH/BU) FOR OPEN

| ![Circuit 8-RE22](image10) | Using a digital multimeter, measure the resistance between fuel pump module C732 pin 4, circuit 91-GA7 (BK/BU), harness side and ground. |
| ![Circuit 8-RE22](image11) | Is the resistance less than 5 ohms? |
| ![Circuit 8-RE22](image12) | Yes. INSTALL a new fuel pump module. TEST the system for normal operation. |
| ![Circuit 8-RE22](image13) | No. REPAIR the circuit. TEST the system for normal operation. |
Using a digital multimeter, measure the resistance between HEC C808b (white) pin 9, circuit 8-RE22 (WH/BU), harness side and VSS C823 pin 2, circuit 8-RE22 (WH/BU), harness side.

Is the resistance less than 5 ohms?

Yes
GO to C4.

No
REPAIR the circuit. TEST the system for normal operation.

C4 CHECK VSS GROUND CIRCUIT 91-RJ29 (BK/OG)

Using a digital multimeter, measure the resistance between VSS C823 pin 3, circuit 91-RJ29 (BK/OG), harness side pin 3, circuit 91-RJ29 (BK/OG), harness side and ground.

Is the resistance less than 5 ohms?

Yes
GO to C5.

No
REPAIR the circuit. TEST the system for normal operation.

C5 CHECK CIRCUIT 15-RJ29 (GN/RD) FOR VOLTAGE

Using a digital multimeter, measure the voltage between VSS C823 pin 1, circuit 15-RJ29 (GN/RD), harness side and ground.

Is the voltage greater than 10 volts?

Yes
INSTALL a new VSS. TEST the system for normal operation.

No
REPAIR the circuit. TEST the system for normal operation.
### PINPOINT TEST D: THE TACHOMETER IS INOPERATIVE

**CONDITIONS**

**D1 CARRY OUT THE HEC TACHOMETER ACTIVE COMMAND**

1. Select HEC TACHOMETER active command. Trigger, monitor and scroll TACHOMETER in 5% increments.

- Does the tachometer gauge increase approximately 450 RPM for every 5%?

  - **Yes**
    - GO to **D2**
  
  - **No**
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.

**D2 CHECK TACHOMETER CIRCUIT 8-GB10 (WH/BK)**

---

**CHECK CIRCUIT 8-RE22 (WH/VT) FOR OPEN OR SHORT TO GROUND**

- Using a digital multimeter, measure the resistance between HEC C808b pin 9, circuit 8-RE22 (WH/VT), harness side and PCM C421 pin 28, circuit 8-RE22 (WH/VT), harness side, and between HEC C808b pin 9, circuit 8-RE22 (WH/VT), and ground.

  - Is the resistance less than 5 ohms between HEC C808b and PCM C421, and greater than 10,000 ohms between HEC C808b and ground?

    - **Yes**
      - REFER to the Powertrain Control/Emissions Diagnosis Manual.
    
    - **No**
      - REPAIR the circuit. TEST the system for normal operation.
PINPOINT TEST E: INCORRECT TEMPERATURE GAUGE INDICATION

Using a digital multimeter, measure the resistance between HEC C808a (black) pin 7, circuit 8-GB10 (WH/BK), harness side and PCM C421 pin 48, circuit 8-GB10 (WH/BK), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - REFER to the Powertrain Control/Emission Diagnosis Manual.
  - No
    - REPAIR circuit 8-GB10 (WH/BK). TEST the system for normal operation.

CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 CARRY OUT THE HEC ENGINE COOLANT TEMPERATURE GAUGE ACTIVE COMMAND</td>
<td></td>
</tr>
<tr>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>[ ] HEC Active Command</td>
<td></td>
</tr>
<tr>
<td>[ ] Select the HEC ENGINE COOLANT active command.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Did the temperature gauge needle start at cold, move to half at 50%, and full hot at 100%?</td>
</tr>
<tr>
<td></td>
<td>- Yes</td>
</tr>
<tr>
<td></td>
<td>- GO to E2</td>
</tr>
<tr>
<td></td>
<td>- No</td>
</tr>
<tr>
<td></td>
<td>- INSTALL a new HEC. For additional information, refer to Instrument Cluster, TEST the system for normal operation.</td>
</tr>
</tbody>
</table>

E2 SIMULATE COLD ENGINE CONDITION

| | |
| [ ] Coolant Temperature Sensor C759 | |
| [ ] | |
Does the temperature gauge indicate cold condition?

- Yes
  - GO to E3.
- No
  - GO to E4.

E3 SIMULATE HOT ENGINE CONDITION

Connect a 7.5 A fused jumper wire between the coolant temperature sensor C759 pin 1, circuit 8-RJ6 (WH/GN) harness side and ground.

Observe the temperature gauge.

Does the temperature gauge indicate hot condition?

- Yes
  - INSTALL a new coolant temperature sensor. TEST the system for normal operation.
- No
  - GO to E4.

E4 CHECK FOR SHORT TO GROUND ON CIRCUIT 8-GA15 (WH/RD)

Using a digital multimeter, measure the resistance between HEC C808b (white) pin 23, circuit 8-GA15 (WH/RD), harness side, and ground.

Is the resistance greater than 10,000 ohms?

- Yes
  - GO to E5.
- No
  - REPAIR the circuit. TEST the system for normal operation.
PINPOINT TEST F: AN INDICATOR IS INOPERATIVE - HIGH BEAM

Coolant Temperature Sensor C759 or C1886

1. Using a digital multimeter, measure the resistance between HEC C808b (white) pin 23, circuit 8-GA15 (WH/RD), harness side and coolant temperature sensor C759, pin 1, circuit 8-GA15 (WH/RD), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
    - If equipped with 2.0L engine, GO to E6.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

E6 CHECK FOR OPEN CIRCUIT 91-GA15 (BK/BU)

Using a digital multimeter, measure the resistance between coolant temperature sensor C759 pin 2, circuit 91-GA15 (BK/BU), harness side and ground.

- Is the resistance less than 5 ohms?
  - Yes
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST F: AN INDICATOR IS INOPERATIVE - HIGH BEAM

CONDITIONS | DETAILS/RESULTS/ACTIONS
---|---
F1 CHECK FOR VOLTAGE ON CIRCUIT 29S-LE11 (OG/WH) |  
3. Turn the light switch to LOW beam position.  
4. Place the multifunction switch to high beam position.  
5. Using a digital multimeter, measure the voltage between HEC C808b (white) pin 25, circuit 29S-LE11 (OG/WH), harness side and ground.
**PINPOINT TEST G: AN INDICATOR IS INOPERATIVE/ALWAYS ON MAINTENANCE INTERVAL WARNING INDICATOR**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G1 CHECK THE MAINTENANCE INTERVAL WARNING INDICATOR ILLUMINATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="" alt="Image" /></td>
<td>Observe the maintenance interval warning indicator.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the maintenance interval warning indicator illuminate for approximately three seconds and then turn off?</td>
</tr>
<tr>
<td></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td></td>
<td>System is OK</td>
</tr>
<tr>
<td></td>
<td><strong>No</strong></td>
</tr>
<tr>
<td></td>
<td>If always on, GO to G2.</td>
</tr>
<tr>
<td></td>
<td>If inoperative, GO to G5.</td>
</tr>
<tr>
<td><strong>G2 RESET THE MAINTENANCE INTERVAL WARNING INDICATOR</strong></td>
<td></td>
</tr>
</tbody>
</table>
Depress the UNIT and SELECT buttons for five seconds.

- Does the maintenance interval warning indicator turn off?
  - Yes
    ADVISE the customer of the maintenance schedule.
  - No
    GO to G3

G3 CHECK MAINTENANCE INTERVAL WARNING INDICATOR WITH THE HEC DISCONNECTED

- Observe the maintenance interval warning indicator.
  - Does the maintenance interval warning indicator turn off?
    - Yes
      INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
    - No
      GO to G4

G4 CHECK CIRCUIT 31S-GE54 (BK/BU) FOR SHORT TO GROUND

- Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 8, circuit 31S-GE54 (BK/BU), harness side and ground.
  - Is the resistance less than 5 ohms?
    - Yes
      REPAIR the circuit. TEST the system for normal operation.
    - No
      INSTALL a new indicator lamp module. TEST the system for normal operation.

G5 CARRY OUT THE WARNING LAMPS AND CHIMES ACTIVE COMMAND

- Select the WARNING LAMPS AND CHIME COMMAND.
HEC Active Command

1. Trigger the ALL WARNING LAMPS active command. Observe the maintenance interval warning indicator.

   - Does the indicator turn on?
     - Yes
       INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
     - No
       GO to G6.

G6 CHECK CIRCUIT 15-GG14 (GN/RD) FOR BATTERY VOLTAGE

1. Using a digital multimeter, measure the voltage between indicator lamp module C467 pin 6, circuit 15-GG14 (GN/RD), harness side and ground.

   - Is the voltage greater than 10 volts?
     - Yes
       GO to G7.
     - No
       REPAIR the circuit. TEST the system for normal operation.

G7 CHECK CIRCUIT 31S-GE54 (BK/BU) FOR OPEN

1. Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 8, circuit 31S-GE54 (BK/BU), harness side and HEC C808a (black) pin 23, circuit 31S-GE54 (BK/BU), harness side.

   - Is the resistance less than 5 ohms?
**PINPOINT TEST H: AN INDICATOR IS INOPERATIVE/ALWAYS ON - ICE WARNING INDICATOR**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1 CHECK THE ICE WARNING INDICATOR ILLUMINATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="image1.png" alt="Image" /> Observe the ice warning indicator.</td>
<td></td>
</tr>
<tr>
<td>● Does the ice warning indicator illuminate for approximately three seconds and then turn off?</td>
<td></td>
</tr>
<tr>
<td>→ Yes System is OK.</td>
<td></td>
</tr>
<tr>
<td>→ No</td>
<td></td>
</tr>
<tr>
<td>If always on, GO to H2.</td>
<td></td>
</tr>
<tr>
<td>If inoperative, GO to H4.</td>
<td></td>
</tr>
<tr>
<td><strong>H2 CHECK THE ICE WARNING INDICATOR WITH THE HEC DISCONNECTED</strong></td>
<td></td>
</tr>
<tr>
<td><img src="image2.png" alt="Image" /> HEC C808a (black)</td>
<td></td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /> Observe the ice warning indicator.</td>
<td></td>
</tr>
<tr>
<td>● Does the ice warning indicator turn off?</td>
<td></td>
</tr>
<tr>
<td>→ Yes GO to H8.</td>
<td></td>
</tr>
<tr>
<td>→ No GO to H3.</td>
<td></td>
</tr>
<tr>
<td><strong>H3 CHECK CIRCUIT 31S-GE13 (BK/RD) FOR SHORT TO GROUND</strong></td>
<td></td>
</tr>
<tr>
<td><img src="image4.png" alt="Image" /> Indicator Lamp Module C467</td>
<td></td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /> Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 10, circuit 31S-GE13 (BK/RD), harness side and ground.</td>
<td></td>
</tr>
<tr>
<td>● Is the resistance greater than 10,000 ohms?</td>
<td></td>
</tr>
<tr>
<td>→ Yes INSTALL a new indicator lamp module. TEST the system for normal operation.</td>
<td></td>
</tr>
<tr>
<td>→ No REPAIR the circuit. TEST the system for normal operation.</td>
<td></td>
</tr>
<tr>
<td><strong>H4 CHECK CIRCUIT 15-GG14 (GN/RD) FOR BATTERY VOLTAGE</strong></td>
<td></td>
</tr>
</tbody>
</table>
| */

---

**Conditions Details/Results/Actions**

**H1 CHECK THE ICE WARNING INDICATOR ILLUMINATION**

1. Observe the ice warning indicator.

2. Does the ice warning indicator illuminate for approximately three seconds and then turn off?

   → Yes System is OK.

   → No

   If always on, GO to H2.

   If inoperative, GO to H4.

**H2 CHECK THE ICE WARNING INDICATOR WITH THE HEC DISCONNECTED**

1. Observe the ice warning indicator.

2. Does the ice warning indicator turn off?

   → Yes GO to H8.

   → No GO to H3.

**H3 CHECK CIRCUIT 31S-GE13 (BK/RD) FOR SHORT TO GROUND**

1. Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 10, circuit 31S-GE13 (BK/RD), harness side and ground.

2. Is the resistance greater than 10,000 ohms?

   → Yes INSTALL a new indicator lamp module. TEST the system for normal operation.

   → No REPAIR the circuit. TEST the system for normal operation.

**H4 CHECK CIRCUIT 15-GG14 (GN/RD) FOR BATTERY VOLTAGE**

1. */
Using a digital multimeter, measure the voltage between indicator lamp module C467 pin 6, circuit 15-GG14 (GN/RD), harness side and ground.

- Is the voltage greater than 10 volts?
  - Yes
    - GO to H5.
  - No
    - REPAIR circuit 14-WC43 (VT). TEST the system for normal operation.

H5 CHECK CIRCUIT 31S-GE13 FOR SHORT TO BATTERY

Using a digital multimeter, measure the voltage between indicator lamp module C467 pin 10, circuit 31S-GE13 (BK/RD), harness side and ground.

- Is the voltage greater than 10 volts?
  - Yes
    - REPAIR the circuit. TEST the system for normal operation.
  - No
    - GO to H6.

H6 CHECK CIRCUIT 31S-GE13 (BK-RD) FOR OPEN

Using a digital multimeter, measure the resistance between the indicator lamp module C467 pin 10, circuit 31S-GE13 (BK/RD), harness side and HEC C808a (black) pin 18, circuit 31S-GE13 (BK/RD), harness side.
Is the resistance less than 5 ohms?

→ Yes
   Go to H7.

→ No
   Repair the circuit. Test the system for normal operation.

H7 CHECK ICE WARNING INDICATOR WITH JUMPER WIRE CONNECTED

1. Indicator Lamp Module C467

2. Connect a 7.5 A fused jumper wire between HEC C808a pin 18, circuit 31S-GE13 (BK/RD), harness side and ground.

→ Does the ice warning indicator turn on?

→ Yes
   Go to H8.

→ No
   Install a new indicator lamp module. Test the system for normal operation.

H8 MONITOR THE HEC EXTTEMP PID

1. HEC C808a (black)
PINPOINT TEST I: AN INDICATOR IS INOPERATIVE/ALWAYS ON - FROST WARNING INDICATOR

1. Select the HEC EXTTEMP PID.

   - Does the PID value correspond to the exterior temperature?

     → Yes
     INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.

     → No
     GO to H9.

H9 CHECK ICE WARNING SENSOR CIRCUITS FOR OPEN

1. Using a digital multimeter, measure the resistance between the HEC C808b pin 1, circuit 9-GE98 (BN/YE), harness side and ice warning sensor C974 pin 1, circuit 9-GE98 (BN/YE), harness side, and measure the resistance between HEC C808b (white) pin 20, circuit 8-GE38 (WH/BK), harness side and ice warning sensor C974 pin 2, circuit 8-GE38 (WH/BK), harness side.

1. Are the resistances less than 5 ohms?

   → Yes
   INSTALL a new ice warning sensor. TEST the system for normal operation.

   → No
   REPAIR circuit 8-WC16 (WH/BK). TEST the system for normal operation.

CONDITIONS DETAILS/RESULTS/ACTIONS

1. CHECK THE FROST WARNING INDICATOR ILLUMINATION

   - Observe the frost warning indicator.

     → Does the frost warning indicator illuminate for approximately three seconds and then turn off?

     → Yes
     INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.

     → No
     GO to H9.
12 CHECK THE FROST WARNING INDICATOR WITH THE HEC DISCONNECTED

If always on, GO to 12.
If inoperative, GO to 14.

13 CHECK CIRCUIT 31S-GE18 (BK/WH) FOR SHORT TO GROUND

Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 9, circuit 31S-GE18 (BK/WH), harness side and ground.

Is the resistance greater than 10,000 ohms?

Yes
INSTALL a new indicator lamp module. TEST the system for normal operation.

No
REPAIR the circuit. TEST the system for normal operation.
Is the voltage greater than 10 volts?

Yes
GO to I5.

No
REPAIR the circuit. TEST the system for normal operation.

I5 CHECK CIRCUIT 31S-GE18 (BK/WH) FOR SHORT TO BATTERY

Using a digital multimeter, measure the voltage between indicator lamp module C467 pin 9, circuit 31S-GE18 (BK/WH), harness side and ground.

Is the voltage greater than 10 volts?

Yes
REPAIR the circuit. TEST the system for normal operation.

No
GO to I6.

I6 CHECK CIRCUIT 31S-GE18 (BK/WH) FOR OPEN

Using a digital multimeter, measure the resistance between the indicator lamp module C467 pin 9, circuit 31S-GE18 (BK/WH), harness side and HEC C808a (black) pin 19, circuit 31S-WC45 (BK/WH), and harness side.

Is the resistance less than 5 ohms?

Yes
GO to I7.
PINPOINT TEST J: AN INDICATOR IS INOPERATIVE/ALWAYS ON - BRAKE PAD WEAR INDICATOR

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>J1 CHECK THE BRAKE PAD WEAR WARNING INDICATOR ILLUMINATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="Image75x414to192x575.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="Image109x313.png" alt="Image" /> Observe the brake pad wear warning indicator.</td>
<td></td>
</tr>
<tr>
<td><img src="Image65x699.png" alt="Image" /> Does the brake pad wear warning indicator illuminate for approximately three seconds and then turn off?</td>
<td></td>
</tr>
<tr>
<td><img src="Image204x709.png" alt="Image" /> Yes</td>
<td>System is OK.</td>
</tr>
<tr>
<td><img src="Image204x699.png" alt="Image" /> No</td>
<td></td>
</tr>
<tr>
<td><img src="Image204x699.png" alt="Image" /> If always on, GO to J2.</td>
<td></td>
</tr>
<tr>
<td><img src="Image204x699.png" alt="Image" /> If inoperative, GO to J4.</td>
<td></td>
</tr>
</tbody>
</table>

| **J2 CHECK DISCONNECTED BRAKE PAD WEAR WARNING INDICATOR WITH THE HEC DISCONNECTED** | |
| ![Image](Image65x699.png) Connect a 7.5 A fused jumper wire between HEC C808a (black) pin 19, circuit 31S-WC45 (BK/WH), harness side and ground. | |
| ![Image](Image65x699.png) Does the frost warning indicator turn on? | |
| ![Image](Image204x383.png) Yes | GO to H8. |
| ![Image](Image204x383.png) No | INSTALL a new indicator lamp module. TEST the system for normal operation. |
Observe the brake pad wear warning indicator.

- Does the brake pad wear warning indicator turn off?
  - Yes
    - GO to J4
  - No
    - GO to J3

J3 CHECK CIRCUIT 31S-GE41 (BK/OG) FOR SHORT TO GROUND

1. Indicator Lamp Module C467

2. Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 11, circuit 31S-GE41 (BK/OG), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    - INSTALL a new indicator lamp module. TEST the system for normal operation.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

J4 CHECK CIRCUIT 15-GG14 (GN/RD) FOR BATTERY VOLTAGE

1. Indicator Lamp Module C467

2. Using a digital multimeter, measure the voltage between the indicator lamp module C467 pin 6, circuit 15-GG14 (GN/RD), harness side and ground.

- Is the voltage greater than 10 volts?
  - Yes
    - GO to J5
  - No
    - REPAIR the circuit. TEST the system for normal operation.

J5 CHECK CIRCUIT 31S-GE41 (BK/OG) FOR SHORT TO BATTERY

1. HEC C808a (black)
Using a digital multimeter, measure the voltage between the indicator lamp module C467 pin 11, circuit 31S-GE41 (BK/OG), harness side and ground.

- Is the voltage greater than 10 volts?
  - Yes
    - REPAIR circuit 31S-WC15 (BK/OG). TEST the system for normal operation.
  - No
    - GO to J6.

**J6 CHECK CIRCUIT 31S-GE41 (BK/OG) FOR OPEN**

Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 11, circuit 31S-GE41 (BK/OG), harness side and HEC C808a (black) pin 24, circuit 31S-GE41 (BK/OG), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - GO to J7.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

**J7 CHECK BRAKE PAD WEAR WARNING INDICATOR WITH JUMPER WIRE CONNECTED**

Connect a 7.5 A fused jumper wire between HEC C808a (black) pin 24, circuit 31S-GE41 (BK/OG), harness side and ground.
Does the brake pad wear warning indicator turn on?

→ Yes
  → GO to J8.

→ No
  → INSTALL a new indicator lamp module. TEST the system for normal operation.

J8 MONITOR THE HEC WEAR_OK PID

Select the brake pad wear HEC WEAR_OK PID.

→ Is the PID value YES?
  → Yes
  → INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  
  → No
  → GO to J9.

J9 CHECK CIRCUIT 31S-GE39 (BK/YE) FOR OPEN

Using a digital multimeter, measure the resistance between HEC C808a (black) pin 12, circuit 31S-GE39 (BK/YE), harness side and ground.
**J10 CHECK CIRCUIT 31S-GE39 (BK/YE) AND 31S-GE39A FOR OPEN**

1. Using a digital multimeter, measure the resistance between HEC C808a (black) pin 12, circuit 31S-GE39 (BK/YE), harness side and LH front brake pad sensor C723 pin 2, circuit 31S-GE39A (BK/YE), harness side, and measure the resistance between HEC C808a (black) pin 12, circuit 31S-GE39 (BK/YE), harness side and ground.

2. Is the resistance less than 5 ohms between the HEC and the LH front brake pad sensor, and greater than 10,000 ohms between the HEC and ground?
   - Yes
     - GO to J11.
   - No
     - REPAIR the circuit. TEST the system for normal operation.

**J11 CHECK CIRCUIT 31-WC14 (BK) FOR OPEN**

3. Using a digital multimeter, measure the resistance between LH front brake pad wear sensor C723 pin 1, circuit 31-WC14 (BK), harness side and ground.

4. Is the resistance less than 5 ohms?
   - Yes
     - INSTALL a new sensor. TEST the system for normal operation.
   - No
REPAIR the circuit. TEST the system for normal operation.

### J12 CHECK CIRCUIT 31S-GE47 (BK/OG) FOR OPEN

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:**

**HEC C808a (black)**

Using a digital multimeter, measure the resistance between HEC C808a (black) pin 13, circuit 31S-GE47 (BK/OG), harness side and ground.

- Is the resistance less than 5 ohms?
  - Yes
    - INSTALL a new HEC. TEST the system for normal operation.
  - No
    - GO to J13.

### J13 CHECK CIRCUIT 31S-GE47 (BK/OG) BETWEEN HEC AND LH REAR BRAKE PAD SENSOR

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:**

**LH Rear Brake Pad Sensor C725**

Using a digital multimeter, measure the resistance between HEC C808a (black) pin 13, circuit 31S-GE47 (BK/OG), harness side and LH rear brake pad sensor C725 pin 2, circuit 31-GE47 (BK/OG), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - GO to J16.
  - No
    - GO to J14.

### J14 CHECK CIRCUIT BETWEEN THE HEC AND RH REAR BRAKE PAD SENSOR

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>
Using a digital multimeter, measure the resistance between HEC C808a (black) pin 13, circuit 31S-GE47 (BK/OG), harness side and RH rear brake pad sensor C1866 pin 2, circuit 31S-GE47 (BK/OG), harness side.

Is the resistance less than 5 ohms?

- Yes
  - GO to J15
- No
  - REPAIR the circuit. TEST the system for normal operation.

### J15 CHECK CIRCUIT BETWEEN THE LH AND RH REAR BRAKE PAD SENSOR

Using a digital multimeter, measure the resistance between RH rear brake pad sensor C1866a pin 1, harness side and LH rear brake pad sensor C725 pin 2, harness side.

Is the resistance less than 5 ohms?

- Yes
  - INSTALL a new RH rear brake pad sensor. TEST the system for normal operation.
- No
  - REPAIR the circuit. TEST the system for normal operation.

### J16 CHECK CIRCUIT 31S-WC20 (BK/OG)

Using a digital multimeter, measure the resistance between LH rear brake pad sensor C725 pin 1, harness side and ground.

Is the resistance less than 5 ohms?

- Yes
  - INSTALL a new LH rear brake pad sensor. TEST the system for normal operation.
- No
  - REPAIR the circuit. TEST the system for normal operation.
K1 CHECK THE LOW WASHER FLUID LEVEL WARNING INDICATOR ILLUMINATION

1. Observe the low washer fluid level warning indicator.
   - Does the low washer fluid level warning prove out?
     - Yes
       System is OK.
     - No
       If always on, GO to K2.
       If inoperative, GO to K6.

K2 MONITOR THE HEC WFLUID PID

1. Select the HEC WFLUID PID.
   - Does the PID value display LOW?
     - Yes
       GO to K3.
     - No
       GO to K6.

K3 CHECK CIRCUIT 8-GC8 (WH/BU) FOR SHORT TO BATTERY VOLTAGE

1. Using a digital multimeter, measure the voltage between HEC C808a (black) pin 10, circuit 8-GC8 (WH/BU), harness side and ground.
   - Is the voltage greater than 10 volts?
<table>
<thead>
<tr>
<th>K4 CHECK CIRCUIT 8-GC8 (WH/BU) FOR OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>REPAIR the circuit. TEST the system for normal operation.</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>GO to K4</td>
</tr>
</tbody>
</table>

**Low Washer Fluid Level Switch C803**

Using a digital multimeter, measure the resistance between HEC C808a pin 10, circuit 8-GC8 (WH/BU), harness side, and low washer fluid level switch C813 pin 2, circuit 8-GC8 (WH/BU), harness side.

* Is the resistance less than 5 ohms?*

| Yes                                    |
| GO to K5                                |
| No                                     |
| REPAIR the circuit. TEST the system for normal operation. |

K5 CHECK GROUND CIRCUIT 31-GC8 (BK)

Using a digital multimeter, measure the resistance between low washer fluid level switch C813 pin 1, circuit 31-GC8 (BK), harness side and ground.

* Is the resistance less than 5 ohms?*

| Yes                                    |
| INSTALL a new low washer fluid level switch. TEST the system for normal operation. |
| No                                     |
| REPAIR the circuit. TEST the system for normal operation. |

K6 CHECK CIRCUIT 31S-GC10 (BK/RD) FOR OPEN

Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 1, circuit 31S-GC10 (BK/RD), harness side and ground; and between indicator lamp module C467 pin 1, circuit 31S-GC10 (BK/RD), harness side and HEC C808a (black) pin 20, circuit 31S-GC10 (BK/RD), harness side; and between indicator lamp module C467 pin 1, circuit 31S-GC10 (BK/RD), harness side and HEC C808a (black) pin 20, circuit 31S-GC10 (BK/RD), harness side; and between indicator lamp module C467 pin 1, circuit 31S-GC10 (BK/RD), harness side and ground.
**PINPOINT TEST L: AN INDICATOR IS INOPERATIVE/ALWAYS ON - DOOR AJAR WARNING INDICATOR**

* Is the resistance less than 5 ohms between the indicator lamp module and HEC, and greater than 10,000 ohms between the indicator lamp module and ground?

- **Yes**
  - If the indicator is always on, INSTALL a new indicator lamp module. TEST the system for normal operation.
  - If the indicator is inoperative, GO to **K7**.

- **No**
  - REPAIR the circuit. TEST the system for normal operation.

**K7 CHECK THE LOW WASHER FLUID LEVEL WARNING INDICATOR WITH JUMPER WIRE CONNECTED**

1. Connect a 7.5 A fused jumper wire between HEC C808a (black) pin 20, circuit 31-GC10 (BK/RD), harness side and ground.

* Does the low washer fluid level warning indicator turn on?

- **Yes**
  - INSTALL a new HEC. TEST the system for normal operation.

- **No**
  - INSTALL a new indicator lamp module. TEST the system for normal operation.
Observe the door ajar warning indicator.

- Does the door ajar warning indicator illuminate for approximately three seconds and then turn off?
  - Yes
    System is OK.
  - No
    If always on, GO to L2.
    If inoperative, GO to L6.

**L2 MONITOR THE HEC D_DR, HE, P_DR, HE AND DECKLID PID**

- Select the HEC D_DR, HE, P_DR, HE, and DECKLID PID. Observe the door ajar indicator and the PID value with respective door/decklid closed and ajar.
  - Do the PID values agree with the door/decklid status?
    - Yes
      GO to L6.
    - No
      If DECKLID PID does not agree, GO to L3.
      If D_DR, HE PID does not agree, GO to L4.
      If P_DR, HE PID does not agree, GO to L5.

**L3 CHECK CIRCUIT 31S-GE11 (BK/WH) FOR SHORT TO GROUND WITH DECKLID CLOSED**

- Using a digital multimeter, measure the resistance between HEC C808a (black) pin 5, circuit 31S-GE11 (BK/WH), harness side and ground.
L4 CHECK CIRCUIT 31S-GE7 (BK/YE) FOR SHORT TO GROUND

1. [Diagram]

   LH Front Door Entry Switch C685

2. [Diagram]

   Central Timer

3. Using a digital multimeter, measure the resistance between HEC C808a (black) pin 6, circuit 31S-GE7 (BK/YE), harness side and ground.

4. Is the resistance greater than 10,000 ohms?

   - Yes
     INSTALL a new LH front door switch. TEST the system for normal operation.
   - No
     REPAIR the circuit. TEST the system for normal operation.

L5 CHECK GROUND CIRCUIT 31S-GE9 (BK/BU)

1. [Diagram]

   RH Front Door Entry Switch C684

2. [Diagram]

   Central Timer

3. Using a digital multimeter, measure the resistance between HEC C808a (black) pin 11, circuit 31S-GE9 (BK/BU), harness side and ground.

4. Is the resistance greater than 10,000 ohms?

   - Yes
     INSTALL a new LH front door entry switch. TEST the system for normal operation.
   - No
     REPAIR the circuit. TEST the system for normal operation.
Is the resistance greater than 10,000 ohms?

→ Yes
INSTALL a new RH front door entry switch. TEST the system for normal operation.

→ No
REPAIR the circuit. TEST the system for normal operation.

L6 CHECK CIRCUIT 31S-GE7B (BK/YE) FOR OPEN OR SHORT TO GROUND

→ Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 2, circuit 31S-GE7B (BK/YE), harness side and HEC C808a (black) pin 25, circuit 31S-GE7B (BK/YE), harness side; and between indicator lamp module C467 pin 2, circuit 31S-GE7B (BK/YE), harness side and ground.

→ Is the resistance less than 5 ohms between the indicator lamp module and the HEC; and greater than 10,000 ohms between the indicator lamp module and ground?

→ Yes
If the indicator is always on, INSTALL a new indicator lamp module. TEST the system for normal operation.
If the indicator is inoperative, GO to L7.

→ No
REPAIR the circuit. TEST the system for normal operation.

L7 CHECK DOOR AJAR WARNING INDICATOR WITH JUMPER WIRE CONNECTED

→ If the indicator is always on, INSTALL a new indicator lamp module. TEST the system for normal operation.
If the indicator is inoperative, GO to L7.

→ REPAIR the circuit. TEST the system for normal operation.
**PINPOINT TEST M: AN INDICATOR IS ALWAYS ON - BULB OUT WARNING INDICATOR**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M1 CHECK THE EXTERIOR LIGHTS</strong></td>
<td></td>
</tr>
<tr>
<td><img src="Image1.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="Image2.png" alt="Image" /></td>
<td>Connect a 7.5 A fused jumper wire between HEC C808a (black) pin 25, circuit 31S-GE7B (BK/YE), harness side and ground.</td>
</tr>
<tr>
<td><img src="Image3.png" alt="Image" /></td>
<td>Does the door ajar warning indicator turn on?</td>
</tr>
<tr>
<td><img src="Image4.png" alt="Image" /></td>
<td>Yes</td>
</tr>
<tr>
<td><img src="Image5.png" alt="Image" /></td>
<td>INSTALL a new HEC. For additional information, refer to <a href="#">Instrument Cluster</a>. TEST the system for normal operation.</td>
</tr>
<tr>
<td><img src="Image6.png" alt="Image" /></td>
<td>No</td>
</tr>
<tr>
<td><img src="Image7.png" alt="Image" /></td>
<td>INSTALL a new indicator lamp module. TEST the system for normal operation.</td>
</tr>
</tbody>
</table>

| **M2 CHECK THE BULB OUT WARNING INDICATOR WITH THE BULB OUTAGE MODULE DISCONNECTED** | |
| ![Image](Image8.png) | |
| ![Image](Image9.png) | Bulb Outage Module C466 |
| ![Image](Image10.png) | Is the bulb out warning indicator off? |
| ![Image](Image11.png) | Yes |
| ![Image](Image12.png) | GO to M4. |
| ![Image](Image13.png) | No |
| ![Image](Image14.png) | For additional information, refer to Section 417-01. |

| **M3 CHECK CIRCUIT 15S-GE15 (GN/BK) FOR SHORT TO GROUND** | |
PINPOINT TEST N: AN INDICATOR IS INOPERATIVE - OIL WARNING

Using a digital multimeter, measure the resistance between indicator lamp module C467 pin 3, circuit 1SS-GE15 (GN/BK), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    INSTALL a new indicator lamp module. TEST the system for normal operation.
  - No
    REPAIR the circuit. TEST the system for normal operation.

M4 CHECK CIRCUIT 8-GE20 (WH/BK) FOR SHORT TO GROUND

Using a digital multimeter, measure the resistance between bulb outage module C466 pin 7, circuit 8-GE20 (WH/BK), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    INSTALL a new bulb outage module. TEST the system for normal operation.
  - No
    REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST N: AN INDICATOR IS INOPERATIVE - OIL WARNING

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 CHECK THE OPERATION OF THE GAUGES</td>
<td></td>
</tr>
<tr>
<td>![Gauge Icon]</td>
<td>Check the operation of the warning indicators and gauges.</td>
</tr>
</tbody>
</table>
  - Are the warning indicators and gauges operating?
PINPOINT TEST Q: AN INDICATOR IS ALWAYS ON - OIL WARNING

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 VERIFY SYSTEM OPERATION</td>
<td></td>
</tr>
</tbody>
</table>

**N2 CHECK OIL PRESSURE CIRCUIT 31S-GC21 (BK/GN) FOR OPEN**

1. Oil Pressure Switch C953

Using a digital multimeter, measure the voltage between oil pressure switch C953 (2.5L) or C954 (2.0L), circuit 31S-GC21 (BK/GN), harness side and ground.

- Is the voltage greater than 10 volts?
  - Yes: INSTALL a new oil pressure switch. TEST the system for normal operation.
  - No: GO to N3.

**N3 CHECK CIRCUIT 31S-GC21 (BK/GN) FOR OPEN**

1. Instrument Cluster C808b (white)

Using a digital multimeter, measure the resistance between HEC C808b (white) pin 5, circuit 31S-GC21 (BK/GN), harness side and oil pressure switch C953 (2.5L) or C954 (2.0L), circuit 31S-GC21 (BK/GN), harness side.

- Is the resistance less than 5 ohms?
  - Yes: INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  - No: REPAIR the circuit. TEST the system for normal operation.
PINPOINT TEST P: THE SAFETY BELT WARNING INDICATOR IS INOPERATIVE (CHIME IS OPERATIVE)

1. Observe the oil warning indicator.
   - Is the oil warning indicator illuminated?
     - Yes
       - GO to O2
     - No
       - Vehicle is OK.

O2 CHECK OIL PRESSURE SWITCH

1. Observe the oil warning indicator.
   - Is the oil warning indicator illuminated?
     - Yes
       - GO to O3
     - No
       - CHECK engine oil pressure. For additional information, refer to Section 303-00. If OK, INSTALL a new oil pressure switch. TEST the system for normal operation.

O3 CHECK CIRCUIT 31S-WD9 (BK/GN) FOR SHORT TO GROUND

Using a digital multimeter, measure the resistance between oil pressure switch C953 (2.5L) or C954 (2.0L), circuit 31S-WD9 (BK/GN), and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST P: THE SAFETY BELT WARNING INDICATOR IS INOPERATIVE (CHIME IS OPERATIVE)

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 CHECK SYSTEM OPERATION</td>
<td></td>
</tr>
<tr>
<td>Check the operation of the safety belt chime and safety belt warning indicator.</td>
<td></td>
</tr>
</tbody>
</table>
  - Does the safety belt chime operate and is the safety belt warning indicator illuminated? |
    - Yes
Vehicle is OK.

→ No
  If safety belt chime is operational and safety belt warning indicator is not illuminated, GO to P2.
  If safety belt chime is not operational and safety belt warning indicator is not illuminated. For additional information, refer to Section 413-09.

P2 CHECK SAFETY BELT WARNING INDICATOR

[Diagram]

Connect a 7.5A fused jumper wire between central junction box (CJB) C362 pin 1, circuit 31S-WC7 (BK/BU), harness side and ground.

● Is the safety belt warning indicator illuminated?
  → Yes
         GO to P4.
  → No
         GO to P3.

P3 CHECK CIRCUIT 31S-GE49 (BK/BU) FOR OPEN

[Diagram]

Using a digital multimeter, measure the resistance between HEC C808b (white) pin 18, circuit 31S-GE49 (BK/BU), harness side and CJB C362 pin 1, circuit 31S-GE49 (BK/BU), harness side.

● Is the resistance less than 5 ohms?
  → Yes
         INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation
  → No
         REPAIR circuit 1S-WC7 (BK/BU). TEST the system for normal operation.
PINPOINT TEST Q: THE SAFETY BELT WARNING INDICATOR IS ALWAYS ON (CHIME IS OPERATIVE)

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1 CHECK SYSTEM OPERATION</strong></td>
<td></td>
</tr>
</tbody>
</table>

1. Buckle the belt.

   - Is the safety belt warning indicator illuminated and the chime is off?
     - Yes
       INSTALL a new central timer module. TEST the system for normal operation.
     - No
       INSTALL a new CJB. TEST the system for normal operation.

| **Q2 CHECK THE INDICATOR WITH CJB C362 DISCONNECTED** | |

1. Observe the safety belt warning indicator.

   - Is the safety belt warning indicator still illuminated?
     - Yes
       GO to Q3
     - No
       GO to Q4

   For additional information, refer to Section 413-09.
Q3 CHECK CIRCUIT 31S-GE49 (BK/BU) FOR SHORT TO GROUND

Using a digital multimeter, measure the resistance between HEC C808b (white) pin 18, circuit 31S-GE49 (BK/BU), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

Q4 CHECK THE CENTRAL JUNCTION BOX (CJB) FOR SHORT TO GROUND

Observe the safety belt warning indicator.

- Is the safety belt warning indicator illuminated?
  - Yes
    - INSTALL a new CJB. TEST the system for normal operation.
  - No
    - INSTALL a new central timer module (CTM). TEST the system for normal operation.

PINPOINT TEST R: THE BRAKE WARNING INDICATOR IS INOPERATIVE

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 VERIFY THE CONDITION</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Apply the parking brake.</td>
</tr>
</tbody>
</table>
Does the brake warning indicator illuminate?

Yes
Vehicle is OK.

No
RELEASE the parking brake. GO to R2.

R2 CHECK BRAKE FLUID LEVEL SWITCH CIRCUIT

1. Connect a jumper wire between brake fluid level switch C810 pin 2, circuit 31S-WB6 (BK/YE), harness side and C810 pin 1 circuit 31-WB7 (BK), harness side.

Does the brake warning indicator illuminate?

Yes
REMOVE the jumper wire. CHECK parking switch for correct operation. INSTALL a new parking brake switch. IF OK, REPAIR circuit 31S-WC18 (BK/RD). TEST the system for normal operation.

No
REMOVE the jumper wire. GO to R3.

R3 CHECK CIRCUIT 31-GC7 (BK) FOR OPEN

1. Using a digital multimeter, measure the resistance between brake fluid level switch C810 pin 1, circuit 31-GC7 (BK) and ground.

Is the resistance less than 5 ohms?

Yes
GO to R4.

No
REPAIR the circuit. TEST the system for normal operation.

R4 CHECK CIRCUIT 31S-GC6 (BK/YE) FOR OPEN

1. Using a digital multimeter, measure the resistance between HEC C808b (white) pin 6, circuit 31S-GC6 (BK/YE), harness side and brake fluid level switch C810 pin 2, circuit 31S-GC6 (BK/YE), harness side.
**PINPOINT TEST S: AN INDICATOR IS INOPERATIVE - LOW FUEL**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 CHECK SYSTEM OPERATION</td>
<td></td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>Fuel Pump Module C732</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td></td>
</tr>
</tbody>
</table>

- Is the resistance less than 5 ohms?
  - Yes
    - INSTALL a new HEC. TEST the system for normal operation.
  - No
    - REPAIR the circuit. TEST the system for normal operation.

**CONDITIONS DETAILS/RESULTS/ACTIONS**

S1 Check System Operation

- Does the low fuel warning indicator stay illuminated?
  - Yes
    - Vehicle is OK.
  - No
    - If the fuel gauge is functioning correctly, INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
    - If the fuel gauge is not functioning correctly, GO to B1.

**PINPOINT TEST T: AN INDICATOR IS ALWAYS ON LOW FUEL**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 CHECK SYSTEM OPERATION</td>
<td></td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>Fuel Pump Module C732</td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td></td>
</tr>
</tbody>
</table>

- Connect a jumper wire between fuel pump module C732 pin 5, circuit 8-GA7 (WH/RD), harness side and ground.
PINPOINT TEST U: AN INDICATOR IS ALWAYS ON - LOW ENGINE COOLANT

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1 VERIFY SYSTEM OPERATION</td>
<td></td>
</tr>
</tbody>
</table>

1. Connect a 7.5 fused jumper wire between low engine coolant level switch C812 pin 1, circuit 31-WB9 (BK), harness side and C812 pin 2 circuit 8-GC9 (WH/GN), harness side.

2. Is the low engine coolant indicator illuminated for over 5 seconds?
   - Yes: GO to U2
   - No: If the engine coolant level in the coolant expansion tank is above the low engine coolant level switch, INSTALL a new engine coolant switch.

U2 CHECK THE GROUND CIRCUIT FOR OPEN

3. Using a digital multimeter, measure the resistance between low engine coolant temperature level switch C812 pin 1, circuit (BK), harness side and ground.

4. Is the resistance less than 5 ohms?
   - Yes: GO to U3
   - No: REPAIR the circuit, TEST the system for normal operation.

U3 CHECK CIRCUIT 8-GC9 FOR OPEN

Is the low fuel warning indicator illuminated?

- Yes: If the fuel gauge is functioning correctly, INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation. If the fuel gauge is not functioning correctly, GO to B1.
- No: The system is OK.
Using a digital multimeter, measure the resistance between low engine coolant level switch C812 pin 2 circuit 8-GC9 (WH/GN), harness side and HEC C808a pin 8, circuit 8-GC9 (WH/GN), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    INSTALL a new HEC. TEST the system for normal operation.
  - No
    REPAIR the circuit. TEST the system for normal operation.

## PINPOINT TEST V: AN INDICATOR IS INOPERATIVE - LOW ENGINE COOLANT

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1 VERIFY SYSTEM OPERATION</td>
<td></td>
</tr>
<tr>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /> Verify the engine coolant level in the expansion tank is at the MAX level. Fill with coolant as necessary.</td>
</tr>
<tr>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /> Observe the engine coolant indicator.</td>
</tr>
<tr>
<td><img src="image5" alt="Image" /></td>
<td><img src="image6" alt="Image" /> Does the low engine coolant indicator illuminate for approximately five seconds and then turn off?</td>
</tr>
<tr>
<td><img src="image7" alt="Image" /></td>
<td><img src="image8" alt="Image" /> INSPECT Instrument Cluster printed circuit for damage. If necessary, INSTALL a new HEC. If OK, INSTALL a new instrument interface module. TEST the system for normal operation.</td>
</tr>
<tr>
<td>V2 CHECK FOR SHORTED LOW ENGINE COOLANT LEVEL SWITCH</td>
<td></td>
</tr>
<tr>
<td><img src="image9" alt="Image" /></td>
<td><img src="image10" alt="Image" /> Observe the low engine coolant indicator.</td>
</tr>
<tr>
<td><img src="image11" alt="Image" /> Low Coolant Level Switch</td>
<td><img src="image12" alt="Image" /> Does the low engine coolant indicator turn off after staying illuminated for approximately five seconds?</td>
</tr>
</tbody>
</table>
| ![Image](image13) | ![Image](image14) GO to V3.
PINPOINT TEST W: AN INDICATOR IS INOPERATIVE - TURN SIGNALS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 CHECK LH TURN SIGNAL OPERATION</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Place the turn signal switch in the LH indicator position.</td>
</tr>
<tr>
<td></td>
<td>Does the HEC LH turn signal indicator illuminate?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Go to W5.</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Go to W2.</td>
</tr>
<tr>
<td>W2 CHECK OUTSIDE LH TURN SIGNAL LAMP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Observe the LH outside turn signal lamp.</td>
</tr>
<tr>
<td></td>
<td>Is the outside LH turn signal operative?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Go to W3.</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>For additional information, refer to Section 417-01.</td>
</tr>
<tr>
<td>W3 CHECK CIRCUIT 49-LG15 (BU/BK) FOR OPEN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using a digital multimeter, measure the resistance between HEC C808a (black) pin 1, circuit 49-LG15 (BU/BK), harness side and central junction box C362 pin 3, circuit 49-LG15 (BU/BK), harness side.</td>
</tr>
</tbody>
</table>

NO INSTALL a new engine coolant level switch. TEST the system for normal operation.

V3 CHECK CIRCUIT 8-GC9 (WH/GN) FOR SHORT TO GROUND

Using a digital multimeter, measure the resistance between HEC C808a pin 8, circuit 8-GC9 (WH/GN), harness side and ground.

Is the resistance less than 10,000 ohms?

Yes

INSPECT instrument cluster printed circuit for damage, if necessary, INSTALL a new HEC. If OK, INSTALL a new instrument interface module. TEST the system for normal operation.

No

REPAIR the circuit. TEST the system for normal operation.

CONDITIONS DETAILS/RESULTS/ACTIONS

W1 CHECK LH TURN SIGNAL OPERATION

Place the turn signal switch in the LH indicator position.

Does the HEC LH turn signal indicator illuminate?

Yes

Go to W5.

No

Go to W2.

W2 CHECK OUTSIDE LH TURN SIGNAL LAMP

Observe the LH outside turn signal lamp.

Is the outside LH turn signal operative?

Yes

Go to W3.

No

For additional information, refer to Section 417-01.

W3 CHECK CIRCUIT 49-LG15 (BU/BK) FOR OPEN

Using a digital multimeter, measure the resistance between HEC C808a (black) pin 1, circuit 49-LG15 (BU/BK), harness side and central junction box C362 pin 3, circuit 49-LG15 (BU/BK), harness side.
Is the resistance less than 5 ohms?

Yes
GO to W4.

No
REPAIR the circuit. TEST the system for normal operation.

W4 CHECK THE CENTRAL JUNCTION BOX (CJB) FOR OPEN

Using a digital multimeter, measure the resistance between CJB C369, terminal 14 and C362, terminal 3.

Is the resistance less than 5 ohms?

Yes
INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.

No
REPAIR or INSTALL a new CJB. TEST the system for normal operation.

W5 CHECK RH TURN SIGNAL OPERATION

Place the turn signal in the RH indicator position.

Does the HEC RH turn signal indicator illuminate?

Yes
Vehicle is OK.

No
GO to W6.

W6 CHECK OUTSIDE RH TURN SIGNAL LAMP

Observe the RH turn signal lamp.

Does the RH turn signal lamp operate?

Yes
GO to W7.
W7 CHECK CIRCUIT 49-LG22 FOR OPEN

1. Instrument Cluster C808a (black)
2. CJB C362
3. Using a digital multimeter, measure the resistance between HEC C808a (black) pin 19 circuit 49-LG22 (BU/YE), harness side and central junction box C362 pin 4, circuit 49-LG22 (BU/YE), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - GO to W8
  - No
    - REPAIR the circuit. TEST the system for normal operation.

W8 CHECK CENTRAL JUNCTION BOX (CJB)

1. CJB C369
2. Using a digital multimeter, measure the resistance between CJB C369, terminal 16 and CJB C362 terminal 4.

- Is the resistance less than 5 ohms?
  - Yes
    - INSTALL a new HEC. For additional information, refer to Instrument Cluster. TEST the system for normal operation.
  - No
    - REPAIR or INSTALL a new CJB. TEST the system for normal operation.
## PINPOINT TEST X: THE CHARGE SYSTEM WARNING INDICATOR IS NEVER ON

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X1 CHECK SYSTEM OPERATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Check System Operation" /></td>
<td><img src="image" alt="Check if the charge warning indicator is illuminated." /></td>
</tr>
<tr>
<td><img src="image" alt="Yes" /></td>
<td>Is the charge warning indicator illuminated?</td>
</tr>
<tr>
<td><img src="image" alt="Yes" /></td>
<td>For additional information, refer to Section 414-00.</td>
</tr>
<tr>
<td><img src="image" alt="No" /></td>
<td>GO to X2.</td>
</tr>
</tbody>
</table>

| **X2 CHECK THE GENERATOR** | |
| ![Check the Generator](image) | ![Check if the charge warning indicator is illuminated.](image) |
| ![Yes](image) | For additional information, refer to Section 414-00. |
| ![No](image) | GO to X3. |

| **X3 CHECK CIRCUIT 15S-BA9 (GN/BK) FOR OPEN** | |
| ![Check Circuit for Open](image) | ![Using a digital multimeter, measure the resistance between HEC C808b (white) pin 4, circuit 15S-BA9 (GN/BK), harness side and generator C1885b (Zetec) or C2104b (Duratec) pin 1 circuit 15S-BA9 (GN/BK), harness side.](image) |
**PINPOINT TEST Y: AN INDICATOR IS INOPERATIVE-MALFUNCTION INDICATOR LAMP (MIL)**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Y1 CHECK SYSTEM OPERATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="circle6" alt="Circle Icon" /> Observe the MIL in the HEC</td>
<td></td>
</tr>
<tr>
<td><img src="circle6" alt="Circle Icon" /> Is the MIL illuminated?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Vehicle is OK</td>
</tr>
<tr>
<td>No</td>
<td>Go to Y2</td>
</tr>
<tr>
<td><strong>Y2 CHECK THE PCM OPERATION</strong></td>
<td></td>
</tr>
<tr>
<td><img src="circle6" alt="Circle Icon" /> Connect a 7.5A fused jumper wire between PCM C421 pin 2 Circuit 91S-RD7 (BK/OG) and ground.</td>
<td></td>
</tr>
<tr>
<td><img src="circle6" alt="Circle Icon" /> Is the MIL illuminated?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Refer to Powertrain Control / Emission Diagnostic Manual to diagnose no MIL condition.</td>
</tr>
<tr>
<td>No</td>
<td>Go to Y3</td>
</tr>
<tr>
<td><strong>Y3 CHECK CIRCUIT 91S-RD7 (BK/OG) FOR OPEN</strong></td>
<td></td>
</tr>
</tbody>
</table>
Using a digital multimeter, measure the resistance between HEC C808a (black) pin 16, circuit 91S-RD7 (BK/OG), harness side and PCM C421 pin 2, circuit 91S-RD7 (BK/OG).

- Is the resistance less than 5 ohms?
  
  → Yes
  INSTALL a new HEC. TEST the system for normal operation.
  
  → No
  REPAIR the circuit. TEST the system for normal operation.

**PINPOINT TEST Z: AN INDICATOR IS ALWAYS ON - MALFUNCTION INDICATOR LAMP (MIL)**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1 CHECK SYSTEM OPERATION</td>
<td></td>
</tr>
<tr>
<td>![HEC diagram]</td>
<td>Observe the MIL in the HEC.</td>
</tr>
<tr>
<td>![MIL illuminated]</td>
<td>Is the MIL illuminated?</td>
</tr>
<tr>
<td>![Yes]</td>
<td>REFER to Powertrain Control / Emissions Diagnostic Manual to diagnose engine concern. REPAIR as necessary. If OK, GO to Z2.</td>
</tr>
<tr>
<td>![No]</td>
<td>Vehicle is OK.</td>
</tr>
<tr>
<td>Z2 CHECK HEC-CIRCUIT 91S-RD7 (BK/OG) FOR SHORT TO GROUND</td>
<td></td>
</tr>
<tr>
<td>![HEC diagram]</td>
<td>Is the MIL illuminated?</td>
</tr>
<tr>
<td>![Yes]</td>
<td>INSTALL a new HEC. TEST the system for normal operation.</td>
</tr>
<tr>
<td>![No]</td>
<td>GO to Z3.</td>
</tr>
</tbody>
</table>
**CHECK CIRCUIT 91S-RD7 (BK/OG) FOR SHORT TO GROUND**

1. Using a digital multimeter, measure the resistance between HEC C808a pin 16, circuit 91S-RD7 (BK/OG) and ground.

   - **Is the resistance greater than 10,000 ohms?**
     - Yes
       - INSTALL a new PCM. TEST the system for normal operation.
     - No
       - REPAIR the circuit. TEST the system for normal operation.

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**PINPOINT TEST AA: AN INDICATOR IS INOPERATIVE - ABS**

<table>
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<tr>
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<tr>
<td><strong>AA1 CHECK SYSTEM OPERATION</strong></td>
<td></td>
</tr>
<tr>
<td>![ABS Gadget]</td>
<td></td>
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<tr>
<td>![PCM C421]</td>
<td></td>
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</tbody>
</table>

  1. Observe the ABS warning indicator.

     - **Does the ABS warning indicator illuminate?**
       - Yes
         - Vehicle is OK.
       - No
         - GO to AA2.

<table>
<thead>
<tr>
<th><strong>AA2 CHECK ABS CONTROL MODULE</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>![ABS Control Module C385]</td>
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</tr>
</tbody>
</table>

  1. Connect a 7.5A fused jumper wire between ABS control module C385 pin 20, circuit 31S-CF28 (BK/RD), harness side and ground.

     - **Does the ABS warning indicator illuminate?**
       - Yes
         - For additional information, refer to Section 206-09A.
**AA3 CHECK CIRCUIT 31S-CF28 (BK/RD) FOR OPEN**

1. Using a digital multimeter, measure the resistance between ABS control module C385 pin 20, circuit 31S-CF28 (BK/RD), harness side and HEC C808b (white) pin 7, circuit 31S-CF28 (BK/RD) harness side.

- **Is the resistance less than 5 ohms?**
  - **Yes**
    - INSTALL a new HEC. TEST the system for normal operation.
  - **No**
    - REPAIR the circuit. TEST the system for normal operation.

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**Diagram of HEC C808b and circuit connections**

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http://www.fordtechservice.dealerconnection.com/pubs/content/~WS2U/~MUS~LEN/19/S2... 6/2/2009