DESCRIPTION AND OPERATION

Instrument Cluster and Panel Illumination

NOTE: The Smart Junction Box (SJB) is also known as the Generic Electronic Module (GEM).

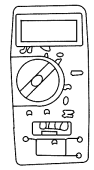
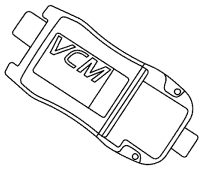
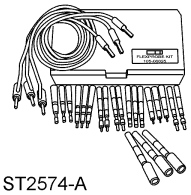
The instrument cluster and panel illumination system illuminates the following components:

- Audio Control Module (ACM)
- Instrument Cluster (IC)
- Instrument panel center switches
- Instrument panel dimmer switch
- Steering wheel switches
- Convertible top switch (part of the overhead console) (if equipped)
- Message center (if equipped)
- Headlamp switch
- Hazard flasher switch
- Climate control assembly
- Transmission Range (TR) indicator
- Door lock control switches
- Window control switches

DIAGNOSIS AND TESTING

Instrument Cluster and Panel Illumination

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2834-A	Vehicle Communications Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit 105-R025C or equivalent

Principles of Operation

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

Dimmable Backlighting

When the parking lamps are on, the SJB provides a pulse-width modulated (PWM) voltage to the dimmable instrument panel switches and components. The instrument panel dimmer switch allows the brightness level of the dimmable backlights and displays to be adjusted.

The SJB communicates with the instrument cluster (IC) and audio control module (ACM) through the controller area network (CAN). The IC and ACM then increase or decrease the intensity of the backlighting according to the instrument panel dimmer switch position.

The dimmable components consist of the:

- IC
- ACM
- Instrument panel dimmer switch
- Message center switch
- Hazard flasher switch
- Climate control assembly
- Transmission range (TR) indicator
- Convertible top switch (part of the overhead console) (if equipped)
- Steering wheel switches
- Headlamp switch

Non-Dimmable Backlighting

When the key is in the ACC or RUN positions, the SJB energizes the accessory delay relay, providing switched voltage to the non-dimmable components and switches. The non-dimmable components consist of the:

- Front window control switches
- Rear window control switch
- Driver door lock control switch
- Passenger door lock control switch

Fault Management

The SJB defaults the dimmable backlighting to full intensity if the instrument panel dimmer switch or circuitry fails.

The IC and the ACM default to full nighttime brightness if they receive a missing or invalid backlighting message from the SJB.

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Instrument panel dimmer switch	• Smart junction box (SJB) fuse 6 (5A) • Miniature bulb(s) • Wiring, terminals or connectors • Accessory delay relay • Instrument cluster • Headlamp switch

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

DIAGNOSIS AND TESTING (Continued)

4. **NOTE:** Make sure to use the latest scan tool release software.

   If the cause is not visually evident, connect the scan tool to the data link connector (DLC).

5. **NOTE:** The vehicle communication module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

   If the scan tool does not communicate with the VCM:

   - Check the VCM connection to the vehicle.
   - Check the scan tool connection to the VCM.
   - Refer to Section 418-00, No Power To The Scan Tool, to diagnose no communication with the scan tool.

6. If the scan tool does not communicate with the vehicle:

   - Verify the ignition key is in the ON position.
   - Verify the scan tool operation with a known good vehicle.
   - Refer to Section 418-00 to diagnose no response from the PCM.

7. Carry out the network test.

   - If the scan tool responds with no communication with the SJB, refer to Section 418-00.
   - If the network test passes, retrieve and record the continuous memory DTCs.

8. Clear the continuous DTCs and carry out the self-test diagnostics for the SJB.

9. If the DTCs retrieved are related to the concern, go to DTC Charts. For all other DTCs, refer to Section 419-10.

10. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

DTC Charts

Smart junction box (SJB) DTC Chart

DTC	Description	Action
B1247	Panel Dim Switch Circuit Open	GO to Pinpoint Test B.
B2027	LED Backlighting Output Circuit Failure	For all hardwired illuminated components inoperative, GO to Pinpoint Test A. For all hardwired illuminated components always on, GO to Pinpoint Test C.
B2132	Dimmer Switch Circuit Short to Gnd	GO to Pinpoint Test B.
All other DTCs	—	REFER to Section 419-10.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• No communication with the Smart junction box (SJB)	• Fuse(s) • Wiring, terminals or connectors • SJB	• REFER to Section 418-00.
• The control illumination is inoperative — all hardwired illumination	• Wiring, terminals or connectors • SJB	• GO to Pinpoint Test A.
• The instrument panel illumination does not dim	• Wiring, terminals or connectors • Instrument panel dimmer switch • SJB	• GO to Pinpoint Test B.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart (Continued)

Condition	Possible Sources	Action
• The control illumination is always on — all hardwired illumination	• Wiring, terminals or connectors • SJB	• GO to Pinpoint Test C.
• All network controlled illumination does not dim	• Medium Speed Controller Area Network (MS-CAN) • SJB	• CARRY OUT the network test. — If the scan tool responds with no communication to any module on the MS-CAN network, REFER to Section 418-00. — If the scan tool communicates with the modules on the MS-CAN network, INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation.
• The instrument cluster (IC) illumination is inoperative	• Wiring, terminals or connectors • IC	• INSTALL a new IC. REFER to Section 413-01. TEST the system for normal operation.
• The audio control module (ACM) unit illumination is inoperative	• ACM	• CHECK for ACM DTCs. CORRECT any DTCs if present. If no DTCs are present, REMOVE the ACM. REFER to Section 415-00. SEND it to an authorized repair facility. TEST the system for normal operation after the repair.
• The window control switch illumination is inoperative	• Window control switch	• CHECK the operation of the power windows. — If the power windows operate correctly, INSTALL a new window control switch. REFER to Section 501-11. TEST the system for normal operation. — If the power windows do not operate correctly, REFER to Section 501-11.
• One or more smart junction box (SJB) controlled illumination source(s) is inoperative	• Wiring, terminals or connectors • Illuminated component • Clockspring • Speed control switch • SJB	• GO to Pinpoint Test D.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Tests

Pinpoint Test A: The Control Illumination Is Inoperative — All Hardwired Illumination

Refer to Wiring Diagrams Cell 71, Cluster and Panel Illumination for schematic and connector information.

Normal Operation

When the headlamp switch is placed in the PARKING or HEADLAMP ON position, the smart junction box (SJB) supplies either a pulse width modulated (PWM) signal or 12 volts to the various backlighting sources in the instrument panel, doors and console.

- DTC B2027 (LED Backlighting Output Circuit Failure) — is a continuous and on-demand DTC that sets when the SJB detects a short to ground on the dimmable backlighting circuits.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- SJB

PINPOINT TEST A: THE CONTROL ILLUMINATION IS INOPERATIVE — ALL HARDWIRED ILLUMINATION

NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

Test Step		Result / Action to Take
A1	**CHECK FOR RECORDED SJB DTCS FROM THE ON-DEMAND SELF-TEST**	
	• Use the recorded results from the SJB self-test. • **Is DTC B2027 recorded?**	**Yes** GO to **A3**. **No** GO to **A2**.
A2	**CHECK THE INSTRUMENT PANEL DIMMER SWITCH**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB PID (PANELINT) while rotating the instrument panel dimmer switch from the lowest setting to the highest setting. • **Does the PID indicate the switch is operating correctly?**	**Yes** GO to **A4**. **No** INSTALL a new instrument panel dimmer switch. CLEAR the DTCs. REPEAT the self-test.
A3	**CHECK CIRCUITS 1403 (BK/WH), 19 (LB/RD), 293 (OG/RD), 203 (OG/LB), 2023 (YE/LB), 2029 (LB/WH), 2030 (YE/WH) AND 1425 (GY/WH) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280b. • Disconnect: SJB C2280e. • Disconnect: SJB C2280f. • Connect a fused (5A) jumper wire between the SJB connector and battery positive as follows:	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: THE CONTROL ILLUMINATION IS INOPERATIVE — ALL HARDWIRED ILLUMINATION (Continued)

<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>A3</td><td>CHECK CIRCUITS 1403 (BK/WH), 19 (LB/RD), 293 (OG/RD), 203 (OG/LB), 2023 (YE/LB), 2029 (LB/WH), 2030 (YE/WH) AND 1425 (GY/WH) FOR A SHORT TO GROUND (Continued)</td><td rowspan="2">Yes
REMOVE the jumper wire. REPAIR the circuit in question for a short to ground. CLEAR the DTCs. REPEAT the self-test.
No
GO to A4.</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Suspect Illuminated Component Location</th><th>SJB Connector-Pin</th><th>Circuit</th></tr>
<tr><td>Instrument panel dimmer switch</td><td>C2280b-8</td><td>1403 (BK/WH)</td></tr>
<tr><td>Transmission range (TR) indicator/ambient lighting switch (if equipped)</td><td>C2280e-12</td><td>19 (LB/RD)</td></tr>
<tr><td>Convertible top switch (part of the overhead console) (if equipped)</td><td>C2280f-6</td><td>293 (OG/RD)</td></tr>
<tr><td>Speed control switch(es)</td><td>C2280b-10</td><td>203 (OG/LB)</td></tr>
<tr><td>Headlamp switch</td><td>C2280b-6</td><td>2023 (YE/LB)</td></tr>
<tr><td>Message center switch</td><td>C2280b-9</td><td>2030 (YE/WH)</td></tr>
<tr><td>Hazard flasher switch</td><td>C2280b-11</td><td>2029 (LB/WH)</td></tr>
<tr><td>Climate control assembly</td><td>C2280b-23</td><td>1425 (GY/WH)</td></tr>
</table>
• Did the jumper wire fail on any of the circuits?
</td></tr>
<tr><td>A4</td><td>CHECK FOR CORRECT SJB OPERATION</td><td rowspan="2">Yes
INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation.
No
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.</td></tr>
<tr><td colspan="2">• Disconnect all the SJB connectors.
• Check for:
— corrosion
— damaged pins
— pushed-out pins
• Connect all the SJB connectors and make sure they seat correctly.
• Operate the system and verify the concern is still present.
• Is the concern still present?</td></tr>
</table>

Pinpoint Test B: The Instrument Panel Illumination Does Not Dim

Refer to Wiring Diagrams Cell 71, Cluster and Panel Illumination for schematic and connector information.

DIAGNOSIS AND TESTING (Continued)

Normal Operation

With the parking lamps on, a voltage signal is supplied to the instrument panel dimmer switch through circuit 1036 (BN/WH) from the smart junction box (SJB). The dimmer switch passes this voltage through a variable resistor and then returns the signal to the SJB on circuit 1035 (OG/RD). The SJB uses the return signal to determine the backlighting intensity desired by the operator. A pulse-width modulated (PWM) signal is sent from the SJB to each of the dimmable backlights, maintaining the operators desired level of lighting intensity.

- DTC B1247 (Panel Dim Switch Circuit Open) — is a continuous and on-demand DTC that sets when the SJB detects a open circuit from the instrument dimmer switch circuitry.
- DTC B2132 (Dimmer Switch Circuit Short to Gnd) — is a continuous and on-demand DTC that sets when the SJB detects a short to ground on the instrument dimmer switch reference signal circuit.

The dimmable backlighting defaults to full intensity if the instrument panel dimmer switch or circuitry fails.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Instrument panel dimmer switch
- SJB

PINPOINT TEST B: THE INSTRUMENT PANEL ILLUMINATION DOES NOT DIM

NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

Test Step		Result / Action to Take
B1	**MONITOR THE INSTRUMENT PANEL ILLUMINATION OPERATION**	
	• With the parking lamps on, rotate the dimmer switch from maximum brightness to minimum brightness. • Monitor all instrument panel illumination sources for correct operation. • **Do all the dimmable instrument panel illumination sources dim correctly?**	**Yes** The system is OK. **No** If only the instrument cluster (IC) does not dim, INSTALL a new IC. REFER to Section 413-01. TEST the system for normal operation. If only the audio control module (ACM) does not dim, REMOVE the ACM. REFER to Section 415-00. SEND it to an authorized repair facility. TEST the system for normal operation after the repair. For all others, GO to **B2**.
B2	**CHECK THE SJB INSTRUMENT PANEL DIMMER SWITCH PIDS**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Turn the parking lamps on. • Monitor the SJB PID (PANELINT) while rotating the instrument panel dimmer switch from the lowest setting to the highest setting. • **Do the SJB instrument panel dimmer switch PIDs agree with the instrument panel dimmer switch position?**	**Yes** GO to **B7**. **No** GO to **B3**.
B3	**CHECK THE INSTRUMENT PANEL DIMMER SWITCH OPERATION**	
	• Disconnect: Instrument Panel Dimmer Switch C2298. • Carry out the instrument panel dimmer switch component test. Refer to Wiring Diagrams Cell 149 for component testing. • **Does the instrument panel dimmer switch pass the component test?**	**Yes** GO to **B4**. **No** INSTALL a new instrument panel dimmer switch. REFER to Section 417-01. CLEAR the DTCs. REPEAT the self-test.
B4	**CHECK CIRCUITS 1035 (OG/RD), 1036 (BN/WH) AND 1405 (LB/BK) FOR A SHORT TO VOLTAGE**	
	• Key in OFF position. • Disconnect: SJB C2280d.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: THE INSTRUMENT PANEL ILLUMINATION DOES NOT DIM (Continued)

<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>B4</td><td>CHECK CIRCUITS 1035 (OG/RD), 1036 (BN/WH) AND 1405 (LB/BK) FOR A SHORT TO VOLTAGE (Continued)</td><td rowspan="2">Yes
REPAIR the circuit. TEST the system for normal operation.
No
GO to B5.</td></tr>
<tr><td colspan="2">• Measure the voltage between the SJB, harness side and ground as follows:

<table><tr><th>Connector-Pin</th><th>Circuit</th></tr><tr><td>C2280b-43</td><td>1035 (OG/RD)</td></tr><tr><td>C2280b-32</td><td>1036 (BN/WH)</td></tr><tr><td>C2280b-1</td><td>1405 (LB/BK)</td></tr></table>
• Is any voltage indicated?</td></tr>
<tr><td>B5</td><td>CHECK CIRCUITS 1035 (OG/RD), 1036 (BN/WH) AND 1405 (LB/BK) FOR A SHORT TO GROUND</td><td rowspan="2">Yes
GO to B6.
No
REPAIR the circuit. TEST the system for normal operation.</td></tr>
<tr><td colspan="2">• Measure the resistance between the SJB/GEM, harness side and ground as follows:

<table><tr><th>Connector-Pin</th><th>Circuit</th></tr><tr><td>C2280b-43</td><td>1035 (OG/RD)</td></tr><tr><td>C2280b-32</td><td>1036 (BN/WH)</td></tr><tr><td>C2280b-1</td><td>1405 (LB/BK)</td></tr></table>
• Is the resistance greater than 10,000 ohms?</td></tr>
<tr><td>B6</td><td>CHECK CIRCUITS 1035 (OG/RD), 1036 (BN/WH) AND 1405 (LB/BK) FOR AN OPEN</td><td rowspan="2">Yes
GO to B7.
No
REPAIR the circuit. TEST the system for normal operation.</td></tr>
<tr><td colspan="2">• Measure the resistance between the SJB, harness side and the instrument panel dimmer switch, harness side as follows:

<table><tr><th>Connector-Pin</th><th>Circuit</th><th>Connector-Pin</th><th>Circuit</th></tr><tr><td>C2280b-43</td><td>1035 (OG/RD)</td><td>C2298-6</td><td>1035 (OG/RD)</td></tr><tr><td>C2280b-32</td><td>1036 (BN/WH)</td><td>C2298-1</td><td>1036 (BN/WH)</td></tr><tr><td>C2280b-1</td><td>1405 (LB/BK)</td><td>C2298-4</td><td>1405 (LB/BK)</td></tr></table>
• Is the resistance less than 5 ohms?</td></tr>
<tr><td>B7</td><td colspan="2">CHECK FOR CORRECT SJB OPERATION</td><td>Yes
INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation.
No
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</td></tr>
<tr><td colspan="3">• Disconnect all the SJB connectors.
• Check for:
— corrosion
— damaged pins
— pushed-out pins
• Connect all the SJB connectors and make sure they seat correctly.
• Operate the system and verify the concern is still present.
• Is the concern still present?</td></tr>
</table>

Pinpoint Test C: The Control Illumination Is Always On — All Hardwired Illumination

Refer to Wiring Diagrams Cell 71, Cluster and Panel Illumination for schematic and connector information.

DIAGNOSIS AND TESTING (Continued)

Normal Operation

When the headlamp switch is placed in the PARKING or HEADLAMP ON position, the smart junction box (SJB) supplies either a pulse width modulated (PWM) signal or 12 volts to the various backlighting sources in the instrument panel, doors and console.

- DTC B2027 (LED Backlighting Output Circuit Failure) — is a continuous and on-demand DTC that sets when the SJB detects a short to voltage on the LED backlighting circuits.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- SJB

PINPOINT TEST C: THE CONTROL ILLUMINATION IS ALWAYS ON — ALL HARDWIRED ILLUMINATION

NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

Test Step		Result / Action to Take
C1	**CHECK FOR RECORDED SJB DTCS FROM THE ON-DEMAND SELF-TEST**	
	• Use the recorded results from the SJB self-test. • **Is DTC B2027 recorded?**	**Yes** GO to C2. **No** GO to C3.
C2	**CHECK CIRCUITS 1403 (BK/WH), 19 (LB/RD), 293 (OG/RD), 203 (OG/LB), 2023 (YE/LB), 2030 (YE/WH) AND 1425 (GY/WH) FOR A SHORT TO VOLTAGE**	
	• Key in OFF position. • Disconnect: SJB C2280b. • Disconnect: SJB C2280e. • Disconnect: SJB C2280f. • Key in ON position. • **Do the dimmable backlighted components continue to illuminate?**	**Yes** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test. **No** GO to C3.
C3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB . REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test D: One Or More Smart Junction Box (SJB) Controlled Illumination Source(s) Is Inoperative

Refer to Wiring Diagrams Cell 71, Cluster and Panel Illumination for schematic and connector information.

Normal Operation — Dimmable Backlighting

With the parking lamps on, a voltage signal is supplied to the instrument panel dimmer switch through circuit 1036 (BN/WH) from the SJB. The dimmer switch passes this voltage through a variable resistor and then returns the signal to the SJB on circuit 1035 (OG/RD). The SJB uses the return signal to determine the backlighting intensity desired by the operator. A pulse-width modulated (PWM) signal is sent from the SJB to each of the dimmable backlights maintaining the operator's desired level of lighting intensity.

DIAGNOSIS AND TESTING (Continued)

Non-Dimmable Backlighting

When the ignition switch is placed in the ACCY or the ON position, a voltage signal is supplied to the SJB. The SJB activates the accessory delay relay, supplying voltage to the non-dimmable backlights.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Illuminated component
- Clockspring
- Speed control switch
- SJB

PINPOINT TEST D: ONE OR MORE SMART JUNCTION BOX (SJB) CONTROLLED ILLUMINATION SOURCE(S) IS INOPERATIVE

NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>D1</td><td>CHECK THE INSTRUMENT PANEL ILLUMINATION OPERATION
• Key in ON position.
• Place the headlamp switch in the PARKLAMP position.
• Rotate the dimmer switch to the maximum brightness position.
• Monitor all instrument panel illumination sources for correct operation.
• Are all the instrument panel illumination sources inoperative?</td><td>Yes
GO to Pinpoint Test A.
No
If the inoperative illumination source(s) are non-dimmable, GO to D2.
For all others, GO to D6.</td></tr>
<tr><td>D2</td><td>CHECK THE DOOR LOCK CONTROL SWITCH LAMP GROUND CIRCUIT 1205 (BK) FOR AN OPEN
• Disconnect: Suspect Door Lock Control Switch.
• Measure the resistance between the suspect door lock control switch, harness side and ground as follows:
<table>
<tr><th>Suspect Door Lock Control Switch</th><th>Connector-Pin</th><th>Circuit</th></tr>
<tr><td>Driver door lock control switch</td><td>C505-1</td><td>1205 (BK)</td></tr>
<tr><td>Passenger door lock control switch</td><td>C605-1</td><td>1205 (BK)</td></tr>
</table>
• Is the resistance less than 5 ohms?</td><td>Yes
GO to D3.
No
REPAIR the circuit in question. TEST the system for normal operation.</td></tr>
<tr><td>D3</td><td>CHECK THE DOOR LOCK CONTROL SWITCH CIRCUIT FOR VOLTAGE
• Key in ON position.
• Measure the voltage between the suspect door lock control switch, harness side and ground as follows:
<table>
<tr><th>Door Lock Control Switch</th><th>Connector-Pin</th><th>Circuit</th></tr>
<tr><td>Driver door lock control switch</td><td>C505-3</td><td>985 (RD/LB)</td></tr>
<tr><td>Passenger door lock control switch</td><td>C605-3</td><td>984 (YE/LB)</td></tr>
<tr><td>Rear window control switch</td><td>C566-5</td><td>333 (YE/RD)</td></tr>
</table>
• Is the voltage greater than 10 volts?</td><td>Yes
INSTALL a new door lock control switch. REFER to Section 501-14. TEST the system for normal operation.
No
REPAIR the circuit in question for an open. TEST the system for normal operation.</td></tr>
</table>

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D: ONE OR MORE SMART JUNCTION BOX (SJB) CONTROLLED ILLUMINATION SOURCE(S) IS INOPERATIVE (Continued)

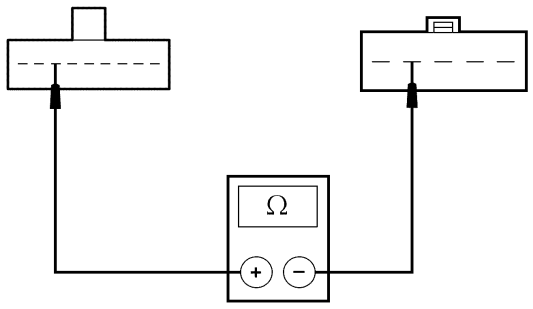
<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>D4</td><td>CHECK THE DIMMABLE BACKLIGHTING OPERATION</td><td rowspan="2">Yes
GO to Pinpoint Test A.
No
GO to D5.</td></tr>
<tr><td colspan="2">• Monitor all instrument panel illumination dimmable sources for correct operation.
• Are all the instrument panel dimmable illumination sources inoperable?</td></tr>
<tr><td>D5</td><td>CHECK THE INOPERABLE ILLUMINATED COMPONENT CIRCUIT FOR VOLTAGE</td><td rowspan="2">Yes
GO to D6.
No
REPAIR the circuit in question. TEST the system for normal operation</td></tr>
<tr><td colspan="2">• Disconnect: Suspect Illuminated Component.
• Turn the parking lamps on and rotate the instrument panel dimmer switch to the full intensity position.
• Measure the voltage between the suspect illuminated component and ground as follows:

<table>
<tr><th>Suspect Illuminated Component Location</th><th>Connector-Pin</th><th>Circuit</th></tr>
<tr><td>Ambient lighting switch (if equipped)</td><td>C3347-7</td><td>VLN04 (VT/GY)</td></tr>
<tr><td>Transmission range (TR) indicator</td><td>C307-4</td><td>19 (LB/RD)</td></tr>
<tr><td>Speed control switch</td><td>C2274-3</td><td>203 (OG/LB)</td></tr>
<tr><td>Convertible top switch (if equipped)</td><td>C9013-8</td><td>293 (OG/RD)</td></tr>
<tr><td>Instrument panel dimmer switch</td><td>C2298-3</td><td>1403 (BK/WH)</td></tr>
<tr><td>Climate control assembly</td><td>C294a-2</td><td>1425 (GY/WH)</td></tr>
<tr><td>Headlamp switch</td><td>C205-2</td><td>2023 (YE/LB)</td></tr>
<tr><td>Hazard flasher switch</td><td>C2039-6</td><td>2029 (LB/WH)</td></tr>
<tr><td>Message center switch</td><td>C253-1</td><td>2030 (YE/WH)</td></tr>
</table>
• Is the voltage greater than 10 volts?</td></tr>
<tr><td>D6</td><td>CHECK GROUND CIRCUIT TO THE ILLUMINATED COMPONENT FOR AN OPEN</td><td rowspan="2"></td></tr>
<tr><td colspan="2">• Turn the headlamp switch OFF.
• Key in OFF position.
• Disconnect: Suspect Illuminated Component.
• Measure the resistance between the inoperative illuminated component, harness side and ground as follows:</td></tr>
</table>

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D: ONE OR MORE SMART JUNCTION BOX (SJB) CONTROLLED ILLUMINATION SOURCE(S) IS INOPERATIVE (Continued)

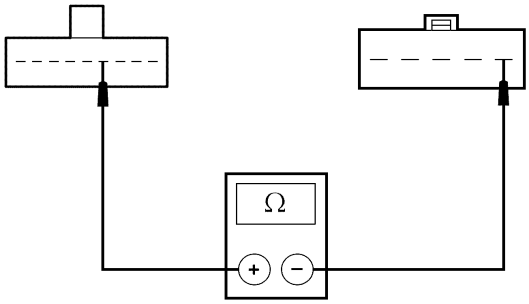
<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>D6</td><td>CHECK GROUND CIRCUIT TO THE ILLUMINATED COMPONENT FOR AN OPEN (Continued)</td><td rowspan="2">Yes
For the speed control switch, GO to D7.
For all others, INSTALL a new component. TEST the system for normal operation.
No
REPAIR the circuit in question. TEST the system for normal operation.</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Suspect Illuminated Component Location</th><th>Connector-Pin</th><th>Circuit</th></tr>
<tr><td>Ambient lighting switch (if equipped)</td><td>C3347-4</td><td>GD908 (BK)</td></tr>
<tr><td>Transmission range (TR) indicator</td><td>C307-1</td><td>1205 (BK)</td></tr>
<tr><td>Speed control switch</td><td>C2274-6</td><td>1205 (BK)</td></tr>
<tr><td>Convertible top switch (if equipped)</td><td>C9013-3</td><td>1205 (BK)</td></tr>
<tr><td>Climate control assembly</td><td>C294a-1</td><td>1205 (BK)</td></tr>
<tr><td>Headlamp switch</td><td>C205-1</td><td>1205 (BK)</td></tr>
<tr><td>Hazard flasher switch</td><td>C2039-1</td><td>1205 (BK)</td></tr>
<tr><td>Message center switch</td><td>C253-4</td><td>1205 (BK)</td></tr>
</table>
• Is the resistance less than 5 ohms?
</td></tr>
<tr><td>D7</td><td>CHECK THE CLOCKSPRING FOR AN OPEN
• Remove the driver air bag module. Refer to Section 501-20B.
• Disconnect: Steering Wheel Control Harness.
• Measure the resistance between the clockspring C2274 pin 3, component side, and the top of the clockspring pin 1, component side.
 

N0072737</td><td></td></tr>
</table>

(Continued)

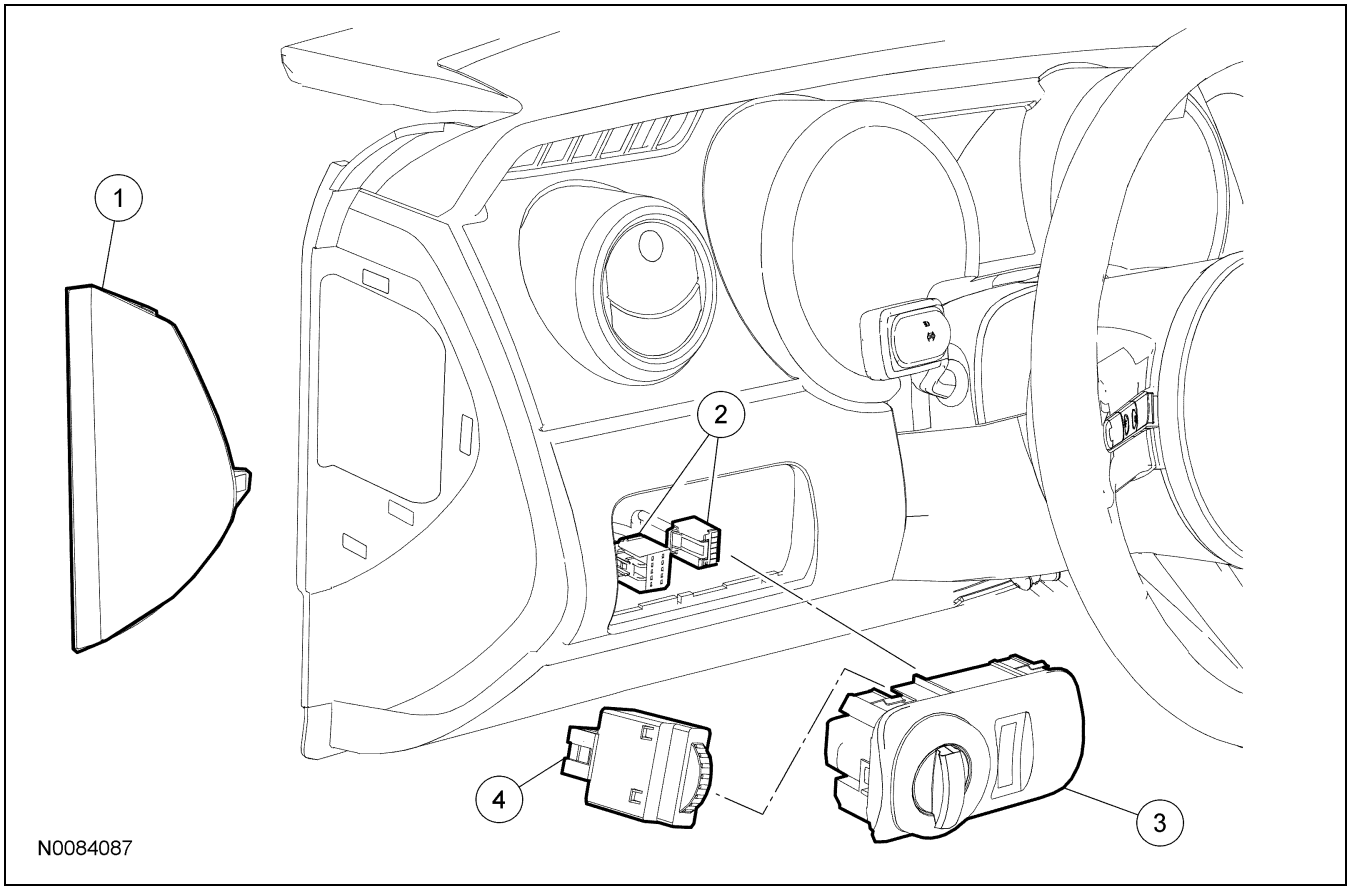
DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D: ONE OR MORE SMART JUNCTION BOX (SJB) CONTROLLED ILLUMINATION SOURCE(S) IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
D7	**CHECK THE CLOCKSPRING FOR AN OPEN (Continued)**	
	• Measure the resistance between the clockspring C2274 pin 6, component side and the top of the clockspring pin 4, component side.  N0072738 • **Are the resistances less than 5 ohms?**	**Yes** INSTALL a new speed control switch. REFER to Section 310-03. INSTALL the driver air bag module. REFER to Section 501-20B. TEST the system for normal operation. **No** INSTALL a new clockspring. REFER to Section 501-20B. INSTALL the driver air bag module. REFER to Section 501-20B. TEST the system for normal operation.
D8	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

REMOVAL AND INSTALLATION

Instrument Panel Dimmer Switch



Item	Part Number	Description
1	6304481	Instrument panel side finish panel
2	11654	Headlamp switch
3	—	Headlamp switch electrical connectors (part of 14401)
4	11691	Instrument panel dimmer switch

Removal and Installation

1. Remove the instrument panel side finish panel.
2. **NOTE:** The headlamp switch is removed by pushing from behind.

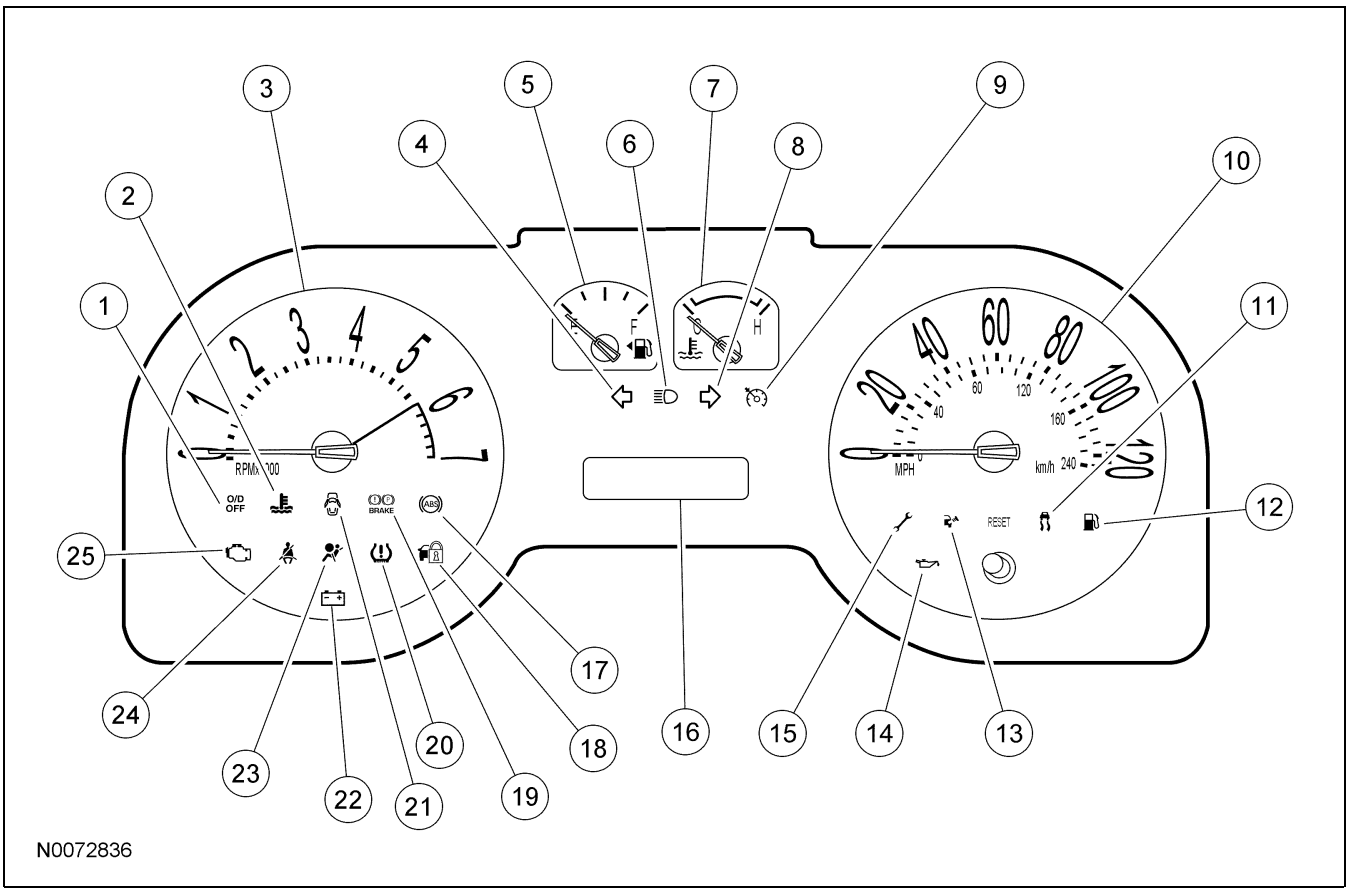
   Remove the headlamp switch.
   - Disconnect the electrical connectors.
3. **NOTE:** The instrument panel dimmer switch is removed by releasing the tabs and pulling from behind.

   Release the tabs and remove the instrument panel dimmer switch assembly.
4. To install, reverse the removal procedure.

DESCRIPTION AND OPERATION

Instrument Cluster (IC)

NOTE: Base 4.0L and 4.6L instrument cluster.



N0072836

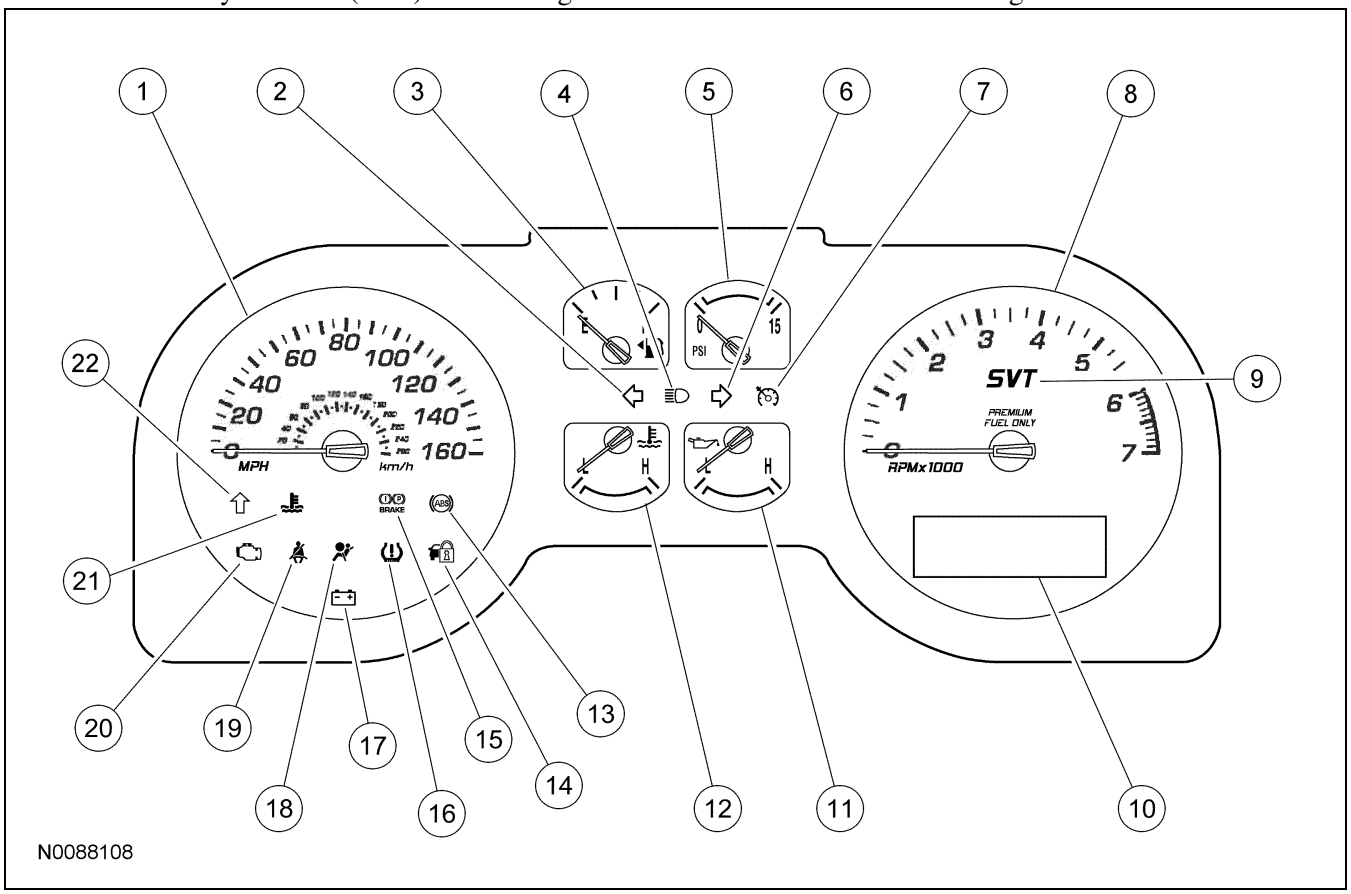
Item	Part Number	Description
1	—	Overdrive (O/D) off indicator
2	—	Engine over temperature warning indicator
3	—	Tachometer
4	—	LH turn indicator
5	—	Fuel gauge
6	—	High beam indicator
7	—	Engine coolant temperature gauge
8	—	RH turn indicator
9	—	Speed control indicator
10	—	Speedometer
11	—	Traction control indicator
12	—	Low fuel warning indicator
13	—	Check fuel cap indicator
14	—	Low oil pressure warning indicator

(Continued)

Item	Part Number	Description
15	—	Powertrain malfunction (wrench) indicator
16	—	Integrated circuit display
17	—	ABS warning indicator
18	—	Anti-theft indicator
19	—	Brake warning indicator
20	—	Tire pressure monitoring system (TPMS) warning indicator
21	—	Door ajar warning indicator
22	—	Charging system warning indicator
23	—	Air bag warning indicator
24	—	Safety belt warning indicator
25	—	Malfunction indicator lamp (MIL)

DESCRIPTION AND OPERATION (Continued)

NOTE: The Shelby GT 500 (5.4L) and message center cluster shown. Other message center clusters similar.



Item	Part Number	Description
1	—	Speedometer
2	—	LH turn indicator
3	—	Fuel gauge
4	—	High beam indicator
5	—	Boost gauge
6	—	RH turn indicator
7	—	Speed control indicator
8	—	Tachometer
9	—	Performance shift indicator
10	—	Message center display
11	—	Oil pressure gauge
12	—	Engine coolant temperature gauge

(Continued)

Item	Part Number	Description
13	—	ABS warning indicator
14	—	Anti-theft indicator
15	—	Brake warning indicator
16	—	Tire pressure monitoring system (TPMS) warning indicator
17	—	Charging system warning indicator
18	—	Air bag warning indicator
19	—	Safety belt warning indicator
20	—	Malfunction indicator lamp (MIL)
21	—	Engine over temperature warning indicator
22	—	Upshift indicator

DESCRIPTION AND OPERATION (Continued)

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

The instrument cluster (IC) is available either with a message center or without a message center (base cluster). The instrument cluster (IC) contains gauges, indicator lamps, and warning lamps that are designed to provide the driver with system status, and to alert the driver that certain conditions exist in the vehicle. Gauges provide information to the driver indicating the status of systems. Examples of the gauges include vehicle speed, fuel level, engine coolant temperature, and engine rpm. Indicator lamps provide information to the driver of conditions that exist in the vehicle. The indicator lamps include the turn signal, high beam, and speed control. Warning indicator lamps provide information to the driver of conditions that could potentially alter vehicle performance. Examples of the warning indicators include the ABS, BRAKE, and low oil pressure. The instrument cluster (IC) lens is the only part that may be installed separately.

DESCRIPTION AND OPERATION

Information And Message Center

The message center is a Vacuum Fluorescent (VF), fixed format display that is integrated into the center of the Instrument Cluster (IC). The message center functions are controlled by the message center switches. The message center displays important vehicle information by constantly monitoring different vehicle systems. The message center displays a warning message pertaining to the system in which a fault has been detected. Refer to the Owner's Literature for operating instructions.

The message center provides the following features:

- Information displays
- Setup displays
- Warning messages
- System check messages

The message center information can be selected through a set of 3 buttons:

- SET
- INFO
- RESET

Information Mode

The information displays are non-timed modes. The selected mode remains on until the driver presses a message center button to change the mode or it is overridden by another mode. The information display modes are:

- Trip/total odometer
- Trip odometer
- Distance To Empty (DTE)
- Average fuel economy
- Fuel used
- Instantaneous fuel economy
- Trip elapsed drive time
- Average speed
- Blank display

Setup Mode

The setup mode provides a list of items that can be configured by the driver. The setup modes are:

- SYSTEM CHECK
- COLOR SELECTION
- UNITS (English/Metric)
- DISPLAY MODE (Single/Dual)
- LANGUAGES

Warnings Mode

A single chime sounds when a warning message is displayed. The warning messages display once whenever the ignition switch is turned to the ON position or a fault occurs in a system.

The warning messages are:

- DRIVER DOOR AJAR
- PASSENGER DOOR AJAR
- TRUNK AJAR
- CHECK CHARGING SYSTEM
- CHECK FUEL CAP
- CHECK TRAC CONTROL
- LOW BRAKE FLUID LEVEL
- BRAKE SYSTEM FAILURE
- PARK BRAKE ON
- LOW FUEL LEVEL
- LOW OIL PRESSURE
- TURN SIGNAL ON

System Check

Selecting this function from the SETUP menu causes the message center to cycle through each of the systems being monitored. For each of the monitored systems, the message center indicates either an OK message or a warning message for 2 to 4 seconds. The sequence of the system check report is as follows:

- OIL PRESSURE OK
- CHARGING SYSTEM OK
- DRIVERS DOOR CLOSED
- PASSENGER DOOR CLOSED
- TRUNK CLOSED
- BRAKE SYSTEM OK
- TRAC CONTROL OK
- FUEL CAP OK
- FUEL LEVEL OK
- XXX MILES TO EMPTY

DESCRIPTION AND OPERATION (Continued)

Performance Mode Configuration (Shelby GT 500 Only)

The message center provides the ability to configure the performance shift warning indicator and the performance shift warning chime features independent of each other. The 2 configurable items for each feature are the feature on/off and the shift points (engine rpm). Refer to Message Center Configuration in this section for configuring these 2 items.

DESCRIPTION AND OPERATION

Warning Chimes

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

The warning device system consists of the following:

- Instrument cluster (IC)
- Safety belt warning indicator switch (part of the safety belt buckle)
- Door ajar switch
- Key-in-ignition warning switch (part of the ignition switch)
- SJB

The warning chimes are designed to provide the driver with an audible warning that acts as a supplemental alert. The only deviation from this strategy is the air bag chime which is used to alert the driver that the primary alerting system does not operate. The instrument cluster (IC) controls all warning chimes based on hardwired inputs and network messages received from external modules.

The warning chime sounds to remind the driver:

- to turn the headlamps off when exiting the vehicle.
- to remove the ignition key when exiting the vehicle.
- to close the doors/decklid after starting the vehicle.
- to fasten the safety belt after starting the vehicle.
- to disengage the parking brake while driving the vehicle.
- to turn off the turn signal while driving the vehicle.

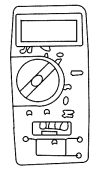
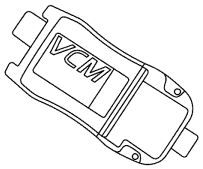
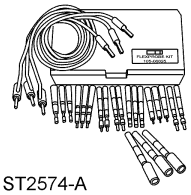
The instrument cluster (IC) uses various inputs to determine when to sound the warning chime. The warning chime sounds:

- if the headlamps are left on with the ignition switch in the OFF position and the driver door ajar.
- if the key is in the ignition in the OFF position, with the ignition key removed, and the driver door ajar.
- if a door/decklid is ajar while the ignition switch is in the RUN position.
- the safety belts are not fastened and the ignition switch is in the RUN position.
- the parking brake is engaged while the vehicle is in motion.
- the turn signal is left on for more than 0.8 km (0.5 mile).
- the air bag warning indicator is inoperative when there are DTCs present.

DIAGNOSIS AND TESTING

Instrument Cluster (IC), Message Center and Warning Chimes

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit 105-R025C or equivalent

Principles of Operation

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

The instrument cluster (IC) utilizes a microprocessor to control the gauge, indicator, message center and warning chimes functions. Data is sent to the instrument cluster (IC) over the high speed controller area network (HS-CAN) bus lines and through hardwired circuitry from individual components. The instrument cluster (IC) uses each input to output an action to the gauges, indicators, message center and warning chimes.

The instrument cluster (IC) uses input messages from other modules to control the gauges, informational indicators, warning indicators, message center and warning chimes over the communication networks. If a required message is missing or invalid for less than 5 seconds, the gauge or indicator that requires the message remains at the last commanded state based upon the last known good message. For example, if the brake status message is missing for less than 5 seconds and the brake warning indicator was ON, the indicator remains in the ON state until the next good message is received. If the message remains missing or invalid for greater than 5 seconds, the instrument cluster (IC) sets a U-code DTC and the output becomes a default action for the indicator or gauge. Each indicator or gauge utilizes a different default strategy depending on the nature of the indication. Refer to the normal operation descriptions located before each individual pinpoint test for further description of the default action specific to each indicator or gauge. If the messaged input to the cluster returns at any time, the normal function of the gauge or indicator resumes.

NOTE: Whenever a network message is suspected as missing and confirmed by a missing message DTC (U-code), it is important to look for other symptoms that may also be present in the instrument cluster (IC) and throughout the vehicle. Once a DTC is set in the instrument cluster (IC), it may be helpful to review the complete message list available in Section 418-00 to see what other modules also rely on the same message and run the self-test for those modules. If the message is missing from other modules, the same DTC may also be set in those modules. Confirmation of missing messages common to multiple modules may indicate that the originating module is the source of the concern or the communication network may be experiencing some problems.

It is very important to understand:

- where the input originates.
- all the information necessary in order for a feature to operate.
- which module(s) receive(s) the input or command message.

DIAGNOSIS AND TESTING (Continued)

- does the module which received the input control the output of the feature, or does it output a message over the communication network to another module.
- which module controls the output of the feature.

Instrument Cluster

Instrument Cluster (IC) Gateway Function

The instrument cluster (IC) acts as a gateway module by receiving information in one format and transmitting it to other modules using another format. For example, the instrument cluster (IC) receives the vehicle speed data from the PCM over the high speed controller area network (HS-CAN), converts the data into a medium speed controller area network (MS-CAN) message and sends (gateways) the message to other network modules such as the heating ventilation air conditioning (HVAC) module, the audio control module (ACM), and the SJB. This enables network communication between modules that do not communicate using the same network (HS-CAN or the MS-CAN).

Instrument Cluster (IC) Configuration

The instrument cluster (IC) contains items that are configurable. All configurable items are configured at the end of the line production and only available for configuration using programmable module installation (PMI) or As-Built data. Refer to Section 418-01 for additional information on PMI module configuration.

Instrument Cluster (IC) Prove-Out

The instrument cluster (IC) and other vehicle modules carry out a display prove-out to verify that all module controlled warning/indicator lamps and monitored systems are functioning correctly within the instrument cluster (IC). When the ignition switch is cycled to the ON position with the engine off, the indicators illuminate to prove-out according the following table:

Indicator	Indicator Type	Prove-Out Duration
Air bag	Warning	6 seconds
ABS	Warning	3 seconds
Anti-theft indicator	Informational	3 seconds
Brake	Warning	3 seconds
Charge	Informational	Engine start up
Check fuel cap	Informational	3 seconds
Door ajar	Informational	No prove-out
Engine over temperature	Warning	3 seconds
High beam	Informational	No prove-out
Low engine oil pressure	Warning	Engine startup
Low fuel	Informational	3 seconds
Malfunction indicator lamp (MIL)	Warning	Engine startup
Overdrive (O/D) off	Informational	No prove-out
RH/LH turn signals	Informational	No prove-out
Safety belt	Warning	65 seconds if the safety belt is unbuckled, turns off when the safety belt is buckled
Speed control	Informational	No prove-out
Tire pressure monitoring system (TPMS)	Warning	3 seconds
Traction control	Informational	3 seconds
Powertrain malfunction (wrench)	Informational	3 seconds

DIAGNOSIS AND TESTING (Continued)

Information And Message Center

The message center is a vacuum fluorescent display, which is part of the instrument cluster (IC). The message center electronic functions use both hardwired and controller area network (CAN) circuits to transmit and receive information.

Warning Chimes

Chime Characteristics

Each warning chime has unique characteristics that help to identify and differentiate each warning chime. The warning chimes use volume, chime frequency, length of time the chime sounds and the number of chime tones to identify which chime is sounding. The instrument cluster (IC) prioritizes the chimes according to a preset hierarchy programmed into the instrument cluster (IC) software. When more than one chime request is received by the instrument cluster (IC), the most important chime sounds. If a lower priority chime is currently sounding, the higher priority request takes over and replaces the lower priority chime.

Safety Belt Warning Chime

The safety belt warning chime is activated when the ignition switch is in the RUN position and the RCM detects an unbuckled driver safety belt. The instrument cluster (IC) generates the chime for a duration of 6 seconds or until the safety belt is buckled.

Belt-Minder®

The Belt-Minder® feature supplements the current safety belt warning function. The Belt-Minder® feature is enabled after the current safety belt warning is complete. The Belt-Minder® reminds the driver that his/her safety belt is unbuckled by intermittently sounding a chime and illuminating the safety belt warning lamp in the instrument cluster (IC) once the vehicle speed has exceeded 5 km/h (3 mph). While activated, the Belt-Minder® alternates the chime and indicator from ON for 6 seconds, to OFF for 30 seconds.

NOTE: The Belt-Minder® is a configurable item. To configure without using a scan tool, refer to Belt-Minder® Deactivating/Activating in this section.

The Belt-Minder® reminder stops when:

- the driver or passenger safety belt is buckled.
- the ignition switch is turned to the OFF or ACC position.
- five minutes have elapsed since Belt-Minder® has started.

Key-In-Ignition Warning Chime

When the key-in-ignition switch closes, it sends a voltage signal to the instrument cluster (IC), which then sounds a warning chime, provided the ignition key is in the ignition lock cylinder, the ignition switch is in the OFF position, and the driver door is open. The instrument cluster (IC) sounds a steady tone, which continues until the key is removed, the ignition switch is rotated to the RUN position, or the driver door is closed.

Air Bag Warning Chime

The air bag warning chime warns the driver that a fault has occurred in the supplemental restraints system (SRS) and that the air bag warning indicator lamp is not working by sounding a chime when the ignition switch is in the RUN position for more than 20 seconds. When these conditions exist, the restraints control module (RCM) sends a chime request through the communication network to the instrument cluster (IC). The instrument cluster (IC) then activates the warning chime. The warning consists of 5 sets of five 1-second tone bursts. Each set is separated by 5 seconds of silence. The warning is repeated every 30 minutes.

Door/Trunk Ajar Warning Chime

The door/trunk ajar warning chime warns that a door, or the trunk, is not fully closed. The chime sounds when any door or the trunk becomes ajar while the ignition switch is in the RUN position.

Headlamps On Warning Chime

The headlamps on warning chime is activated when the instrument cluster (IC) receives the parking lamps ON message from the SJB, the key is out of the ignition, and the driver door is ajar. The warning consists of repeated one-half second bursts and continues to sound until the exterior lamps are turned off, the driver door is closed, or 10 minutes have elapsed, at which time the battery saver turns the exterior lamps off.

DIAGNOSIS AND TESTING (Continued)

Message Center Warning Chime

The message center warning chime accompanies any initial warning message display, as well as any repeated initial warning message. As the message center is an integral part of the instrument cluster (IC), the interaction between the message center and the chime function is also integral to the instrument cluster (IC).

The message center switch tone sounds when any switch on the message center is pressed. The message center switches are supplied with a voltage reference signal from the instrument cluster (IC). When a switch is pressed, it routes the signal through a specific resistor in the switch assembly and then to ground.

Performance Shift Warning Chime

The performance shift warning chime provides an audible alert to inform the driver to shift the transmission gear. The chime is configured through the message center independently of the visual performance shift indicator. The chime feature on/off status and the desired rpm for the chime to sound are configurable items. The instrument cluster (IC) uses engine data rpm sent to the instrument cluster (IC) over the high speed controller area network (HS-CAN) communication lines and compares the value against the customer preset engine rpm to determine when to sound the chime. When the actual engine rpm matches the preset engine rpm, the instrument cluster (IC) sounds the chime.

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Accessory drive belt • Brake fluid level • Door/trunk ajar status • Engine coolant level • Engine oil level • Fuel cap status • Fuel level • Fuel tank • Tire pressure	• Smart junction box (SJB): — 8 (10A) — 16 (5A) — 19 (5A) • Wiring, terminals or connectors • Message center switches • Key-in ignition warning switch (part of the ignition switch) • Smart junction box (SJB) • Instrument cluster (IC)

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. **NOTE:** Make sure to use the latest scan tool software release.

   If the cause is not visually evident, connect the scan tool to the data link connector (DLC).
5. **NOTE:** The vehicle communication module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

   If the scan tool does not communicate with the VCM:

   - Check the VCM connection to the vehicle.
   - Check the scan tool connection to the VCM.
   - Refer to Section 418-00, No Power To The Scan Tool, to diagnose no communication with the scan tool.
6. If the scan tool does not communicate with the vehicle:

   - Verify the ignition key is in the ON position.
   - Verify the scan tool operation with a known good vehicle.
   - Refer to Section 418-00 to diagnose no response from the PCM.
7. Carry out the network test.

   - If the scan tool responds with no communication for one or more modules, refer to Section 418-00.
   - If the network test passes, retrieve and record the continuous memory DTCs.

DIAGNOSIS AND TESTING (Continued)

8. Clear the continuous DTCs and carry out the self-test diagnostics for the instrument cluster (IC), ABS module, PCM, SJB and restraints control module (RCM).
9. If the DTCs retrieved are related to the concern, go to DTC Charts.
10. If no DTCs related to the concern are retrieved, GO to Symptom Chart — Instrument Cluster (IC), GO to Symptom Chart — Information And Message Center or GO to Symptom Chart — Warning Chimes.

DTC Charts

Instrument Cluster (IC) DTC Chart

DTC	Description	Action
B1202	Fuel Sender Circuit Open (fuel pump module sender)	GO to Pinpoint Test B.
B1204	Fuel Sender Circuit Short To Ground (fuel pump module sender)	GO to Pinpoint Test B.
B1205	EIC Switch-1 Assembly Circuit Failure	GO to Pinpoint Test AJ.
B1317	Battery Voltage High	CLEAR the DTCs. REPEAT the self-test. If DTC B1317 is retrieved, REFER to Section 414-00 to diagnose the charging system for overcharging.
B1318	Battery Voltage Low	GO to Pinpoint Test AO.
B1342	ECU is Faulted	INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
B1353	Ignition Key-In Circuit Open	GO to Pinpoint Test AL.
B1556	Ignition RUN/START Circuit Open	GO to Pinpoint Test A.
B1557	Ignition RUN/START Circuit Short to Battery	GO to Pinpoint Test AP.
B2143	NVM Memory Failure	CLEAR the DTCs. REPEAT the self-test. If the DTC is still present, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
B236A	Chime Output Open	CLEAR the DTCs. REPEAT the self-test. If the DTC is still present, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
B2477	Module Configuration Failure	CONFIGURE the instrument cluster (IC). REFER to Section 418-01. CLEAR the DTCs. REPEAT the self-test. If DTC B2477 returns, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section.
B2627	Fuel Sender Circuit Open #2 (fuel sender)	GO to Pinpoint Test B.
B2628	Fuel Sender Circuit Short to Ground #2 (fuel sender)	GO to Pinpoint Test B.
B2879	Fuel Tank Jet Pump Fault	GO to Pinpoint Test B.

DIAGNOSIS AND TESTING (Continued)

Instrument Cluster (IC) DTC Chart (Continued)

DTC	Description	Action
B2903	Chime Output Circuit Short To Battery	CLEAR the DTCs. REPEAT the self-test. If the DTC is still present, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
B2940	Chime Output Circuit Short To Ground	CLEAR the DTCs. REPEAT the self-test. If the DTC is still present, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
C1093	Traction Control Disable Switch Circuit Failure	REFER to Section 206-09.
U0073	Control Module Communication Bus A Off	REFER to Section 418-00.
U1900	CAN Communication Bus Fault - Receive Error	REFER to Section 418-00.
U2023	Fault Received From External Node	U2023 is set when a module receives invalid network data from another module with a faulted input. RETRIEVE and REPAIR all non-network DTCs in the other modules on the network. REFER to Section 419-10 for a list of all DTCs.
U2050	No Application Present	REPROGRAM the instrument cluster (IC). If the DTC occurs after a software reprogram, REPROGRAM the instrument cluster (IC) again. If the DTC reappears after each attempt to reprogram, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
All other DTCs	—	REFER to Section 419-10.

Smart Junction Box (SJB) DTC Chart

DTC	Description	Action
B1201	Fuel Sender Circuit Failure (fuel pump module sender)	GO to Pinpoint Test B.
B1202	Fuel Sender Circuit Open (fuel pump module sender)	GO to Pinpoint Test B.
B2479	Brake Park Switch Circuit Short to Ground	GO to Pinpoint Test M.
B2627	Fuel Sender Circuit Open #2 (fuel sender)	GO to Pinpoint Test B.
B2628	Fuel Sender Circuit Short to Ground #2 (fuel sender)	GO to Pinpoint Test B.
C1189	Brake Fluid Level Sensor Input Short Circuit to Ground	GO to Pinpoint Test M.
All other DTCs	—	REFER to Section 419-10.

DIAGNOSIS AND TESTING (Continued)

PCM DTC Chart

DTC	Description	Action
P0457	Evaporative Emission System Leak Detected (fuel cap loose/off)	GO to Pinpoint Test V.
P0460	Fuel Level Sensor A Circuit	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P0461	Fuel Level Sensor A Circuit Range/Performance	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P0462	Fuel Level Sensor A Circuit Low	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P0463	Fuel Level Sensor A Circuit High	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P2065	Fuel Level Sensor B Circuit	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P2066	Fuel Level Sensor B Circuit Range/Performance	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P2067	Fuel Level Sensor B Circuit Low	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
P2068	Fuel Level Sensor B Circuit High	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual first. If sent here from the PC/ED manual, GO to Pinpoint Test B.
All other DTCs	—	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Symptom Charts

Symptom Chart — Instrument Cluster (IC)

Condition	Possible Sources	Action
• No communication with the instrument cluster (IC)	• Fuse(s) • Wiring, terminals or connectors • Instrument cluster (IC)	• REFER to Section 418-00.
• No communication with the smart junction box (SJB)	• Fuse(s) • Wiring, terminals or connectors • SJB	• REFER to Section 418-00.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Instrument Cluster (IC) (Continued)

Condition	Possible Sources	Action
• The instrument cluster (IC) is inoperative	• Fuse(s) • Wiring, terminals or connectors • Instrument cluster (IC)	• GO to Pinpoint Test A.
• Incorrect fuel gauge indication	• Wiring, terminals or connectors • Fuel pump module • Fuel sender • Fuel tank • SJB • Instrument cluster (IC)	• GO to Pinpoint Test B.
• The boost gauge is inoperative (Shelby GT 500 only)	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test C.
• Incorrect temperature gauge indication	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test D.
• Incorrect voltage gauge indication	• Charging system concern • Instrument cluster (IC)	• GO to Pinpoint Test E.
• The tachometer is inoperative	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test F.
• Incorrect oil pressure gauge indication	• Wiring, terminals or connectors • Engine oil pressure switch • SJB • Instrument cluster (IC)	• GO to Pinpoint Test G.
• The speedometer/odometer is inoperative	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test H.
• Incorrect speedometer indication	• Tire size configuration • Axle ratio configuration • PCM concern • Instrument cluster (IC)	• GO to Pinpoint Test I.
• The low oil pressure warning indicator is never/always on	• Wiring, terminals or connectors • Engine oil pressure switch • SJB • Instrument cluster (IC)	• GO to Pinpoint Test J.
• The engine over temperature warning indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test K.
• The brake warning indicator is never on	• Wiring, terminals or connectors • Parking brake switch • Brake fluid level switch • SJB • Instrument cluster (IC)	• GO to Pinpoint Test L.
• The brake warning indicator is always on	• Wiring, terminals or connectors • Parking brake switch • Brake fluid level switch • SJB • Instrument cluster (IC)	• GO to Pinpoint Test M.
• The ABS warning indicator is never/always on	• ABS module • Instrument cluster (IC)	• GO to Pinpoint Test N.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Instrument Cluster (IC) (Continued)

Condition	Possible Sources	Action
• The air bag warning indicator is never/always on	• Wiring, terminals or connectors • Restraints control module (RCM) • Instrument cluster (IC)	• GO to Pinpoint Test O.
• The safety belt warning indicator is never/always on	• Wiring, terminals or connectors • RCM • Instrument cluster (IC)	• GO to Pinpoint Test P.
• The door ajar warning indicator is never/always on	• SJB • Instrument cluster (IC)	• GO to Pinpoint Test Q.
• The malfunction indicator lamp (MIL) is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test R.
• The powertrain malfunction (wrench) warning indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test S.
• The O/D off indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test T.
• The charging system warning indicator is never/always on	• Charging system concern • PCM • Instrument cluster (IC)	• GO to Pinpoint Test U.
• The check fuel cap indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test V.
• The high beam indicator is never/always on	• SJB • Instrument cluster (IC)	• GO to Pinpoint Test W.
• The turn signal indicator is never/always on	• SJB • Instrument cluster (IC)	• GO to Pinpoint Test X.
• The speed control indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test Y.
• The traction control indicator is never/always on	• ABS module • Instrument cluster (IC)	• GO to Pinpoint Test Z.
• The daytime running lamps (DRL) indicator is never/always on	• SJB • Instrument cluster (IC)	• GO to Pinpoint Test AA.
• The low fuel warning indicator is never/always on	• Instrument cluster (IC)	• GO to Pinpoint Test AB.
• The performance shift warning indicator is never/always on (Shelby GT 500 only)	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test AC.
• The shift indicator is never/always on (Shelby GT 500 only)	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test AD.
• The tire pressure monitoring system (TPMS) warning indicator is never/always on	• TPMS concern • SJB • Instrument cluster (IC)	• GO to Pinpoint Test AE.
• The anti-theft indicator is never/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test AF.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Information And Message Center

Condition	Possible Sources	Action
• The message center is not operating correctly	• Message center switch concern • Instrument cluster (IC)	• GO to Pinpoint Test AG.
• The message center display is blank	• Instrument cluster (IC)	• PRESS the message center INFO button. If the message center display is still blank, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The message center switch does not operate correctly	• Wiring, terminals or connectors • Message center switch • Instrument cluster (IC)	• GO to Pinpoint Test AH.
• The CHECK TRAC CONTROL warning is inoperative	• Instrument cluster (IC)	• CHECK the traction control system for correct operation. — If the traction control system does not operate correctly, REFER to Section 206-09. — If the traction control system operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The TURN SIGNAL ON message is inoperative	• Instrument cluster (IC)	• CHECK the turn signal indicators for correct operation. — If the turn signal indicators do not operate correctly, GO to Pinpoint Test X. — If the turn signal indicators operate correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Information And Message Center (Continued)

Condition	Possible Sources	Action
• The CHECK CHARGING SYSTEM message is inoperative	• Instrument cluster (IC)	• CHECK the charging system warning indicator for correct operation. — If the charging system warning indicator does not operate correctly, GO to Pinpoint Test U. — If the charging system warning indicator operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The BRAKE SYSTEM FAILURE warning is inoperative	• Instrument cluster (IC)	• CHECK the brake warning indicator for correct operation. — If the brake warning indicator does not operate correctly, GO to Pinpoint Test L. — If the brake warning indicator operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The LOW FUEL LEVEL message is inoperative	• Instrument cluster (IC)	• CHECK the fuel gauge for correct operation. — If the fuel gauge does not operate correctly, GO to Pinpoint Test B. — If the fuel gauge operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Information And Message Center (Continued)

Condition	Possible Sources	Action
• The LOW OIL PRESSURE warning is inoperative	• Instrument cluster (IC)	• CHECK the oil pressure gauge for correct operation. — If the oil pressure gauge does not operate correctly, GO to Pinpoint Test G. — If the oil pressure gauge operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The CHECK FUEL CAP message is inoperative/always on	• PCM • Instrument cluster (IC)	• GO to Pinpoint Test AI.
• The DRIVER DOOR, PASSENGER DOOR, AND TRUNK AJAR warning is inoperative	• Instrument cluster (IC)	• CHECK the interior lamps for correct operation. — If the interior lamps do not operate correctly, REFER to Section 417-02. — If the interior lamps operate correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The PARK BRAKE ON message is inoperative	• Instrument cluster (IC)	• CHECK the brake warning indicator for correct operation. — If the brake warning indicator does not operate correctly, GO to Pinpoint Test L. — If the brake warning indicator operates correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Warning Chimes

Condition	Possible Sources	Action
• All the chimes are inoperative	• Instrument cluster (IC)	• INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
• The key-in-ignition chime is inoperative	• Wiring, terminals or connectors • Key-in-ignition switch (part of the ignition switch) • Instrument cluster (IC)	• GO to Pinpoint Test AJ.
• The headlamps on warning chime is inoperative	• Smart junction box (SJB)	• GO to Pinpoint Test AK.
• The chime sounds when the driver door is ajar (no key in the ignition and the headlamps are off)	• Wiring, terminals or connectors • Key-in-ignition switch (part of the ignition switch) • Instrument cluster (IC)	• GO to Pinpoint Test AL.
• The performance shift warning chime does not operate correctly	• Instrument cluster (IC) configuration • Instrument cluster (IC)	• GO to Pinpoint Test AM.
• The safety belt warning chime is inoperative	• Instrument cluster (IC)	• GO to Pinpoint Test AN.
• The Belt-Minder® feature does not operate correctly	• Belt-Minder® deactivated • Instrument cluster (IC)	• GO to Pinpoint Test AN.
• The air bag warning chime does not operate correctly	• Instrument cluster (IC)	• CHECK the operation of the safety belt and air bag warning indicators. — If the safety belt and air bag warning indicators do not operate correctly, GO to Pinpoint Test P (safety belt warning indicator) or GO to Pinpoint Test O (air bag warning indicator). — If the safety belt and air bag warning indicators operate correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart — Warning Chimes (Continued)

Condition	Possible Sources	Action
• The message center switch tone is inoperative	• Instrument cluster (IC)	• CHECK the operation of the message center switch. — If the message center switch do not operate correctly, GO to Pinpoint Test AH. — If the message center switch operate correctly, INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.

Pinpoint Tests

Pinpoint Test A: The Instrument Cluster (IC) Is Inoperative

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

Normal Operation

With the ignition switch in the START or RUN position, the instrument cluster (IC) receives voltage from the smart junction box (SJB) through circuits 489 (PK/BK) and 1266 (RD/YE). With the ignition switch in the OFF position, the instrument cluster (IC) receives its keep-alive voltage from the SJB through circuit 1001 (WH/YE). The instrument cluster (IC) is grounded through circuit 1205 (BK).

- DTC B1556 (Ignition RUN/START Circuit Open) — is a continuous and on-demand DTC that sets in the instrument cluster if the instrument cluster (IC) receives a network message from the SJB indicating that the ignition switch is in the RUN or START position and there is no voltage on the instrument cluster (IC) run/start circuit 489 (PK/BK).

This pinpoint test is intended to diagnose the following:

- Fuse(s)
- Wiring, terminals or connectors
- Instrument cluster (IC)

PINPOINT TEST A: THE INSTRUMENT CLUSTER (IC) IS INOPERATIVE

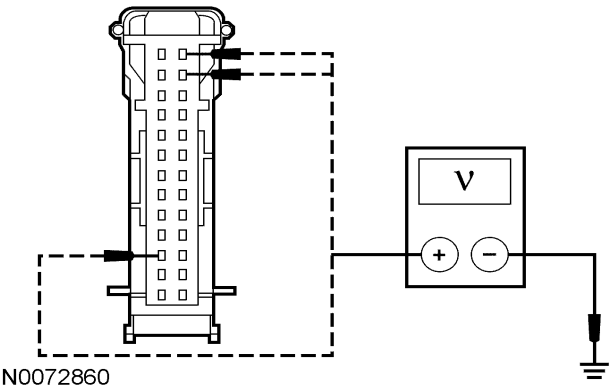
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

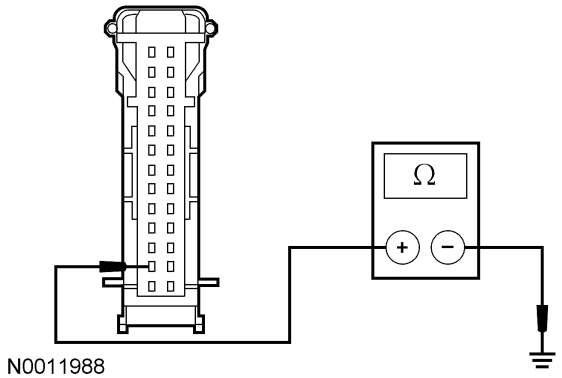
Test Step		Result / Action to Take
A1	**CHECK THE INSTRUMENT CLUSTER (IC) VOLTAGE SUPPLY**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220. • Key in ON position. • Measure the voltage between the instrument cluster (IC), harness side and ground as follows:	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: THE INSTRUMENT CLUSTER (IC) IS INOPERATIVE (Continued)

<table>
<tr><th colspan="2">Test Step</th><th>Result / Action to Take</th></tr>
<tr><td>A1</td><td>CHECK THE INSTRUMENT CLUSTER (IC) VOLTAGE SUPPLY (Continued)</td><td rowspan="2">Yes
GO to A2.
No
VERIFY the SJB fuses 8 (10A), 16 (5A), and 19 (5A) are OK. If OK, REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Instrument Cluster (IC) Connector-Pin</th><th>Circuit</th></tr>
<tr><td>C220-3</td><td>1001 (LG/RD)</td></tr>
<tr><td>C220-25</td><td>1266 (RD/YE)</td></tr>
<tr><td>C220-26</td><td>489 (PK/BK)</td></tr>
</table>


N0072860
• Are the voltages greater than 10 volts?
</td></tr>
<tr><td>A2</td><td>CHECK CIRCUIT 1205 (BK) FOR AN OPEN</td><td rowspan="2">Yes
GO to A3.
No
REPAIR the circuit. TEST the system for normal operation.</td></tr>
<tr><td colspan="2">
• Key in OFF position.
• Measure the resistance between the instrument cluster (IC) C220-2, circuit 1205 (BK) harness side and ground.


N0011988
• Is the resistance less than 5 ohms?
</td></tr>
<tr><td>A3</td><td>CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION</td><td rowspan="2">Yes
INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation.
No
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.</td></tr>
<tr><td colspan="2">
• Disconnect the instrument cluster (IC) connector.
• Check for:
— corrosion
— damaged pins
— pushed-out pins
• Connect the instrument cluster (IC) connector and make sure it seats correctly.
• Operate the system and verify the concern is still present.
• Is the concern still present?
</td></tr>
</table>

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test B: Incorrect Fuel Gauge Indication

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

Normal Operation

The fuel tank is a saddle tank design with variable resistance senders in each side of the tank. The fuel pump module and the fuel sender are driven by floats that provide resistances related to the fuel level on each side of the tank to the smart junction box (SJB). The fuel pump module and the fuel sender uses an approximate resistance range between 15 ohms ± 2 ohms at empty (E) and 160 ohms ± 4 ohms at full (F). The fuel pump module is hardwired to the SJB through the signal circuit 1356 (LG/VT) and the return circuit 1357 (LB/YE). The fuel sender is hardwired to the SJB through the signal circuit 29 (YE/WH) and the return circuit 1357 (LB/YE). The SJB monitors the resistance readings that are sent to the SJB from the fuel pump module and the fuel sender and sends the instrument cluster (IC) a message over the communication network to command the fuel gauge with a corresponding movement of the pointer. If the fuel sender is open, the fuel gauge defaults to the fuel pump sender value only and the fuel gauge indicates E to 1/2 tank. If the fuel pump sender is open, the fuel gauge defaults to the empty position.

The instrument cluster (IC) uses 4 different operating modes to calculate the fuel level:

- Key OFF fueling
- Anti-slosh (default mode)
- Key ON fueling
- Recovery

After a fuel fill up, the time for the fuel gauge to move from empty (E) to full (F) ranges from 2 seconds to 55 minutes depending on which operating mode the fuel gauge is in.

Key Off Fueling Mode

The key OFF fueling mode (2 seconds to read empty [E] to full [F]) requires 3 conditions be met:

- The key must be in the OFF position throughout the entire refueling of the vehicle.
- At least 15% of the vehicle's fuel capacity must be added to the fuel tank.
- The instrument cluster (IC) must receive a valid key ON fuel sender reading within 1 second of the key being put into the RUN position. The key ON sample readings are considered valid if the fuel sender reading is between 15 ohms ± 2 ohms and 160 ohms ± 4 ohms.
- If these conditions are not met, the fuel gauge stays in the anti-slosh mode, which results in a slow to read full (F) event.

Anti-Slosh Mode

The default fuel gauge mode is called the anti-slosh mode. To prevent fuel gauge changes from fuel slosh (gauge instability due to changes in fuel sender readings caused by fuel moving around in the tank), the fuel gauge takes approximately 55 minutes to go from empty (E) to full (F).

Key On Fueling Mode

The key ON fueling mode (approximately 90 seconds to read empty [E] to full [F]) requires 3 conditions be met:

- The transmission is in PARK (P) (automatic transmissions), or the parking brake applied (manual transmissions).
- The key is in the RUN position.
- At least 15% of the vehicle's fuel capacity must be added to the fuel tank.

In key ON fueling mode, a 30-second timer activates after the transmission is put into the PARK (P) position (automatic transmissions) or when the parking brake is applied (manual transmissions). When the 30-second time has elapsed and at least 15% of the vehicle's fuel capacity has been added, the fuel gauge response time is 90 seconds to read from empty (E) to full (F). When the transmission is shifted out of PARK (P) or the parking brake is released, the fuel gauge strategy reverts to the anti-slosh mode. The key ON fueling mode prevents slow to read full events from happening if the customer refuels the vehicle with the key in the RUN position.

DIAGNOSIS AND TESTING (Continued)

Recovery Mode

Recovery mode is incorporated into the instrument cluster (IC) strategy to recover from missing fuel level inputs during a refueling event. Missing fuel level inputs result from intermittent opens in the fuel sender or its circuits. Recovery mode (empty [E] to full [F] approximately 20 minutes) is initiated when the following 2 conditions are met:

- The instrument cluster (IC) is in the anti-slosh (default) mode.
- The actual fuel level in the tank is greater than what is being displayed by the fuel gauge.

Instrument Cluster (IC) DTCs

DTC Description	Fault Trigger Conditions
• B1202 — Fuel Sender Circuit Open)	A continuous DTC set in the instrument cluster (IC) if the message from the SJB indicates an open or short to voltage on the input from circuits 1356 (LG/VT) or 1357 (LB/YE) for 33 seconds.
• B1204 — Fuel Sender Circuit Short To Ground	A continuous DTC set in the instrument cluster (IC) if the message from the SJB indicates a short to ground on the input from circuit 1356 (LG/VT) or if circuit 1356 (LG/VT) is shorted to circuit 1357 (LB/YE) for 33 seconds.
• B2627 — Fuel Sender Circuit Open #2	A continuous DTC set in the instrument cluster (IC) if the message from the SJB indicates an open or short to voltage on the input from circuits 29 (YE/WH) or 1357 (LB/YE).
• B2628 — Fuel Sender Circuit Short To Ground #2	A continuous DTC set in the instrument cluster (IC) if the message from the SJB indicates a short to ground on the input from circuit 29 (YE/WH) or if circuit 29 (YE/WH) is shorted to circuit 1357 (LB/YE).
NOTE: Normal operation of the fuel delivery system allows the fuel sender side of the fuel tank (the side opposite the fuel filler hose inlet) to have less fuel than the fuel pump module side of the tank (the side with the fuel filler hose inlet). B2879 — Fuel Tank Jet Pump Fault	A continuous DTC set in the instrument cluster (IC) if the fuel level message from the SJB indicates a large discrepancy in the amount of fuel between the fuel pump module and the fuel sender sides of the tank. The fuel level in the fuel sender side of the tank (the side opposite the fuel filler hose inlet) has significantly more fuel than the fuel pump module side of the tank (the side with the fuel filler hose inlet).

Smart Junction Box (SJB) DTCs

DTC Description	Fault Trigger Conditions
• B1201 — Fuel Sender Circuit Failure	Sets in the SJB on-demand if the SJB detects a short to ground on the input from circuit 1356 (LG/VT) or if circuit 1356 (LG/VT) is shorted to circuit 1357 (LB/YE).
• B1202 — Fuel Sender Circuit Open	Sets in the SJB on-demand if the SJB detects an open or short to voltage on the input from circuits 1356 (LG/VT) or 1357 (LB/YE).

DIAGNOSIS AND TESTING (Continued)

Smart Junction Box (SJB) DTCs (Continued)

DTC Description	Fault Trigger Conditions
• B2627 — Fuel Sender Circuit Open #2	Sets in the SJB on-demand if the SJB detects an open or short to voltage on the input from circuits 29 (YE/WH) or 1357 (LB/YE).
• B2628 — Fuel Sender Circuit Short To Ground #2	Sets in the SJB on-demand if the SJB detects a short to ground on the input from circuit 29 (YE/WH) or if circuit 29 (YE/WH) is shorted to circuit 1357 (LB/YE).

PCM DTCs

DTC Description	Fault Trigger Conditions
• P0460 — Fuel Level Sensor A Circuit	Sets when the PCM determines the value of the fuel pump module signal is stuck, that the fuel level input signal does not change or does not correspond with the calculated fuel usage.
• P0461 — Fuel Level Sensor A Circuit Range/Performance	Sets when the PCM determines the fuel pump module signal repeatedly moves in and out of range, exceeding the minimum or maximum allowable calibrated parameters for a specified fuel fill percentage in the fuel tank.
• P0462 — Fuel Level Sensor A Circuit Low	Sets in the PCM when the PCM detects a short to ground on the fuel pump module signal circuit based on the messaged input received from the instrument cluster (IC).
• P0463 — Fuel Level Sensor A Circuit High	Sets in the PCM when the PCM detects an open or a short to voltage on the fuel pump module signal circuit based on the messaged input received from the instrument cluster (IC).
• P2065 — Fuel Level Sensor B Circuit	Sets when the PCM determines the value of the fuel level sensor input signal is stuck, that the fuel level input signal does not change or does not correspond with the calculated fuel usage.
• P2066 — Fuel Level Sensor B Circuit Range/Performance	Sets when the PCM determines the fuel level sensor input signal repeatedly moves in and out of range, exceeding the minimum or maximum allowable calibrated parameters for a specified fuel fill percentage in the fuel tank.
• P2067 — Fuel Level Sensor B Circuit Low	Sets in the PCM when the PCM detects a short to ground on the fuel level sensor signal circuit based on the messaged input received from the instrument cluster (IC).
• P2068 — Fuel Level Sensor B Circuit High	Sets in the PCM when the PCM detects an open or a short to voltage on the fuel level sensor signal circuit based on the messaged input received from the instrument cluster (IC).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Fuel pump module
- Fuel sender
- SJB
- Fuel tank
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION

⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

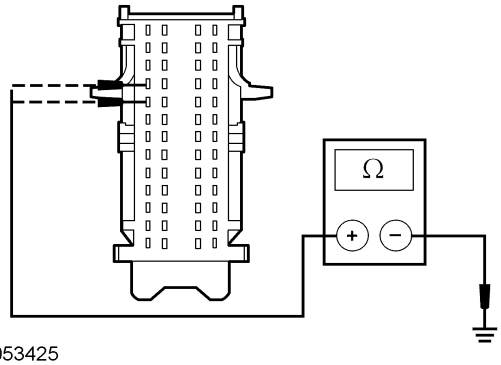
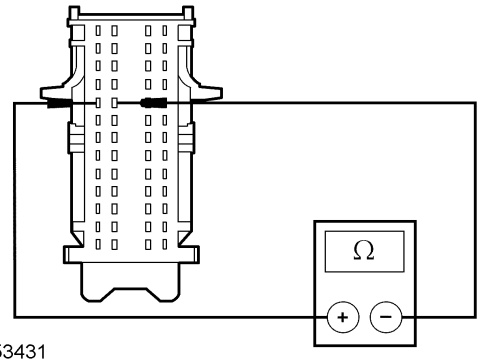
NOTE: Once repairs are complete, clear the SJB, PCM and instrument cluster (IC) DTCs.

Test Step		Result / Action to Take
B1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) FUEL GAUGE ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) fuel gauge (FUEL) active command and scroll the fuel level at: 0%, 50%, and 100%. • **Does the fuel gauge needle start at empty (E), move to half at 50%, and full (F) at 100%?**	**Yes** GO to **B2**. **No** GO to **B22**.
B2	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND INSTRUMENT CLUSTER (IC) AND SJB SELF-TESTS**	
	NOTE: The only instrument cluster (IC) DTC used for diagnosis is B2879. For other instrument cluster (IC) fuel level DTCs, follow the diagnostics for the SJB fuel level DTCs. • Check for recorded instrument cluster (IC) and SJB DTCs from the continuous and on-demand self-tests. • **Are any instrument cluster (IC) or SJB DTCs recorded?**	**Yes** For SJB DTCs B1201 or B2628, GO to **B3**. If both SJB DTCs B1202 and B2627 are retrieved, GO to **B7**. For SJB DTC B1202, GO to **B8**. For SJB DTC B2627, GO to **B13**. For instrument cluster (IC) DTC B2879, GO to **B17**. **No** GO to **B17**.
B3	**CHECK THE FUEL SENDER FOR A SHORT TO GROUND**	
	• Disconnect: Fuel Pump Module C433 (4.0L and 4.6L) or C4331 (5.4L) (DTC B1201) or Fuel Sender C434 (DTC B2628). • Key in ON position. • Wait 1 minute. • Enter the following diagnostic mode on the scan tool: SJB On-Demand Self-Test. • **NOTE:** Make sure to use only the SJB self-test and SJB retrieved DTCs for this step. Once the repairs are complete, clear the SJB, PCM and instrument cluster (IC) DTCs. **NOTE:** It is normal for DTCs B1201 and B2628 to be present during this step and should be ignored. Clear the SJB DTCs. Repeat the SJB on-demand self-test. • **Is DTC B1202 or B2627 retrieved?**	**Yes** For DTC B1201, GO to **B20**. For DTC B2628, INSTALL a new fuel sender. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test. **No** GO to **B4**.
B4	**CHECK CIRCUITS 29 (YE/WH) OR 1356 (LG/VT) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280c.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

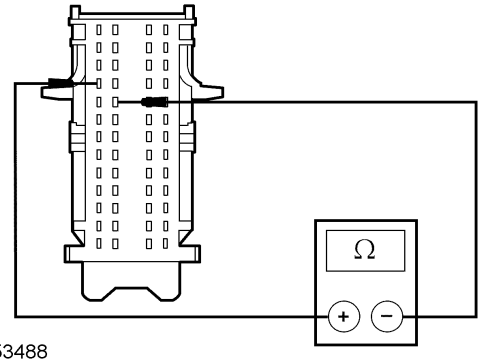
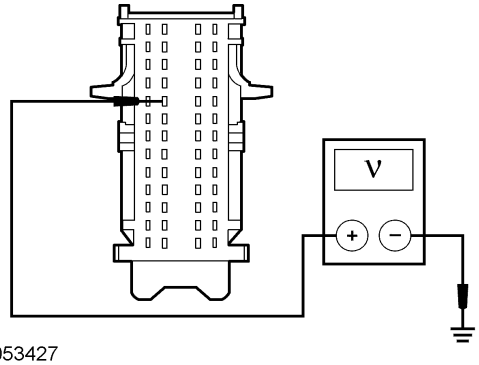
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B4	**CHECK CIRCUITS 29 (YE/WH) OR 1356 (LG/VT) FOR A SHORT TO GROUND (Continued)**	
	• Measure the resistance between the SJB C2280c-43 (DTC B2628), circuit 29 (YE/WH), harness side and ground; or between the SJB C2280c-44 (DTC B1201), circuit 1356 (LG/VT), harness side and ground.  N0053425 • **Is the resistance greater than 10,000 ohms?**	**Yes** For DTC B1201, GO to **B5**. For DTC B2628, GO to **B6**. **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
B5	**CHECK CIRCUITS 1356 (LG/VT) AND 1357 (LB/YE) FOR A SHORT TOGETHER**	
	• Measure the resistance between the SJB C2280c-31, circuit 1357 (LB/YE), harness side and the SJB C2280c-44, circuit 1356 (LG/VT), harness side.  N0053431 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to **B21**. **No** REPAIR the circuits. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

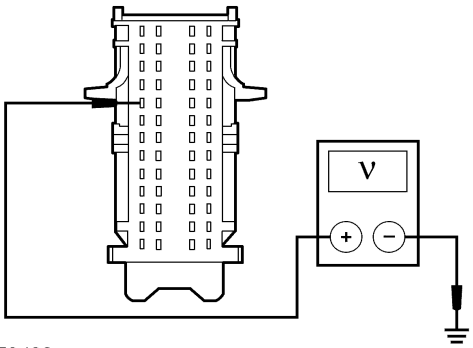
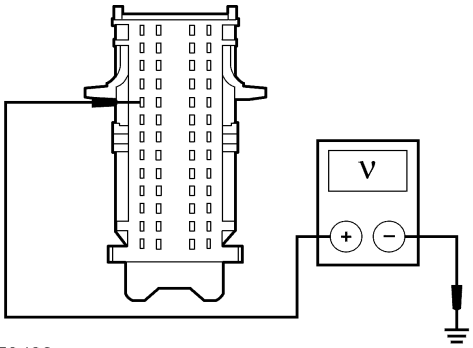
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B6	**CHECK CIRCUITS 29 (YE/WH) AND 1357 (LB/YE) FOR A SHORT TOGETHER**	
	• Measure the resistance between the SJB C2280c-43, circuit 29 (YE/WH), harness side and the SJB C2280c-31, circuit 1357 (LB/YE), harness side.  N0053488 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to **B21**. **No** REPAIR the circuits. CLEAR the DTCs. REPEAT the self-test.
B7	**CHECK THE FUEL LEVEL RETURN CIRCUITRY**	
	NOTE: Make sure to use only the SJB self-test and SJB retrieved DTCs for this step. Once the repairs are complete, clear the SJB, PCM and instrument cluster (IC) DTCs. • Key in OFF position. • Disconnect: SJB C2280c. • Key in ON position. • Measure the voltage between the SJB C2280c-31, circuit 1357 (LB/YE), harness side and ground.  N0053427 • **Is any voltage present?**	**Yes** REPAIR circuit 1357 (LB/YE) for a short to voltage. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR circuit 1357 (LB/YE) for an open. CLEAR the DTCs. REPEAT the self-test.
B8	**CHECK THE FUEL PUMP MODULE CIRCUITRY FOR A SHORT TO VOLTAGE**	
	NOTE: Make sure to use only the SJB self-test and SJB retrieved DTCs for this step. Once the repairs are complete, clear the SJB, PCM and instrument cluster (IC) DTCs. • Key in OFF position. • Disconnect: SJB C2280c. • Key in ON position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B8	**CHECK THE FUEL PUMP MODULE CIRCUITRY FOR A SHORT TO VOLTAGE (Continued)**	
	• Measure the voltage between the SJB C2280c-44, circuit 1356 (LG/VT), harness side and ground.  N0053428 • **Is any voltage present?**	**Yes** GO to **B9**. **No** GO to **B10**.
B9	**CHECK CIRCUIT 1356 (LG/VT) FOR A SHORT TO VOLTAGE**	
	• Key in OFF position. • Disconnect: Fuel Pump Module C433 (4.0L and 4.6L) or C4331 (5.4L). • Key in ON position. • Measure the voltage between the SJB C2280c-44, circuit 1356 (LG/VT), harness side and ground.  N0053428 • **Is any voltage present?**	**Yes** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. **No** INSTALL a new fuel pump module. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.
B10	**CHECK THE FUEL PUMP MODULE CIRCUITRY FOR AN OPEN**	
	• Key in OFF position. • Disconnect: Fuel Pump Module C433.	

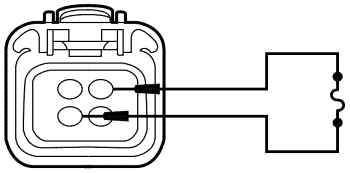
(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

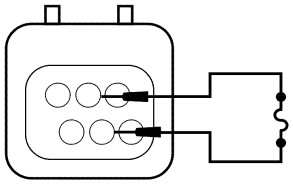
Test Step		Result / Action to Take
B10	CHECK THE FUEL PUMP MODULE CIRCUITRY FOR AN OPEN (Continued)	

- On 4.0L and 4.6L engines, connect a fused (5A) jumper wire between the fuel pump module C433-2, circuit 1357 (LB/YE), harness side and the fuel pump module C433-4, circuit 1356 (LG/VT), harness side.



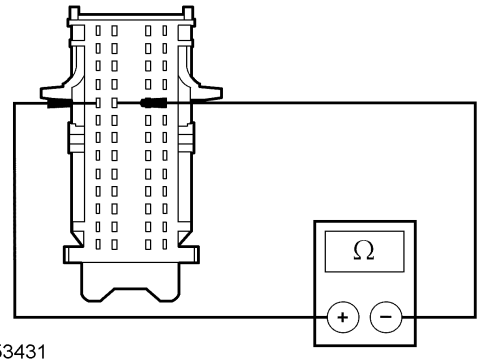
N0053518

- On 5.4L engines, connect a fused (5A) jumper wire between the fuel pump module C4331-2, circuit 1357 (LB/YE), harness side and the fuel pump module C4331-5, circuit 1356 (LG/VT), harness side.



N0058799

- Measure the resistance between the SJB C2280c-31, circuit 1357 (LB/YE), harness side; and between the SJB C2280c-44, circuit 1356 (LG/VT), harness side.



N0053431

- **Is the resistance less than 5 ohms?**

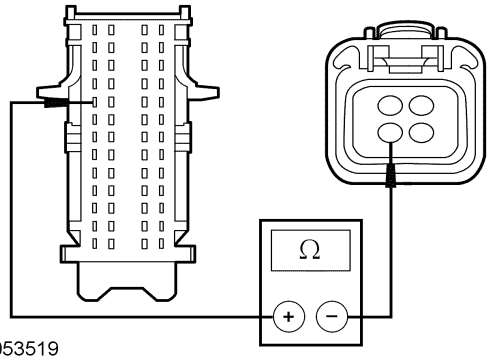
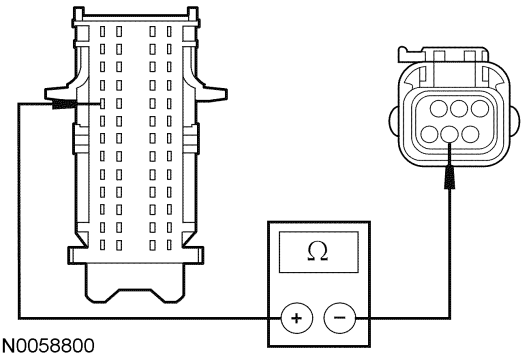
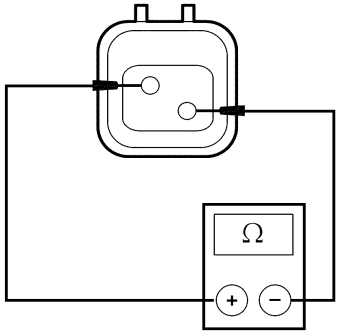
Yes
REMOVE the jumper wire. GO to **B12**.

No
REMOVE the jumper wire. GO to **B11**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

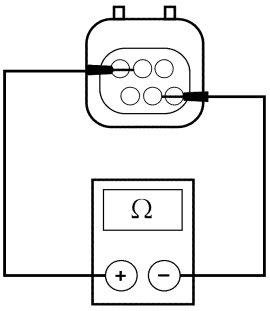
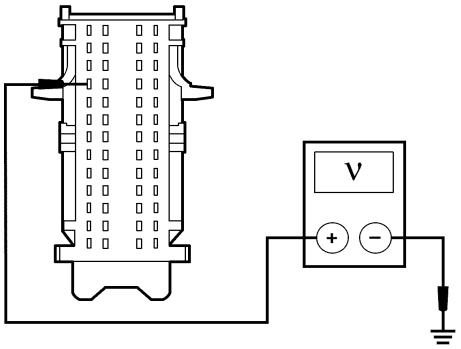
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B11	CHECK CIRCUIT 1356 (LG/VT) FOR AN OPEN	
	• On 4.0L and 4.6L engines, measure the resistance between the SJB C2280c-44, circuit 1356 (LG/WH), harness side and the fuel pump module C433-4, circuit 1356 (LG/WH), harness side.  N0053519 • On 5.4L engines, measure the resistance between the SJB C2280c-44, circuit 1356 (LG/WH), harness side and the fuel pump module C4331-5, circuit 1356 (LG/WH), harness side.  N0058800 • **Is the resistance less than 5 ohms?**	**Yes** REPAIR circuit 1357 (LB/YE) for an open. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR circuit 1356 (LG/VT) for an open. CLEAR the DTCs. REPEAT the self-test.
B12	CHECK THE FUEL PUMP MODULE FOR AN OPEN	
	NOTE: The fuel pump module resistance varies from 15 ± 2 ohms when empty (E) to 160 ± 4 ohms when full (F). • On 4.0L and 4.6L engines, measure the resistance between the fuel pump module C433 pin 2, component side and the fuel pump module C433 pin 4, component side.  N0053522	

(Continued)

DIAGNOSIS AND TESTING (Continued)

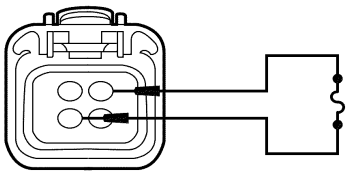
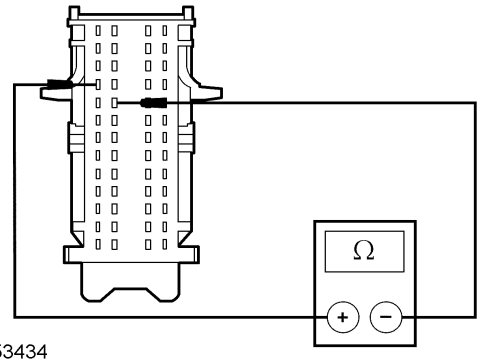
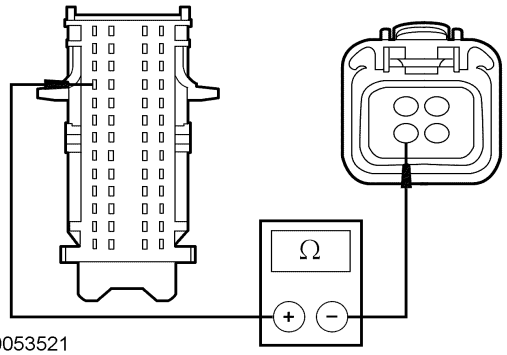
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B12	**CHECK THE FUEL PUMP MODULE FOR AN OPEN (Continued)**	
	• On 5.4L engines, measure the resistance between the fuel pump module C4331 pin 2, component side and the fuel pump module C4331 pin 5, component side.  N0058801 • **Is the resistance between 15 and 160 ohms?**	**Yes** GO to **B21**. **No** GO to **B20**.
B13	**CHECK CIRCUIT 29 (YE/WH) FOR A SHORT TO VOLTAGE**	
	NOTE: Make sure to use only the SJB self-test and SJB retrieved DTCs for this step. Once the repairs are complete, clear the SJB, PCM and instrument cluster (IC) DTCs. • Key in OFF position. • Disconnect: SJB C2280c. • Key in ON position. • Measure the voltage between the SJB C2280c-43, circuit 29 (YE/WH), harness side and ground.  N0053433 • **Is any voltage present?**	**Yes** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. **No** GO to **B14**.
B14	**CHECK THE FUEL SENDER CIRCUITRY FOR AN OPEN**	
	• Key in OFF position. • Disconnect: Fuel Sender C434.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

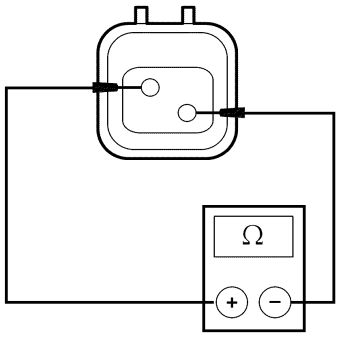
PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B14	**CHECK THE FUEL SENDER CIRCUITRY FOR AN OPEN (Continued)**	
	• Connect a fused (5A) jumper wire between the fuel sender C434-2, circuit 1357 (LB/YE), harness side and the fuel sender C434-4, circuit 29 (YE/WH), harness side.  N0053518 • Measure the resistance between the SJB C2280c-31, circuit 1357 (LB/YE), harness side; and between the SJB C2280c-43, circuit 29 (YE/WH), harness side.  N0053434 • **Is the resistance less than 5 ohms?**	**Yes** REMOVE the jumper wire. GO to **B16**. **No** REMOVE the jumper wire. GO to **B15**.
B15	**CHECK CIRCUIT 29 (YE/WH) FOR AN OPEN**	
	• Measure the resistance between the SJB C2280c-43, circuit 29 (YE/WH), harness side and the fuel sender C433-4, circuit 29 (YE/WH), harness side.  N0053521 • **Is the resistance less than 5 ohms?**	**Yes** REPAIR circuit 1357 (LB/YE) for an open. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR circuit 29 (YE/WH) for an open. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B16	**CHECK THE FUEL SENDER FOR AN OPEN**	
	NOTE: The fuel pump module resistance varies from 19 ± 2 ohms when empty (E) to 160 ± 4 ohms when full (F). • Measure the resistance between the fuel sender C434 pin 2, component side and the fuel sender C434 pin 4, component side.  N0053522 • **Is the resistance between 19 and 160 ohms?**	**Yes** GO to **B21**. **No** INSTALL a new fuel sender. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.
B17	**INSPECT THE FUEL TANK**	
	• Check the fuel tank for any damage or deformation. • **Is the fuel tank OK?**	**Yes** GO to **B18**. **No** VERIFY that the fuel pump module or fuel sender are not damaged. INSTALL a new fuel tank. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.
B18	**INSPECT THE FUEL PUMP MODULE, FUEL SENDER AND FUEL TRANSFER TUBES**	
	• Remove the fuel pump module and fuel sender. Refer to Section 310-01. • Inspect the fuel transfer tube, connections, fuel pump module and sender for any damage or deformation. • **Are the fuel transfer tube, connections, fuel pump module and the fuel sender OK?**	**Yes** GO to **B19**. **No** REPAIR or INSTALL a new fuel tank (for fuel transfer tube concerns), fuel pump module or fuel sender as necessary. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.
B19	**CHECK THE FUEL PUMP MODULE AND FUEL SENDER RESISTANCE READINGS**	
	NOTE: The fuel pump module and fuel sender resistance values vary from 15 ± 2 ohms when empty (E) to 160 ± 4 ohms when full (F).	

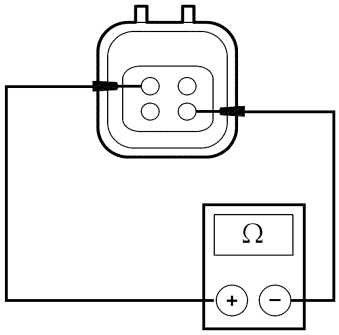
(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

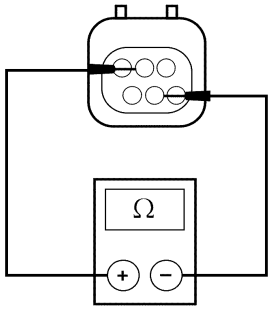
Test Step		Result / Action to Take
B19	CHECK THE FUEL PUMP MODULE AND FUEL SENDER RESISTANCE READINGS (Continued)	

- If equipped with a 4.0L or 4.6L engine, measure the resistance between the fuel pump module C433 pin 4, component side and the fuel pump module C433 pin 2, component side while slowly moving the float arm from the bottom to the top of travel.



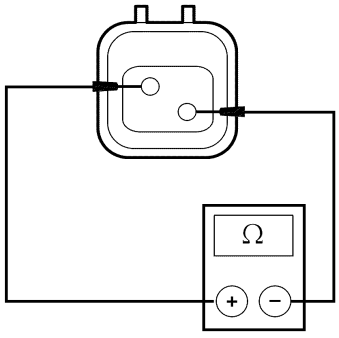
N0072861

- If equipped with a 5.4L engine, measure the resistance between the fuel pump module C4331 pin 5, component side and the fuel pump module C4331 pin 2, component side while slowly moving the float arm from the bottom to the top of travel.



N0058801

- For the fuel sender, measure the resistance between the fuel sender C434 pin 4, component side and the fuel sender C434 pin 2, component side while slowly moving the float arm from the bottom to the top of travel.



N0053522

- **Does the resistance start at approximately 15 ohms with the float at the bottom of the travel and slowly increase to approximately 160 ohms at the top of the travel?**

Yes
INSTALL a new fuel tank. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.

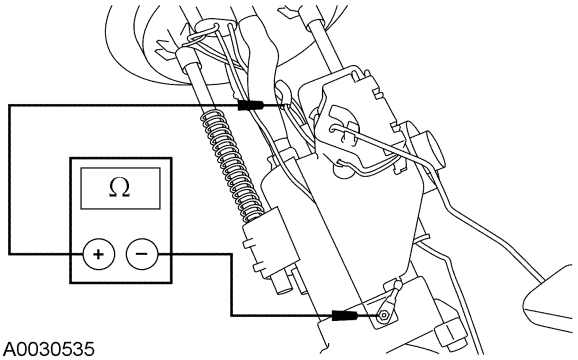
No
For the fuel pump module, GO to **B20**.

For the fuel sender, INSTALL a new fuel sender. REFER to Section 310-01. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: INCORRECT FUEL GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
B20	**CHECK THE FUEL LEVEL SENSOR**	
	• **NOTE:** The fuel level sensor resistance will measure between 15 ohms ± 2 ohms at the lower stop position and 160 ohms ± 4 ohms at the upper stop position. Remove the fuel pump module. Refer to Section 310-01. • **NOTE:** Disconnect the fuel level sensor input wire from the fuel level sensor for this measurement. Measure the resistance between the fuel level sensor input wire and the fuel level sensor ground while slowly moving the float arm between the lower stop and the upper stop position.  A0030535 • **Does the resistance slowly increase within specification from approximately 15 ohms to 160 ohms?**	**Yes** INSTALL a new fuel pump module. REFER to Section 310-01. TEST the system for normal operation. **No** INSTALL a new fuel level sensor. REFER to Section 310-01. TEST the system for normal operation.
B21	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.
B22	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test C: The Boost Gauge Is Inoperative (Shelby GT 500 Only)

Normal Operation

The boost gauge measures the amount of engine boost provided by the supercharger in pounds per square inch (PSI). The instrument cluster (IC) receives the boost gauge data from the PCM over the high speed controller area network (HS-CAN) communication bus lines. If the boost gauge status message is invalid or missing for more than 5 seconds, the boost gauge indication is zero. If the message is invalid or missing for less than 5 seconds, the boost gauge displays the last valid data received. The missing or invalid data may make the gauge appear sluggish or unresponsive to engine boost changes.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST C: THE BOOST GAUGE IS INOPERATIVE (SHELBY GT 500 ONLY)

Test Step		Result / Action to Take
C1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs retrieved?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **C2**.
C2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) GAUGES ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) boost gauge (BOOST) active command the boost gauge on while monitoring the boost gauge. • **Does the boost gauge sweep correctly?**	**Yes** GO to **C3**. **No** GO to **C4**.
C3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
C4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test D: Incorrect Temperature Gauge Indication

Normal Operation

The PCM receives the engine coolant temperature status through hardwired circuitry to the engine coolant temperature (ECT) sensor. The instrument cluster (IC) receives the engine coolant temperature data from the PCM over the communication network. The instrument cluster (IC) monitors the engine coolant temperature data received from the PCM and commands the engine coolant temperature gauge pointer.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST D: INCORRECT TEMPERATURE GAUGE INDICATION

Test Step		Result / Action to Take
D1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **D2**.
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	
D2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) COOLANT TEMPERATURE GAUGE ACTIVE COMMAND USING THE SCAN TOOL**	**Yes** GO to **D4**. **No** GO to **D3**.
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) temperature gauge (ENGCOOLNT) active command on and off while monitoring the temperature gauge. • **Does the temperature gauge start at C (cold) when at 0%, and move to H (hot) at 100%?**	
D3	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	
D4	**CHECK FOR CORRECT PCM OPERATION**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test E: Incorrect Voltage Gauge Indication

Normal Operation

The voltage gauge displays the system battery voltage as measured at the instrument cluster (IC) RUN input circuit.

This pinpoint test is intended to diagnose the following:

- Charging system concern
- Instrument cluster (IC)

PINPOINT TEST E: INCORRECT VOLTAGE GAUGE INDICATION

Test Step		Result / Action to Take
E1	**CHECK THE CHARGING SYSTEM FOR CORRECT OPERATION**	
	• Check the charging system. Refer to Section 414-00. • **Does the charging system operate correctly?**	**Yes** GO to **E2**. **No** REPAIR the charging system. REFER to Section 414-00.
E2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) VOLTMETER ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) voltmeter (VOLT__GAUGE) active command on and off while monitoring the voltmeter. • **Does the voltmeter start at L (low) when at 0%, and move to H (high) at 100%?**	**Yes** GO to Pinpoint Test A. **No** GO to **E3**.
E3	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test F: The Tachometer Is Inoperative

Normal Operation

The instrument cluster (IC) receives the tachometer data from the PCM over the communication network and commands the tachometer pointer between 0 and 7,000 rpm (4.0L and 5.4L engines), or between 0 and 8,000 rpm (4.6L engine) according to the data.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST F: THE TACHOMETER IS INOPERATIVE

Test Step		Result / Action to Take
F1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **F2**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: THE TACHOMETER IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
F2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) TACHOMETER ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) tachometer (TACH_IND) active command and scroll in increments of 10% while monitoring the tachometer. The tachometer should increase in increments of approximately 700 rpm (4.0L engine), or 800 rpm (4.6L engine) for each 10% change. • **Does the tachometer gauge increase within specifications?**	**Yes** GO to F3. **No** GO to F4.
F3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
F4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test G: Incorrect Oil Pressure Gauge Indication

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

Normal Operation

The smart junction box (SJB) is hardwired to the engine oil pressure switch. The engine oil pressure switch unit consists of a diaphragm and contact points, which are normally open. When there is low (under 41 kPa [6 psi]) or no oil pressure, the engine oil pressure switch remains open, removing the ground to the SJB. When sufficient oil pressure exists, the engine oil pressure switch closes providing a ground signal to the SJB. The SJB monitors the oil pressure ground signal and sends a message to the instrument cluster (IC) to operate the oil pressure gauge according to the engine oil pressure.

The engine oil pressure switch is hardwired to the SJB through circuit 208 (GY). When the oil pressure is within normal ranges, the engine oil pressure switch closes, grounding the signal to the SJB. The SJB then sends a message to the instrument cluster (IC) through the communication network to command the oil pressure gauge into the normal range. When engine oil pressure is low, the engine oil pressure switch opens, removing the ground to the SJB. The SJB sends a low oil pressure message to the instrument cluster (IC) through the communication network to command the oil pressure gauge to the low oil pressure range.

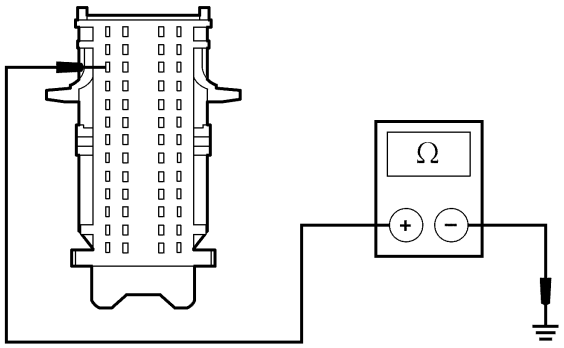
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Engine oil pressure switch
- SJB
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST G: INCORRECT OIL PRESSURE GAUGE INDICATION

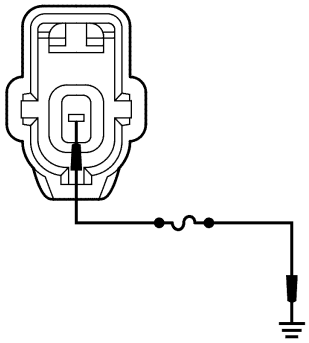
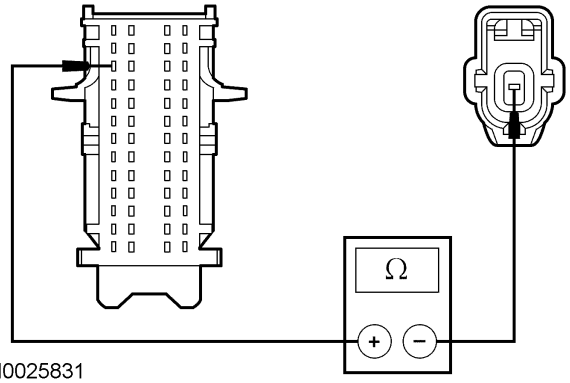
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
G1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) TACHOMETER ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) oil pressure gauge (OIL__POS) active command on and off while monitoring the oil pressure gauge. • **Does the oil pressure gauge start at the low range and increase to the normal range when commanded on?**	**Yes** If the oil pressure gauge always indicates normal, GO to **G2**. If the oil pressure gauge always indicates low, GO to **G4**. **No** GO to **G8**.
G2	**CHECK THE ENGINE OIL PRESSURE SWITCH**	
	• Key in OFF position. • Disconnect: Engine Oil Pressure Switch C103. • Key in ON position. • With the engine oil pressure switch disconnected, monitor the oil pressure gauge. • **Does the oil pressure gauge indicate low?**	**Yes** INSTALL a new engine oil pressure switch. TEST the system for normal operation. **No** GO to **G3**.
G3	**CHECK CIRCUIT 208 (GY) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-42, circuit 208 (GY), harness side and ground.  N0012025 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to **G7**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
G4	**CHECK THE ENGINE OIL PRESSURE SWITCH**	
	• Key in OFF position. • Disconnect: Engine Oil Pressure Switch C103.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST G: INCORRECT OIL PRESSURE GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
G4	**CHECK THE ENGINE OIL PRESSURE SWITCH (Continued)**	
	• Connect a fused (5A) jumper wire between the engine oil pressure switch C103-1, circuit 208 (GY), harness side and ground.  N0002760 • Key in ON position. • **Does the oil pressure gauge indicate normal?**	**Yes** REMOVE the jumper wire. GO to **G6**. **No** REMOVE the jumper wire. GO to **G5**.
G5	**CHECK CIRCUIT 208 (GY) FOR AN OPEN**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-42, circuit 208 (GY), harness side and the engine oil pressure switch C103-1, circuit 208 (GY), harness side.  N0025831 • **Is the resistance less than 5 ohms?**	**Yes** GO to **G7**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
G6	**CHECK THE OIL PRESSURE**	
	• Carry out the engine oil pressure test. Refer to Section 303-00. • **Is the oil pressure within specification?**	**Yes** INSTALL a new engine oil pressure switch. TEST the system for normal operation. **No** REFER to Section 303-00.
G7	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST G: INCORRECT OIL PRESSURE GAUGE INDICATION (Continued)

Test Step		Result / Action to Take
G8	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test H: The Speedometer/Odometer Is Inoperative

Normal Operation

The instrument cluster (IC) receives the vehicle speed information from the PCM over the communication network and displays it on the speedometer. If the instrument cluster (IC) receives no vehicle speed signal after 1 second, the speedometer defaults to 0.

The instrument cluster (IC) receives an odometer message from the PCM and stores the mileage in memory. When the instrument cluster (IC) fails to receive the odometer message for more than 2 seconds, the odometer displays dashes.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST H: THE SPEEDOMETER/ODOMETER IS INOPERATIVE

Test Step		Result / Action to Take
H1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any PCM DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** For an inoperative speedometer, GO to **H2**. For an inoperative odometer, GO to **H3**.
H2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) SPEEDOMETER ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) speedometer (SPDOMETER) active command. Command the speedometer and scroll in increments of 10% while monitoring the speedometer. The speedometer should increase in increments of approximately 19 km/h (12 mph) (4.0L engine), 23 km/h (14 mph) (4.6L engine) or 26 km/h (16 mph) (5.4L engine) for each 10% change. • **Does the speedometer begin at 0 and increase within specifications?**	**Yes** GO to **H4**. **No** GO to **H6**.
H3	**MONITOR THE MESSAGE CENTER CIRCUIT DISPLAYS**	
	• Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST H: THE SPEEDOMETER/ODOMETER IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
H3	**MONITOR THE MESSAGE CENTER CIRCUIT DISPLAYS (Continued)**	
	• Select the all segments (SEGMENTS) active command and command the segments on while monitoring the message center display. • **Do the message center display segments illuminate correctly?**	**Yes** GO to **H4**. **No** GO to **H6**.
H4	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND INSTRUMENT CLUSTER (IC) SELF-TESTS**	
	• Check for recorded instrument cluster (IC) DTCs from the continuous and on-demand self-tests. • **Is DTC U1900 recorded?**	**Yes** Section 418-00. **No** GO to **H5**.
H5	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
H6	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test I: Incorrect Speedometer Indication

Normal Operation

The instrument cluster (IC) receives the vehicle speed information from the PCM over the communication network and displays it on the speedometer. If the instrument cluster (IC) receives no vehicle speed signal after 1 second, the speedometer defaults to 0.

NOTE: Items that may affect the speedometer accuracy are tire size and tire wear.

This pinpoint test is intended to diagnose the following:

- Tire size configuration
- Axle ratio configuration
- PCM concern
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST I: INCORRECT SPEEDOMETER INDICATION

Test Step		Result / Action to Take
I1	**VERIFY THE VEHICLE TIRE SIZE AND AXLE RATIO CONFIGURATION**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Module Programming. • Select programmable parameters and confirm that the axle ratio and tire size are correctly configured. • **Is the axle ratio and tire size correctly configured?**	**Yes** GO to I2. **No** Configure the axle ratio or tire size as required. TEST the system for normal operation.
I2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) SPEEDOMETER ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) speedometer (SPDOMETER) active command. Command the speedometer and scroll in increments of 10% while monitoring the speedometer. The speedometer should increase in increments of approximately 19 km/h (12 mph) (4.0L engine), 23 km/h (14 mph) (4.6L engine) or 26 km/h (16 mph) (5.4L engine) for each 10% change. • **Does the speedometer begin at 0 and increase within specifications?**	**Yes** GO to I3. **No** GO to I4.
I3	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any PCM DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to I4.
I4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test J: The Low Oil Pressure Warning Indicator Is Never/Always On

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

Normal Operation

The smart junction box (SJB) is hardwired to the engine oil pressure switch. The engine oil pressure switch unit consists of a diaphragm and contact points, which are normally open. When there is low (under 41 kPa [6 psi]) or no oil pressure, the engine oil pressure switch remains open, removing the ground to the SJB. When sufficient oil pressure exists, the engine oil pressure switch closes providing a ground signal to the SJB. The SJB monitors the oil pressure ground signal and sends a message to the instrument cluster (IC) to operate the oil pressure gauge according to the engine oil pressure.

The engine oil pressure switch is hardwired to the SJB through circuit 208 (GY). When the oil pressure is within normal ranges, the engine oil pressure switch closes, grounding the signal to the SJB. The SJB then sends a message to the instrument cluster (IC) through the communication network to command the low oil pressure warning indicator off. When engine oil pressure is low, the engine oil pressure switch opens, removing the ground to the SJB. The SJB sends a low oil pressure message to the instrument cluster (IC) through the communication network to command the low oil pressure warning indicator on.

This pinpoint test is intended to diagnose

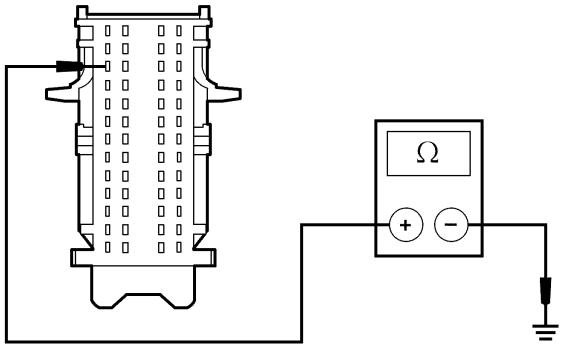
DIAGNOSIS AND TESTING (Continued)

the following:

- Wiring, terminals or connectors
- Engine oil pressure switch
- SJB
- Instrument cluster (IC)

PINPOINT TEST J: THE LOW OIL PRESSURE WARNING INDICATOR IS NEVER/ALWAYS ON

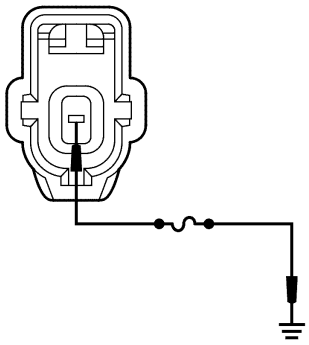
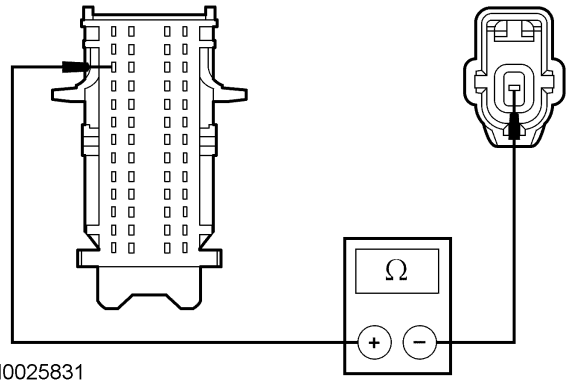
CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
J1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on then off while monitoring the low oil pressure warning indicator. • **Does the low oil pressure warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** If the low oil pressure warning indicator is never on, GO to J2. If the low oil pressure warning indicator is always on, GO to J4. **No** GO to J8.
J2	**CHECK THE ENGINE OIL PRESSURE SWITCH**	
	• Key in OFF position. • Disconnect: Engine Oil Pressure Switch C103. • Key in ON position. • With the engine oil pressure switch disconnected, monitor the low oil pressure warning indicator. • **Is the low oil pressure warning indicator illuminated?**	**Yes** INSTALL a new engine oil pressure switch. TEST the system for normal operation. **No** GO to J3.
J3	**CHECK CIRCUIT 208 (GY) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-42, circuit 208 (GY), harness side and ground.  N0012025 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to J7. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
J4	**CHECK THE ENGINE OIL PRESSURE SWITCH**	
	• Key in OFF position. • Disconnect: Engine Oil Pressure Switch C103.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST J: THE LOW OIL PRESSURE WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
J4	**CHECK THE ENGINE OIL PRESSURE SWITCH (Continued)**	
	• Connect a fused (5A) jumper wire between the engine oil pressure switch C103-1, circuit 208 (GY), harness side and ground.  N0002760 • Key in ON position. • **Does the low oil pressure warning indicator illuminate?**	**Yes** REMOVE the jumper wire. GO to **J6**. **No** REMOVE the jumper wire. GO to **J5**.
J5	**CHECK CIRCUIT 208 (GY) FOR AN OPEN**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-42, circuit 208 (GY), harness side and the engine oil pressure switch C103-1, circuit 208 (GY), harness side.  N0025831 • **Is the resistance less than 5 ohms?**	**Yes** GO to **J7**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
J6	**CHECK THE OIL PRESSURE**	
	• Carry out the engine oil pressure test. Refer to Section 303-00. • **Is the oil pressure within specification?**	**Yes** INSTALL a new engine oil pressure switch. TEST the system for normal operation. **No** REFER to Section 303-00.
J7	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST J: THE LOW OIL PRESSURE WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
J8	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test K: The Engine Over Temperature Warning Indicator Is Never/Always On

Normal Operation

The engine over temperature warning indicator informs the driver that the engine coolant is overheating due to loss of engine coolant fluid or other cause, and that the PCM is in failsafe cooling mode. There are two levels of failsafe cooling mode. The 1st mode is when the PCM provides engine operation but takes on the limp home strategy. The 2nd mode is when the PCM determines that the engine is sufficiently over temperature and is about to be shut down by the PCM. In both modes, the PCM provides the engine over temperature information to the instrument cluster (IC) to illuminate the engine over temperature warning indicator.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST K: THE ENGINE OVER TEMPERATURE WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
K1	**RETRIEVE THE RECORDED DTCs FROM THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **K2**.
K2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) failsafe warning indicator (OVTEMP__LMP) active command on and off while monitoring the engine over temperature warning indicator. • **Does the engine over temperature warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **K3**. **No** GO to **K4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST K: THE ENGINE OVER TEMPERATURE WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
K3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
K4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test L: The Brake Warning Indicator Is Never On

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

Refer to Wiring Diagrams Cell 13, Power Distribution/SJB for schematic and connector information.

Normal Operation

The brake warning indicator alerts the driver if any of the following brake system conditions are present: the parking brake is set, the brake fluid level is low, the ABS module detects a base brake system failure, there is a loss of communication between the instrument cluster (IC) and the smart junction box (SJB), or there is a loss of communication between the instrument cluster (IC) and the ABS module.

When the parking brake is applied, circuit 1309 (RD/YE) to the SJB is grounded by the parking brake switch through circuit 1205 (BK). The SJB receives the ground signal and sends the instrument cluster (IC) a message over the communication network to illuminate the brake warning indicator. When the brake fluid level is low, the brake fluid level switch closes, providing a signal to the SJB on circuit 547 (LG/YE) which is then routed back to the SJB on the signal return circuit 512 (TN/LG). When a base brake system concern is detected, the ABS module sends a signal to the instrument cluster (IC) over the communication network to illuminate the brake system warning indicator.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking brake switch
- Brake fluid level switch
- SJB
- Instrument cluster (IC)

PINPOINT TEST L: THE BRAKE WARNING INDICATOR IS NEVER ON

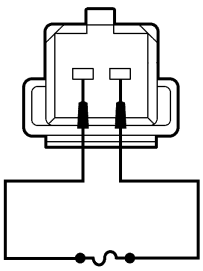
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
L1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

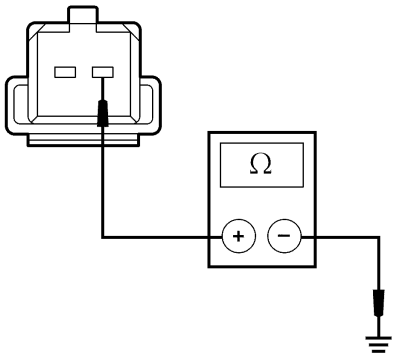
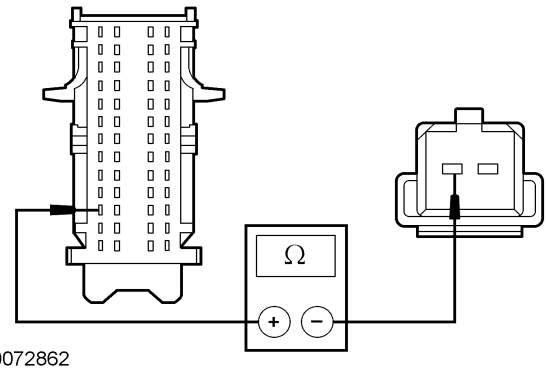
PINPOINT TEST L: THE BRAKE WARNING INDICATOR IS NEVER ON (Continued)

Test Step		Result / Action to Take
L1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL (Continued)**	
	• Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) brake warning indicator (BRK__LAMP) active command on while monitoring the brake warning indicator. • **Does the brake warning indicator illuminate?**	**Yes** GO to L2. **No** GO to L11.
L2	**CHECK THE BRAKE WARNING INDICATOR WITH THE PARKING BRAKE APPLIED**	
	• Apply the parking brake while monitoring the brake warning indicator. • **Does the brake warning indicator illuminate?**	**Yes** GO to L7. **No** GO to L3.
L3	**CHECK THE PARKING BRAKE SWITCH PID**	
	• Apply the parking brake. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB parking brake switch (PRK__BRK) PID while applying the parking brake. • **Does the PID agree with the parking brake position?**	**Yes** GO to L10. **No** GO to L4.
L4	**CHECK THE PARKING BRAKE SWITCH**	
	• Key in OFF position. • Disconnect: Parking Brake Switch C306. • Connect a fused (5A) jumper wire between the parking brake switch C306-1, circuit 1309 (RD/YE), harness side and the parking brake switch C306-2, circuit 1205 (BK), harness side.  N0002774 • Key in ON position. • **Does the brake warning indicator illuminate?**	**Yes** REMOVE the jumper wire. INSTALL a new parking brake switch. TEST the system for normal operation. **No** REMOVE the jumper wire. GO to L5.
L5	**CHECK CIRCUIT 1205 (BK) FOR AN OPEN**	
	• Key in OFF position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

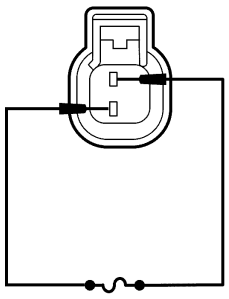
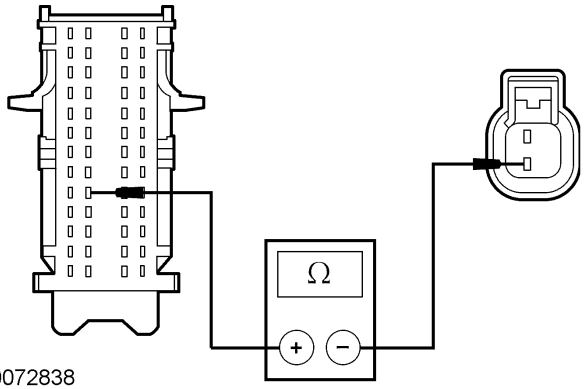
PINPOINT TEST L: THE BRAKE WARNING INDICATOR IS NEVER ON (Continued)

Test Step		Result / Action to Take
L5	**CHECK CIRCUIT 1205 (BK) FOR AN OPEN (Continued)**	
	• Measure the resistance between the parking brake switch C306-2, circuit 1205 (BK), harness side and ground.  N0009406 • **Is the resistance less than 5 ohms?**	**Yes** GO to **L6**. **No** REPAIR the circuit. TEST the system for normal operation.
L6	**CHECK CIRCUIT 1309 (RD/YE) FOR AN OPEN**	
	• Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-50, circuit 1309 (RD/YE), harness side and the parking brake switch C306-1, circuit 1309 (RD/YE), harness side.  N0072862 • **Is the resistance less than 5 ohms?**	**Yes** GO to **L10**. **No** REPAIR the circuit. TEST the system for normal operation.
L7	**CHECK THE SJB OPERATION USING THE SCAN TOOL**	
	• Key in OFF position. • Disconnect: Brake Fluid Level Switch C124.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

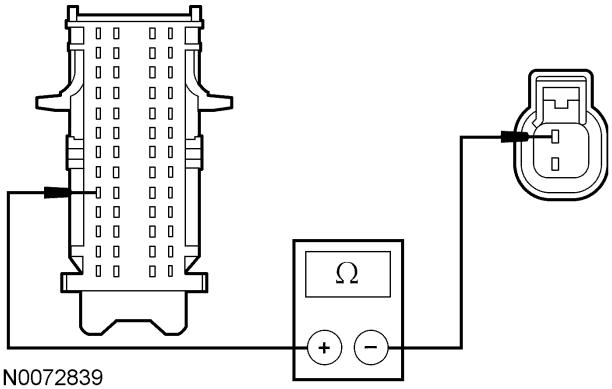
PINPOINT TEST L: THE BRAKE WARNING INDICATOR IS NEVER ON (Continued)

Test Step		Result / Action to Take
L7	**CHECK THE SJB OPERATION USING THE SCAN TOOL (Continued)**	
	• Connect a fused (10A) jumper wire between the brake fluid level switch C124-1, circuit 547 (LG/YE), harness side and the brake fluid level switch C124-2, circuit 512 (TN/LG), harness side.  N0011996 • Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB brake fluid level (BRK__FLUID) PID. • **Does the PID indicate low brake fluid level?**	**Yes** REMOVE the jumper wire. INSTALL a new brake fluid level switch. TEST the system for normal operation. **No** REMOVE the jumper wire. GO to **L8**.
L8	**CHECK CIRCUIT 512 (TN/LG) FOR AN OPEN**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-35, circuit 512 (TN/LG), harness side and the brake fluid level switch C124-2, circuit 512 (TN/LG), harness side.  N0072838 • **Is the resistance less than 5 ohms?**	**Yes** GO to **L9**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST L: THE BRAKE WARNING INDICATOR IS NEVER ON (Continued)

Test Step		Result / Action to Take
L9	CHECK CIRCUIT 547 (LG/YE) FOR AN OPEN	
	• Measure the resistance between the SJB C2280c-48, circuit 547 (LG/YE), harness side and the brake fluid level switch C124-1, circuit 547 (LG/YE), harness side.  N0072839 • **Is the resistance less than 5 ohms?**	**Yes** GO to **L10**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
L10	CHECK FOR CORRECT SJB OPERATION	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify that the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.
L11	CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION	
	• Disconnect all the instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify that the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test M: The Brake Warning Indicator Is Always On

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

Refer to Wiring Diagrams Cell 13, Power Distribution/SJB for schematic and connector information.

Normal Operation

The brake warning indicator alerts the driver if any of the following brake system conditions are present: the parking brake is set, the brake fluid level is low, the ABS module detects a base brake system failure, there is a loss of communication between the instrument cluster (IC) and the smart junction box (SJB), or there is a loss of communication between the instrument cluster (IC) and the ABS module.

DIAGNOSIS AND TESTING (Continued)

When the parking brake is applied, circuit 1309 (RD/YE) to the SJB is grounded by the parking brake switch through circuit 1205 (BK). The SJB receives the ground signal and sends the instrument cluster (IC) a message over the communication network to illuminate the brake warning indicator. When the brake fluid level is low, the brake fluid level switch closes, providing a signal to the SJB on circuit 547 (LG/YE) which is then routed back to the SJB on the signal return circuit 512 (TN/LG). When a base brake system concern is detected, the ABS module sends a signal to the instrument cluster (IC) over the communication network to illuminate the brake system warning indicator.

- DTC B2479 (Brake Park Switch Circuit Short to Ground) — sets on-demand if the SJB detects that the parking brake is applied during the self-test or if there is a short to ground on the parking brake input circuit 1309 (RD/YE).
- DTC C1189 (Brake Fluid Level Sensor Input Short Circuit to Ground) — sets on-demand and continuously if the SJB detects that the brake fluid is low or there is a short to ground on the brake fluid level input circuit 547 (LG/YE).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking brake switch
- Brake fluid level switch
- SJB
- Instrument cluster (IC)

PINPOINT TEST M: THE BRAKE WARNING INDICATOR IS ALWAYS ON

⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

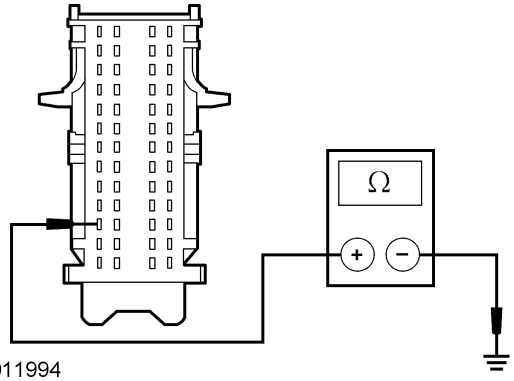
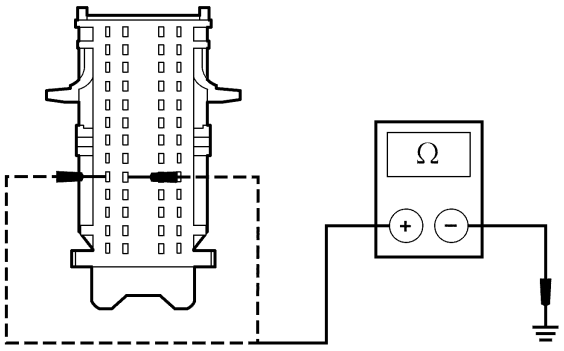
NOTE: Verify that the brake fluid level is full and the parking brake is fully released before proceeding with diagnostics.

Test Step		Result / Action to Take
M1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND SJB SELF-TESTS**	
	• Check for recorded SJB DTCs from the continuous and on-demand self-tests. • **Are any SJB DTCs recorded?**	**Yes** For DTC B2479, GO to **M4**. For DTC C1189, GO to **M6**. All other SJB DTCs, REFER to DTC Charts in this section. **No** GO to **M2**.
M2	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND ABS MODULE SELF-TESTS**	
	• Check for recorded ABS module DTCs from the continuous and on-demand self-tests. • **Are any ABS module DTCs recorded?**	**Yes** REFER to Section 206-09. **No** GO to **M3**.
M3	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) brake warning indicator (BRK__LAMP) active command on while monitoring the brake warning indicator. • **Does the brake warning indicator illuminate?**	**Yes** GO to **M9**. **No** GO to **M10**.
M4	**CHECK THE PARKING BRAKE SWITCH**	
	• Key in OFF position. • Disconnect: Parking Brake Switch C306. • Key in ON position. • Observe the brake warning indicator. • **Does the brake warning indicator continue to illuminate?**	**Yes** GO to **M5**. **No** INSTALL a new parking brake switch. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

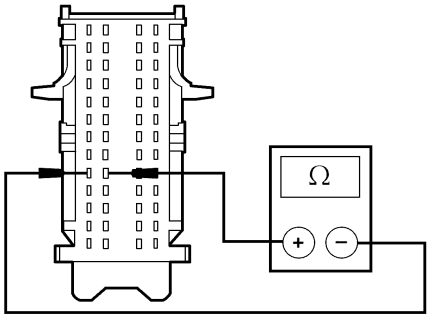
PINPOINT TEST M: THE BRAKE WARNING INDICATOR IS ALWAYS ON (Continued)

Test Step		Result / Action to Take
M5	**CHECK CIRCUIT 1309 (RD/YE) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-50, circuit 1309 (RD/YE), harness side and ground.  N0011994 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to M9. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
M6	**CHECK THE SJB OPERATION USING THE SCAN TOOL**	
	• Key in OFF position. • Disconnect: Brake Fluid Level Switch C124. • Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB brake fluid level (BRK__FLUID) PID. • **Does the PID indicate the brake fluid level is OK?**	**Yes** INSTALL a new brake fluid level switch. TEST the system for normal operation. **No** GO to M7.
M7	**CHECK CIRCUITS 512 (TN/LG) AND 547 (LG/YE) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-35, circuit 512 (TN/LG), harness side and ground; and between the SJB C2280c-48, circuit 547 (LG/YE), harness side and ground.  N0012024 • **Are the resistances greater than 10,000 ohms?**	**Yes** GO to M8. **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST M: THE BRAKE WARNING INDICATOR IS ALWAYS ON (Continued)

Test Step		Result / Action to Take
M8	**CHECK CIRCUITS 512 (TN/LG) AND 547 (LG/YE) FOR A SHORT TOGETHER**	
	• Measure the resistance between the SJB C2280c-35, circuit 512 (TN/LG), harness side and the SJB C2280c-48, circuit 547 (LG/YE), harness side.  N0072863 • **Is the resistance less than 5 ohms?**	**Yes** GO to M9. **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
M9	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify that the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.
M10	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all the instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify that the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test N: The ABS Warning Indicator Is Never/Always On

Normal Operation

The status of the ABS system is sent to the instrument cluster (IC) from the ABS module over the communication network. The instrument cluster (IC) monitors the ABS input and illuminates the ABS warning indicator when a concern is present.

This pinpoint test is intended to diagnose the following:

- ABS module
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST N: THE ABS WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
N1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND ABS MODULE SELF-TESTS**	
	• Check for recorded ABS module DTCs from the continuous and on-demand self-tests. • **Are any ABS module DTCs recorded?**	**Yes** REFER to Section 206-09. **No** GO to **N2**.
N2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) ABS warning indicator (ABS_LAMP) active command on and off while monitoring the ABS warning indicator. • **Does the ABS warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **N3**. **No** GO to **N4**.
N3	**CHECK FOR CORRECT ABS MODULE OPERATION**	
	• Disconnect the ABS module connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the ABS module connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new ABS module. REFER to Section 206-09. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
N4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test O: The Air Bag Warning Indicator Is Never/Always On

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

Normal Operation

The air bag warning indicator is used to provide a status of the supplemental restraint system (SRS). The instrument cluster (IC) receives a ground from the restraints control module (RCM) through circuit 608 (BK/YE) to turn off the air bag warning indicator. If an air bag system concern is detected or a fault is detected in circuit 608 (BK/YE), a DTC is logged in the RCM and the RCM removes the ground to the instrument cluster (IC) to turn on the air bag warning indicator.

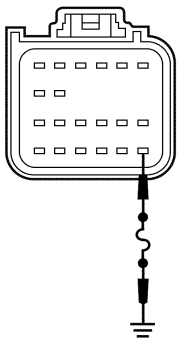
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- RCM
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST O: THE AIR BAG WARNING INDICATOR IS NEVER/ALWAYS ON

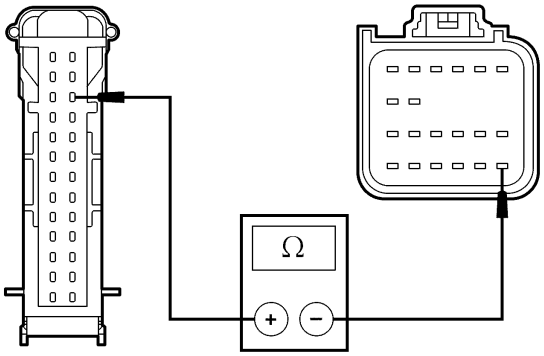
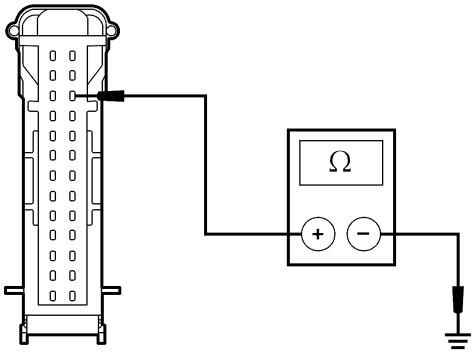
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
O1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND RCM SELF-TESTS**	
	• Check for recorded RCM DTCs from the continuous and on-demand self-tests. • **Are any RCM DTCs recorded?**	**Yes** REFER to Section 501-20B. **No** GO to **O2**.
O2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on then off while monitoring the air bag warning indicator. • **Does the air bag warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** If the air bag indicator is never on, GO to **O5**. If the air bag indicator is always on, GO to **O3**. **No** GO to **O6**.
O3	**CHECK THE RCM FOR CORRECT OPERATION**	
	• Deactivate the supplemental restraint system (SRS). Refer to Section 501-20B. • Key in OFF position. • Disconnect: RCM C2041a. • Connect a fused (5A) jumper wire between the RCM C2041a-19, circuit 608 (BK/YE), harness side and ground.  A0040663 • Key in ON position. • **Does the air bag indicator lamp illuminate after the instrument cluster (IC) proves out?**	**Yes** REMOVE the jumper wire. GO to **O7**. **No** REMOVE the jumper wire. GO to **O4**.
O4	**CHECK CIRCUIT 608 (BK/YE) FOR AN OPEN**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST O: THE AIR BAG WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
O4	**CHECK CIRCUIT 608 (BK/YE) FOR AN OPEN (Continued)**	
	• Measure the resistance between the instrument cluster (IC) C220-24, circuit 608 (BK/YE), harness side and the RCM C2041a-19, circuit 608 (BK/YE), harness side.  N0012027 • **Is the resistance less than 5 ohms?**	**Yes** GO to **O8**. **No** REPAIR the circuit. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation.
O5	**ISOLATE THE RCM**	
	• Key in OFF position. • Deactivate the SRS. Refer to Section 501-20B. • Disconnect: RCM C2041a. • Observe the air bag warning indicator. • Key in ON position. • **Does the air bag warning indicator illuminate?**	**Yes** GO to **O7**. **No** GO to **O6**.
O6	**CHECK CIRCUIT 608 (BK/YE) FOR A SHORT TO GROUND**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220. • Measure the resistance between the instrument cluster (IC) C220-24, circuit 608 (BK/YE), harness side and ground.  N0012028 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to **O8**. **No** REPAIR the circuit. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation.
O7	**CHECK FOR CORRECT RCM OPERATION**	
	• Disconnect all the RCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the RCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new RCM and ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ACTIVATE the SRS. REFER to Section 501-20B.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST O: THE AIR BAG WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
O8	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ACTIVATE the SRS. REFER to Section 501-20B.

Pinpoint Test P: The Safety Belt Warning Indicator Is Never/Always On

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

Normal Operation

The safety belt warning indicator informs the driver that his/her safety belt and/or the front passengers safety belt is unbuckled. The first 65 seconds after the ignition switch transitions from OFF or ACC to RUN or START, the safety belt warning indicator and the associated chime are used as a reminder to the driver that the front row safety belts are not buckled. In this first 65 seconds the indicator illuminates when the driver and/or front passenger safety belt is unbuckled (with a person in the seat) and turns off whenever the safety belt(s) in the occupied front row seat(s) is buckled. The indicator illuminates again if a safety belt is unbuckled after both are buckled and the 65 seconds has not yet expired. After 65 seconds, the indicator turns off regardless of the front row safety belts status.

The safety belt switch is hardwired to the restraints control module (RCM). The instrument cluster (IC) receives the safety belt switch status from the RCM through circuit 1083 (LB/PK). When the safety belt is unfastened, the RCM signals the instrument cluster (IC) to illuminate the safety belt warning indicator. A Belt-Minder® chime that is operating correctly indicates the RCM is monitoring and transmitting the correct operation of the safety belt status to the instrument cluster (IC).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- RCM
- Instrument cluster (IC)

PINPOINT TEST P: THE SAFETY BELT WARNING INDICATOR IS NEVER/ALWAYS ON

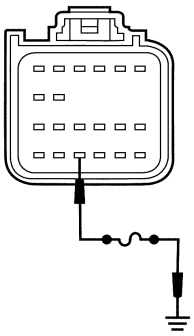
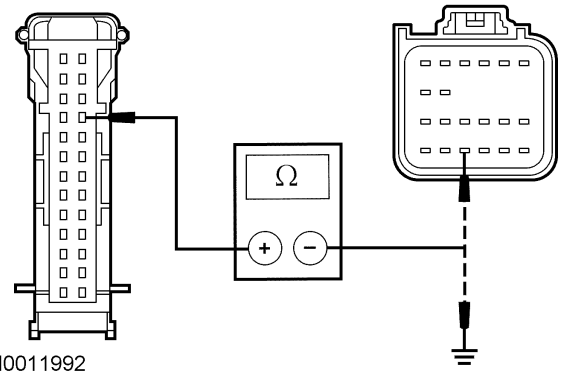
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
P1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND RCM SELF-TESTS**	
	• Check for recorded RCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs retrieved?**	**Yes** REFER to Section 501-20B. **No** GO to **P2**.
P2	**CHECK THE SAFETY BELT WARNING INDICATOR OPERATION**	
	• Deactivate the supplemental restraint system (SRS). Refer to Section 501-20B. • Key in OFF position. • Disconnect: RCM C2041a.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST P: THE SAFETY BELT WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
P2	**CHECK THE SAFETY BELT WARNING INDICATOR OPERATION (Continued)**	
	• **NOTE:** If the fuse fails, repair circuit 1083 (LB/PK) for a short to ground. Connect a fused (5A) jumper wire between the RCM C2041a-22, circuit 1083 (LB/PK), harness side and ground.  A0041080 • Observe the safety belt warning indicator with the jumper wire connected and disconnected. • Key in ON position. • **Does the safety belt warning indicator lamp illuminate with the jumper wire disconnected, and turn off when the jumper wire is connected?**	**Yes** REMOVE the jumper wire. GO to **P4**. **No** REMOVE the jumper wire. GO to **P3**.
P3	**CHECK CIRCUIT 1083 (LB/PK) FOR AN OPEN OR A SHORT TO GROUND**	
	• Measure the resistance between the instrument cluster (IC) C220-23, circuit 1083 (LB/PK), harness side and the RCM C2041a-22, circuit 1083 (LB/PK), harness side; and between the instrument cluster (IC) C220-23, circuit 1083 (LB/PK), harness side and ground.  N0011992 • **Is the resistance less than 5 ohms between the instrument cluster (IC) and the RCM, and greater than 10,000 ohms between the instrument cluster (IC) and ground?**	**Yes** GO to **P5**. **No** REPAIR the circuit. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST P: THE SAFETY BELT WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
P4	**CHECK FOR CORRECT RCM OPERATION**	
	• Disconnect all the RCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the RCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new RCM. REFER to Section 501-20B. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ACTIVATE the SRS. REFER to Section 501-20B.
P5	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. ACTIVATE the SRS. REFER to Section 501-20B. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ACTIVATE the SRS. REFER to Section 501-20B.

Pinpoint Test Q: The Door Ajar Warning Indicator Is Never/Always On

Normal Operation

The door ajar indicator informs the driver that one or more doors, or the decklid is open while the ignition switch is in the RUN position. When a door or decklid is ajar, the smart junction box (SJB) sends a message to the instrument cluster (IC) to illuminate the door ajar indicator.

This pinpoint test is intended to diagnose the following:

- SJB
- Instrument cluster (IC)

PINPOINT TEST Q: THE DOOR AJAR WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
Q1	**CHECK THE OPERATION OF THE INTERIOR LAMPS**	
	• Open and close each door and the decklid, and monitor the interior lamps. • **Do the interior lamps operate correctly?**	**Yes** GO to **Q2**. **No** REFER to Section 417-02.
Q2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) door ajar warning indicator (DRAJLMP) active command on and off while monitoring the door ajar warning indicator. • **Does the door ajar warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **Q3**. **No** GO to **Q4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST Q: THE DOOR AJAR WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
Q3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
Q4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test R: The Malfunction Indicator Lamp (MIL) Is Never/Always On

Normal Operation

The MIL is controlled by the instrument cluster (IC) using data sent from the PCM over the communication network. When an emission system concern exists, the PCM sets a DTC and sends the instrument cluster (IC) a message to turn on the MIL.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST R: THE MALFUNCTION INDICATOR LAMP (MIL) IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
R1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **R2**.
R2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on then off while monitoring the MIL indicator. • **Does the MIL indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **R3**. **No** GO to **R4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST R: THE MALFUNCTION INDICATOR LAMP (MIL) IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
R3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
R4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test S: The Powertrain Malfunction (Wrench) Warning Indicator is Never/Always On

Normal Operation

The PCM monitors the electronic throttle control (ETC) system and provides the instrument cluster (IC) with the ETC status over the communication network. When a system concern is detected, the PCM provides the instrument cluster (IC) with a signal commanding the instrument cluster (IC) to illuminate the powertrain malfunction (wrench) indicator or display a message if equipped with a message center.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST S: THE POWERTRAIN MALFUNCTION (WRENCH) WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
S1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **S2**.
S2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) powertrain malfunction (wrench) warning indicator (ETC__IND) active command on and off while monitoring the powertrain malfunction (wrench) warning indicator. • **Does the powertrain malfunction (wrench) warning indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **S3**. **No** GO to **S4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST S: THE POWERTRAIN MALFUNCTION (WRENCH) WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
S3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
S4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test T: The O/D Off Indicator Is Never/Always On

Normal Operation

The overdrive (O/D) off function is controlled by the O/D off switch located on the shifter assembly. The instrument cluster (IC) receives the overdrive off message from the PCM through the communication network. When the transmission overdrive is selected off, the overdrive off switch provides a ground signal to the PCM. The PCM, upon receipt of the overdrive off ground signal, provides an overdrive off message to the instrument cluster (IC) and the instrument cluster (IC) illuminates the O/D off indicator.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST T: THE O/D OFF INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
T1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Are any PCM DTCs recorded?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **T2**.
T2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) O/D OFF (OVERDRV) active command on and off while monitoring the O/D OFF indicator. • **Does the O/D OFF indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **T3**. **No** GO to **T4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST T: THE O/D OFF INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
T3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
T4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test U: The Charging System Warning Indicator Is Never/Always On

Normal Operation

The PCM constantly monitors the generator regulator output. When the PCM detects a continuous high or low output signal, or when the ignition switch is ON and the engine is OFF, the PCM sends a message over the communication network to the instrument cluster (IC) to illuminate the charging system warning indicator. When the ignition switch is in the ON position, with the engine running, and the PCM determines that the set point for the regulator has been met, the PCM sends a message to the instrument cluster (IC) to turn off the charging system warning indicator.

This pinpoint test is intended to diagnose the following:

- Charging system concern
- PCM
- Instrument cluster (IC)

PINPOINT TEST U: THE CHARGING SYSTEM WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
U1	**CHECK THE CHARGING SYSTEM FOR CORRECT OPERATION**	
	• Check the charging system operation. Refer to Section 414-00. • **Is the charging system operating correctly?**	**Yes** GO to **U2**. **No** REFER to Section 414-00.
U2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on while monitoring the charging system warning indicator. • **Is the charging system warning indicator illuminated?**	**Yes** GO to **U3**. **No** GO to **U4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST U: THE CHARGING SYSTEM WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
U3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
U4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test V: The Check Fuel Cap Indicator Is Never/Always On

Normal Operation

The PCM monitors the fuel tank evaporative emission system for significant leaks that occur following refueling of the vehicle. Once the PCM detects a fuel vapor leak, the PCM sends the instrument cluster a message over the communication network to turn on the check fuel cap indicator. DTC P0457 sets in the PCM following a successful cruise test, which is initiated when the vehicle is driven at a steady speed above 64 km/h (40 mph) for a duration of approximately 4-5 minutes. If the PCM is unable to successfully run the cruise test, the instrument cluster does not receive the check fuel cap message and the check fuel cap indicator remains off.

- DTC P0457 (Evaporative Emission System Leak Detected [fuel cap loose/off]) — sets in the PCM if a fuel tank pressure change greater than -23.7 kPa (-7 in-Hg) of vacuum within 30 seconds after refueling occurs, or there is an excessive purge (fuel vapor) flow of greater than 454 g (1.0 lb) per minute.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST V: THE CHECK FUEL CAP INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
V1	**CARRY OUT THE INSTRUMENT CLUSTER INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST V: THE CHECK FUEL CAP INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
V1	**CARRY OUT THE INSTRUMENT CLUSTER INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL (Continued)**	
	• Select the instrument cluster (IC) check fuel cap indicator (FUEL__CAP) active command. Command the check fuel cap indicator on and off. Observe the check fuel cap indicator. • **Does the check fuel cap indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **V2**. **No** GO to **V4**.
V2	**RETRIEVE THE RECORDED DTCs FROM BOTH CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Is DTC P0457 recorded?**	**Yes** If the check fuel cap indicator is illuminated, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. If the check fuel cap indicator is not illuminated, GO to **V3**. **No** If the check fuel cap indicator is always on, GO to **V4**. If the check fuel cap indicator is not illuminated, the system is operating normally at this time. If the fuel cap was left off and the check fuel cap warning indicator did not turn on, driving conditions may not have allowed for the PCM to run the cruise test and message the instrument cluster to turn on the check fuel cap warning indicator.
V3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
V4	**CHECK FOR CORRECT INSTRUMENT CLUSTER OPERATION**	
	• Disconnect the instrument cluster connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster. REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test W: The High Beam Indicator Is Never/Always On

Normal Operation

When the high beams are turned on, the smart junction box (SJB) sends a signal to the instrument cluster (IC) through the communication network to illuminate the high beam indicator.

This pinpoint test is intended to diagnose the following:

- SJB
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST W: THE HIGH BEAM INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
W1	**CHECK THE HIGH BEAM HEADLAMPS OPERATION**	
	• Key in ON position. • Place the headlamp switch in the HIGH BEAMS ON position. Observe the high beam headlamps. • **Do the high beam headlamps operate correctly?**	**Yes** GO to W2. **No** REFER to Section 417-01.
W2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) high beam indicator (HIGH_BEAM) active command on and off while monitoring the high beam indicator. • **Does the high beam indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to W3. **No** GO to W4.
W3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
W4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test X: The Turn Signal Indicator Is Never/Always On

Normal Operation

When the multifunction switch is in the left or the right turn position, a message is sent to the instrument cluster (IC) from the SJB over the communication network, and the left or the right turn signal indicator flashes on and off.

This pinpoint test is intended to diagnose the following:

- SJB
- Instrument cluster (IC)

PINPOINT TEST X: THE TURN SIGNAL INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
X1	**CHECK THE TURN SIGNAL LAMPS OPERATION**	
	• Key in ON position. • Operate the LH and RH turn signals. • **Do the turn signals operate correctly?**	**Yes** GO to X2. **No** REFER to Section 417-01.
X2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST X: THE TURN SIGNAL INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
X2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL (Continued)**	
	• Select the instrument cluster (IC) all warning lamps (ALL__LAMP) active command on and off while monitoring the LH and RH turn signal indicators. • **Do the LH and RH turn signal indicators illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to X3. **No** GO to X4.
X3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
X4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test Y: The Speed Control Indicator Is Never/Always On

Normal Operation

The instrument cluster (IC) receives the speed control data from the PCM through the communication network. When the speed control is engaged, the PCM provides a signal to the instrument cluster (IC) to illuminate the speed control indicator.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST Y: THE SPEED CONTROL INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
Y1	**CHECK THE SPEED CONTROL OPERATION**	
	• Test drive the vehicle and operate the speed control. • **Does the speed control operate correctly?**	**Yes** GO to Y2. **No** REFER to Section 310-03.
Y2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) speed control indicator (CRUISE) active command while monitoring the speed control indicator. • **Does the speed control indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to Y3. **No** GO to Y4.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST Y: THE SPEED CONTROL INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
Y3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
Y4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test Z: The Traction Control Indicator Is Never/Always On

Normal Operation

The traction control indicator informs the driver that a traction control event is taking place, by flashing the indicator. It is also used to indicate a traction control system concern by illuminating the indicator constantly (not flashing). The instrument cluster (IC) receives the traction control signal from the ABS module through the communication network. When a traction control event is taking place, the ABS module sends a message to the instrument cluster (IC) over the communication network to flash the traction control indicator. When a traction control system concern exists, the ABS module sends a message to the instrument cluster (IC) to turn on the traction control indicator.

This pinpoint test is intended to diagnose the following:

- ABS module
- Instrument cluster (IC)

PINPOINT TEST Z: THE TRACTION CONTROL INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
Z1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND ABS MODULE SELF-TESTS**	
	• Check for recorded ABS module DTCs from the continuous and on-demand self-tests. • **Are any DTCs recorded?**	**Yes** REFER to Section 206-09. **No** GO to **Z2**.
Z2	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND INSTRUMENT CLUSTER (IC) SELF-TESTS**	
	• Check for recorded instrument cluster (IC) DTCs from the continuous and on-demand self-tests. • **Is DTC C1093 recorded?**	**Yes** REFER to Section 206-09. **No** GO to **Z3**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST Z: THE TRACTION CONTROL INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
Z3	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) traction control indicator (STAB__IND) active command on and off while monitoring the traction control indicator. • **Does the traction control indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **Z4**. **No** GO to **Z5**.
Z4	**CHECK FOR CORRECT ABS MODULE OPERATION**	
	• Disconnect the ABS module connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the ABS module connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new ABS module. REFER to Section 206-09. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
Z5	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AA: The Daytime Running Lamps (DRL) Indicator Is Never/Always On

Normal Operation

When the DRL is on, the smart junction box (SJB) sends a message over the communication network to the instrument cluster (IC) to illuminate the DRL indicator.

This pinpoint test is intended to diagnose the following:

- SJB
- Instrument cluster (IC)

PINPOINT TEST AA: THE DAYTIME RUNNING LAMPS (DRL) INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
AA1	**CHECK THE DRL OPERATION**	
	• Check the operation of the DRL. • **Does the DRL operate correctly?**	**Yes** GO to **AA2**. **No** REFER to Section 417-01.
AA2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all warning lamps (ALL__LAMP) active command on and off while monitoring the DRL indicator. • **Does the DRL indicator illuminate when commanded on, and turn off when commanded off?**	**Yes** GO to **AA3**. **No** GO to **AA4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AA: THE DAYTIME RUNNING LAMPS (DRL) INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
AA3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
AA4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AB: The Low Fuel Warning Indicator Is Never/Always On

Normal Operation

The low fuel indicator is on when the fuel level reaches a predetermined level of approximately 1/16 tank. The low fuel level warning indicator and the fuel gauge are controlled by the instrument cluster (IC) based upon the fuel level data provided by the smart junction box (SJB). When the instrument cluster (IC) receives the data, the fuel gauge indicates low fuel and the instrument cluster (IC) illuminates the low fuel warning indicator.

This pinpoint test is intended to diagnose the following:

- Instrument cluster (IC)

PINPOINT TEST AB: THE LOW FUEL WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
AB1	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on then off while monitoring the low fuel warning indicator. • **Does the low fuel warning indicator illuminate when commanded on and turn off when commanded off?**	**Yes** GO to **AB2**. **No** GO to **AB3**.
AB2	**CHECK THE FUEL GAUGE FOR CORRECT OPERATION**	
	• Key in ON position. • Check the fuel gauge. • **Does the fuel gauge operate correctly?**	**Yes** GO to **AB3**. **No** GO to Pinpoint Test B.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AB: THE LOW FUEL WARNING INDICATOR IS NEVER/ALWAYS ON (Continued)

Test Step		Result / Action to Take
AB3	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AC: The Performance Shift Warning Indicator Is Never/Always On (Shelby GT 500 Only)

Normal Operation

The performance shift warning indicator shares the SVT logo on the tachometer. The performance shift indicator is configurable on or off and uses engine rpm to determine when to illuminate. The SVT logo is normally backlit in red when the performance indicator is configured off. When the performance shift warning indicator is configured on, the SVT logo red backlighting is turned off. When a preset engine rpm is reached, the SVT logo illuminates orange to alert the driver of the selected shift point. The performance shift warning indicator can be configured on or off through the message center.

The performance shift indicator receives the engine rpm status from the PCM over the high speed controller area network (HS-CAN) communication bus lines. When the engine rpm is equal to the preset (configured) shift rpm, the instrument cluster (IC) turns on the performance shift indicator.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST AC: THE PERFORMANCE SHIFT WARNING INDICATOR IS NEVER/ALWAYS ON (SHELBY GT 500 ONLY)

Test Step		Result / Action to Take
AC1	**CHECK THE PERFORMANCE SHIFT CONFIGURATION**	
	• Verify that the performance shift indicator is configured on. Refer to Message Center Configuration or the Owner's Literature for additional information. • **Is the performance shift indicator configured on?**	**Yes** GO to **AC2**. **No** CONFIGURE the performance shift indicator on. REFER to Message Center Configuration or the Owner's Literature for additional information. TEST the system for normal operation.
AC2	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Retrieve the recorded DTCs from the PCM continuous and on-demand self-tests. • **Are any DTCs retrieved?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **AC3**.
AC3	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AC: THE PERFORMANCE SHIFT WARNING INDICATOR IS NEVER/ALWAYS ON (SHELBY GT 500 ONLY) (Continued)

Test Step		Result / Action to Take
AC3	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND (Continued)**	
	• Select the instrument cluster (IC) all lamps (ALL__LAMP) active command on then off while monitoring the performance shift indicator. • **Does the performance shift indicator turn on when commanded on and turn off when commanded off?**	**Yes** GO to **AC4**. **No** GO to **AC5**.
AC4	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
AC5	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AD: The Shift Indicator Is Never/Always On (Shelby GT 500 Only)

Normal Operation

The shift indicator is used to inform the driver of shift points that provide the highest fuel economy. The shift indicator is controlled by the instrument cluster (IC) based upon a shift message sent from the PCM over the high speed controller area network (HS-CAN) communication bus lines.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST AD: THE SHIFT INDICATOR IS NEVER/ALWAYS ON (SHELBY GT 500 ONLY)

Test Step		Result / Action to Take
AD1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Retrieve the recorded DTCs from the PCM continuous and on-demand self-tests. • **Are any DTCs retrieved?**	**Yes** REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **AD2**.
AD2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) all lamps (ALL__LAMP) active command while monitoring the up shift indicator. • **Does the shift indicator turn on when commanded on and turn off when commanded off?**	**Yes** GO to **AD3**. **No** GO to **AD4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AD: THE SHIFT INDICATOR IS NEVER/ALWAYS ON (SHELBY GT 500 ONLY) (Continued)

Test Step		Result / Action to Take
AD3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
AD4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AE: The Tire Pressure Monitoring System (TPMS) Warning Indicator Is Never/Always On

Normal Operation

The tire pressure warning indicator alerts the driver that one or more of the tires on the vehicle has low tire pressure or is flat. The tire pressure monitoring system (TPMS) system consists of a tire pressure sensor and a transmitter located on each tire. The instrument cluster (IC) receives the TPMS status message(s) from the smart junction box (SJB) over the medium speed controller area network (MS-CAN) communication bus lines. If a low tire is detected by the TPMS, the SJB sends a message to the instrument cluster (IC) and the instrument cluster (IC) turns on the TPMS warning indicator. If there is a problem or fault detected in the TPMS, the SJB sends the appropriate message to the instrument cluster (IC) and the instrument cluster (IC) flashes the TPMS warning indicator. If the TPMS status message is invalid or missing for more than 5 seconds, the instrument cluster (IC) flashes the TPMS warning indicator for 75 seconds then turns the indicator on steady.

This pinpoint test is intended to diagnose the following:

- TPMS concern
- SJB
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AE: THE TIRE PRESSURE MONITORING SYSTEM (TPMS) WARNING INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
AE1	**CHECK THE TIRE PRESSURE**	
	• Verify that the tire pressure in all tires meets the recommended tire pressures on the vehicle certification label. Refer to Section 100-01. • **Do all the tires meet the recommended tire pressures?**	**Yes** GO to **AE2**. **No** CORRECT the tire pressures. TEST the system for normal operation.
AE2	**RETRIEVE THE RECORDED DTCs FROM BOTH THE INSTRUMENT CLUSTER (IC) CONTINUOUS AND ON-DEMAND SELF-TESTS**	
	• Check for recorded instrument cluster (IC) DTCs from the continuous and on-demand self-tests. • **Is DTC B2477 recorded?**	**Yes** REFER to Section 418-01 to carry out the programmable module installation (PMI) for the instrument cluster. **No** GO to **AE3**.
AE3	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND SJB SELF-TESTS**	
	• Check for recorded DTCs from the SJB continuous and on-demand self-tests. • **Are any SJB DTCs retrieved?**	**Yes** REFER to Section 419-10. **No** GO to **AE4**.
AE4	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) tire pressure warning indicator (TIRE__PRES) active command on then off again while monitoring the TPMS warning indicator. • **Does the TPMS warning indicator turn on when commanded on and turn off when commanded off?**	**Yes** GO to **AE5**. **No** GO to **AE6**.
AE5	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
AE6	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test AF: The Anti-Theft Indicator Is Never/Always On

Normal Operation

The instrument cluster (IC) receives the anti-theft status from the PCM over the high speed controller area network (HS-CAN) communication bus lines. The anti-theft indicator proves out for 3 seconds when the ignition switch is turned to the RUN or the START position. If there is a passive anti-theft system (PATS) concern, the indicator either flashes rapidly or glows steadily (for more than 3 seconds) when the ignition switch is turned to the RUN or START position. The PATS also flashes the anti-theft indicator every 2 seconds at ignition OFF to act as a visual theft deterrent.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST AF: THE ANTI-THEFT INDICATOR IS NEVER/ALWAYS ON

Test Step		Result / Action to Take
AF1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Retrieve the recorded DTCs from the PCM continuous and on-demand self-tests. • **Are any DTCs retrieved?**	**Yes** If there are any PATS DTCs present, REFER to Section 419-01B. For all other PCM DTCs, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. **No** GO to **AF2**.
AF2	**CARRY OUT THE INSTRUMENT CLUSTER (IC) INDICATOR LAMP CONTROL ACTIVE COMMAND**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) anti-theft indicator (THFTLMP) active command on then off again while monitoring the anti-theft indicator. • **Does the anti-theft indicator turn on when commanded on and turn off when commanded off?**	**Yes** GO to **AF3**. **No** GO to **AF4**.
AF3	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
AF4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect all instrument cluster (IC) connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all instrument cluster (IC) connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test AG: The Message Center Is Not Operating Correctly

Normal Operation

The message center display is located below the speedometer in the instrument cluster (IC). The message center functionality is controlled through the message center switches, which are hardwired to the instrument cluster (IC) through circuits 1410 (TN/OG) and 1411 (GY/OG). The message center switches use a different resistance value for each switch, allowing the instrument cluster (IC) to determine which switch is pressed.

This pinpoint test is intended to diagnose the following:

- Message center switch concern
- Instrument cluster (IC)

PINPOINT TEST AG: THE MESSAGE CENTER IS NOT OPERATING CORRECTLY

Test Step		Result / Action to Take
AG1	**CHECK THE MESSAGE CENTER DISPLAY OPERATION USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) display segment (SEGMENTS) active command. Command the display segments on while observing the message center display. • **Does the message center display illuminate all segments?**	**Yes** The system is OK. If the SET, INFO or RESET buttons are inoperative, GO to Pinpoint Test AH. **No** GO to **AG2**.
AG2	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AH: The Message Center Switch Does Not Operate Correctly

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

Normal Operation

The message center switch assembly uses circuits 1410 (TN/OG) and 1411 (GY/OG) to communicate the requested switch function to the message center.

- DTC B1205 (EIC Switch-1 Assembly Circuit Failure) — is an on-demand DTC that sets if the instrument cluster (IC) detects any of the message center buttons pressed during the self-test.

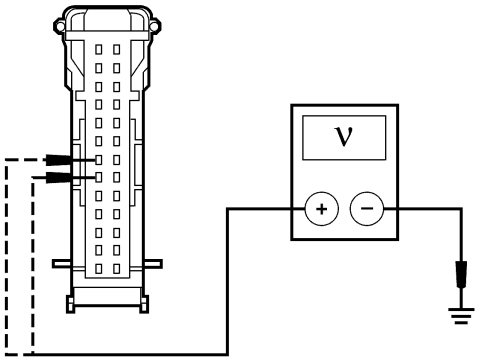
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Message center switch
- Instrument cluster (IC)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AH: THE MESSAGE CENTER SWITCH DOES NOT OPERATE CORRECTLY

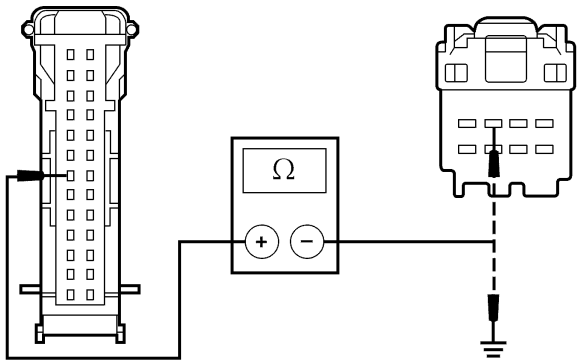
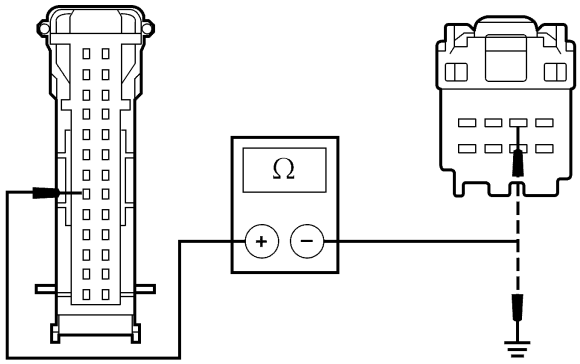
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

	Test Step	Result / Action to Take
AH1	**RETRIEVE THE RECORDED DTCs FROM BOTH THE CONTINUOUS AND ON-DEMAND INSTRUMENT CLUSTER (IC) SELF-TESTS**	
	• Check the recorded instrument cluster (IC) DTCs from the continuous and on-demand self-tests. • **Is DTC B1205 recorded?**	**Yes** INSTALL a new message center switch. REFER to Message Center Switch. TEST the system for normal operation. **No** GO to **AH2**.
AH2	**CHECK THE INSTRUMENT CLUSTER (IC) PID FOR THE MESSAGE CENTER SWITCH USING THE SCAN TOOL**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: Instrument Cluster (IC) DataLogger. • Select the instrument cluster (IC) message center INFO switch (INFOSW), SETUP switch (SETUPSW) and RESET switch (RES_SW) PIDs while pressing each message center switch (INFO, SETUP, and RESET). • **Does the PID agree with the switch position?**	**Yes** GO to **AH7**. **No** GO to **AH3**.
AH3	**CHECK CIRCUITS 1410 (TN/OG) AND 1411 (GY/OG) FOR A SHORT TO VOLTAGE**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220. • Disconnect: Message Center Switch C253. • Key in ON position. • Measure the voltage between the instrument cluster (IC) C220-7, circuit 1410 (TN/OG), harness side and ground; and between the instrument cluster (IC) C220-6, circuit 1411 (GY/OG), harness side and ground.  N0012667 • **Is any voltage present?**	**Yes** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test. **No** GO to **AH4**.
AH4	**CHECK CIRCUIT 1410 (TN/OG) FOR AN OPEN AND SHORT TO GROUND**	
	• Key in OFF position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

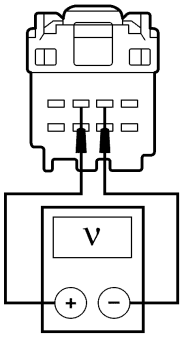
PINPOINT TEST AH: THE MESSAGE CENTER SWITCH DOES NOT OPERATE CORRECTLY (Continued)

Test Step		Result / Action to Take
AH4	**CHECK CIRCUIT 1410 (TN/OG) FOR AN OPEN AND SHORT TO GROUND (Continued)**	
	• Measure the resistance between the instrument cluster (IC) C220-7, circuit 1410 (TN/OG), harness side and the message center switch C253-3, circuit 1410 (TN/OG), harness side; and between the instrument cluster (IC) C220-7, circuit 1410 (TN/OG), harness side and ground.  N0012061 • **Is the resistance less than 5 ohms between the instrument cluster (IC) and the message center switch, and greater than 10,000 ohms between the instrument cluster (IC) and ground?**	**Yes** GO to **AH5**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
AH5	**CHECK CIRCUIT 1411 (GY/OG) FOR AN OPEN AND SHORT TO GROUND**	
	• Measure the resistance between the instrument cluster (IC) C220-6, circuit 1411 (GY/OG), harness side and the message center switch C253-2, circuit 1411 (GY/OG), harness side; and between the instrument cluster (IC) C220-6, circuit 1411 (GY/OG), harness side and ground.  N0012062 • **Is the resistance less than 5 ohms between the instrument cluster (IC) and the message center switch, and greater than 10,000 ohms between the instrument cluster (IC) and ground?**	**Yes** GO to **AH6**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
AH6	**CHECK FOR VOLTAGE FROM THE INSTRUMENT CLUSTER (IC)**	
	• Connect: Instrument Cluster (IC) C220. • Key in ON position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AH: THE MESSAGE CENTER SWITCH DOES NOT OPERATE CORRECTLY (Continued)

Test Step		Result / Action to Take
AH6	**CHECK FOR VOLTAGE FROM THE INSTRUMENT CLUSTER (IC) (Continued)**	
	• Measure the voltage between the message center switch C269-3, circuit CMC29 (GN/VT), harness side and the message center switch C269-2, circuit VMC29 (YE), harness side and ground.  N0064498 • **Is the voltage greater than 10 volts?**	**Yes** INSTALL a new message center switch. REFER to Message Center Switch in this section. TEST the system for normal operation. **No** GO to **AH7**.
AH7	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test AI: The CHECK FUEL CAP Message Is Inoperative/Always On

Normal Operation

The PCM monitors the fuel tank evaporative emission system for significant leaks that occur following refueling of the vehicle. Once the PCM detects a fuel vapor leak, the PCM sends the instrument cluster (IC) a message over the communication network to turn on the CHECK FUEL CAP message. DTC P0457 sets in the PCM following a successful cruise test, which is initiated when the vehicle is driven at a steady speed above 64 km/h (40 mph) for a duration of approximately 4-5 minutes. If the PCM is unable to successfully run the cruise test, the instrument cluster (IC) does not receive the check fuel cap message and the CHECK FUEL CAP message remains off.

- DTC P0457 (Evaporative Emission System Leak Detected [fuel cap loose/off]) — sets in the PCM if a fuel tank pressure change greater than -23.7 kPa (-7 in-Hg) of vacuum within 30 seconds after refueling occurs, or there is an excessive purge (fuel vapor) flow of greater than 454 g (1.0 lb) per minute.

This pinpoint test is intended to diagnose the following:

- PCM
- Instrument cluster (IC)

PINPOINT TEST AI: THE CHECK FUEL CAP MESSAGE IS INOPERATIVE/ALWAYS ON

Test Step		Result / Action to Take
AI1	**RETRIEVE THE RECORDED DTCs FROM BOTH CONTINUOUS AND ON-DEMAND PCM SELF-TESTS**	
	• Check for recorded PCM DTCs from the continuous and on-demand self-tests. • **Is DTC P0457 recorded?**	**Yes** If the CHECK FUEL CAP message is displayed, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. If the CHECK FUEL CAP message is not displayed, GO to **AI2**. **No** If the CHECK FUEL CAP message is always displayed, GO to **AI3**. If the CHECK FUEL CAP message is not displayed, the system is operating normally at this time. If the fuel cap was left off and the check fuel cap warning indicator did not turn on, driving conditions may not have allowed for the PCM to run the cruise test and message the instrument cluster (IC) to turn on the check fuel cap warning indicator.
AI2	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the PCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AI: THE CHECK FUEL CAP MESSAGE IS INOPERATIVE/ALWAYS ON (Continued)

Test Step		Result / Action to Take
AI3	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AJ: The Key-In-Ignition Chime Is Inoperative

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

Normal Operation

When the key is inserted into the ignition lock cylinder, the key-in-ignition switch (part of the ignition switch) closes and routes a voltage signal to the instrument cluster (IC) through circuit 1414 (LG/VT). The voltage signal indicates to the instrument cluster (IC) the key is inserted into the ignition lock cylinder. If the instrument cluster (IC) detects that the ignition switch is in the OFF or ACC position with the key inserted in the ignition lock cylinder and the driver door is ajar, the key-in-ignition warning chime (located in the instrument cluster [IC]) sounds.

- DTC B1353 (Ignition Key-In Chime Circuit Open) — is a continuous and on-demand DTC that sets in the instrument cluster (IC) if the instrument cluster (IC) detects a run/start input on circuit 489 (PK/BK) with no key-in-ignition input on circuit 1414 (LG/VT).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Key-in-ignition switch (part of the ignition switch)
- Instrument cluster (IC)

PINPOINT TEST AJ: THE KEY-IN-IGNITION CHIME IS INOPERATIVE

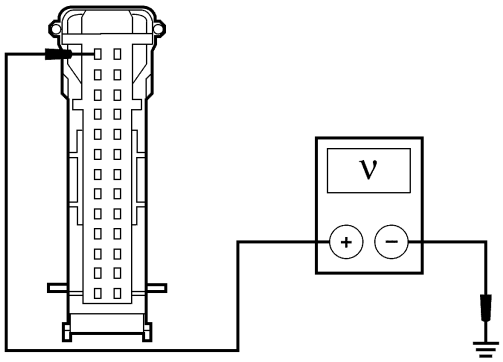
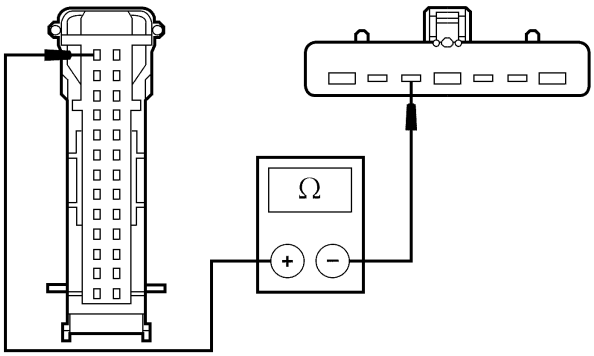
⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
AJ1	**CHECK FOR DRIVER DOOR AJAR INPUT TO THE SJB**	
	• Check the operation of the interior lamps while opening and closing the driver door. • **Do the interior lamps operate correctly?**	**Yes** GO to AJ2. **No** REFER to Section 417-02.
AJ2	**CHECK INSTRUMENT CLUSTER (IC) CHIME FUNCTION**	
	• Key in OFF position. • Turn the parking lamps on. • Open the driver door. • **Does the headlamps on warning chime sound?**	**Yes** GO to AJ3. **No** GO to AJ5.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AJ: THE KEY-IN-IGNITION CHIME IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
AJ3	**CHECK THE INPUT TO THE INSTRUMENT CLUSTER (IC) FOR DTC B1353**	
	• Disconnect: Instrument Cluster (IC) C220. • Insert the ignition key into the ignition lock cylinder. • Measure the voltage between the instrument cluster (IC) C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is the voltage greater than 10 volts?**	**Yes** GO to **AJ5**. **No** GO to **AJ4**.
AJ4	**CHECK CIRCUIT 1414 (LG/VT) FOR AN OPEN**	
	• Disconnect: Ignition Switch C250. • Measure the resistance between the instrument cluster (IC) C220-13, circuit 1414 (LG/VT), harness side and the ignition switch C250-5, circuit 1414 (LG/VT), harness side.  N0012127 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new ignition switch. REFER to Section 211-05. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
AJ5	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test AK: The Headlamps On Warning Chime Is Inoperative

Normal Operation

When the key is inserted into the ignition lock cylinder, the key-in-ignition switch (part of the ignition switch) closes and routes a voltage signal to the instrument cluster (IC) through circuit 1414 (LG/VT). When the ignition key is not inserted into the ignition lock cylinder, the driver door is ajar and the headlamps are on, the smart junction box (SJB) sends a message to the instrument cluster (IC) over the medium speed controller area network (MS-CAN). The instrument cluster (IC) interprets this signal and sounds the headlamps on warning chime.

This pinpoint test is intended to diagnose the following:

- SJB

PINPOINT TEST AK: THE HEADLAMPS ON WARNING CHIME IS INOPERATIVE

Test Step		Result / Action to Take
AK1	**CHECK THE EXTERIOR LIGHTING**	
	• Check the operation of the exterior lighting. • **Does the exterior lighting operate correctly?**	**Yes** GO to **AK2**. **No** REFER to Section 417-01.
AK2	**CHECK INSTRUMENT CLUSTER (IC) CHIME FUNCTION**	
	• Key in OFF position. • Place the key in the ignition lock cylinder. • Open the driver door. • **Does the key-in-ignition warning chime sound?**	**Yes** GO to **AK3**. **No** GO to Pinpoint Test AJ.
AK3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all of the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all of the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AL: The Chime Sounds When The Driver Door Is Ajar (No Key In The Ignition And The Headlamps Are Off)

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

Normal Operation

When the key is inserted into the ignition lock cylinder, the key-in-ignition switch (part of the ignition switch) closes and routes a voltage signal to the instrument cluster (IC) through circuit 1414 (LG/VT). The voltage signal indicates to the instrument cluster (IC) the key is inserted into the ignition lock cylinder. If the instrument cluster (IC) detects that the ignition switch is in the OFF or ACC position with the key inserted in the ignition lock cylinder and the driver door is ajar, the key-in-ignition warning chime (located in the instrument cluster [IC]) sounds.

This pinpoint test is intended to diagnose

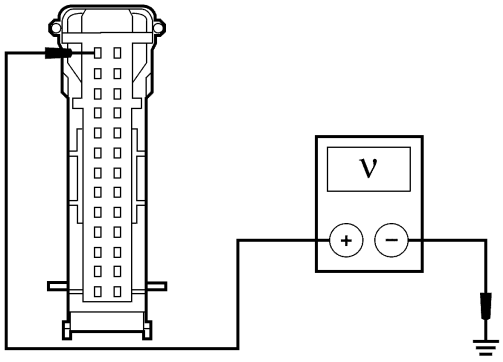
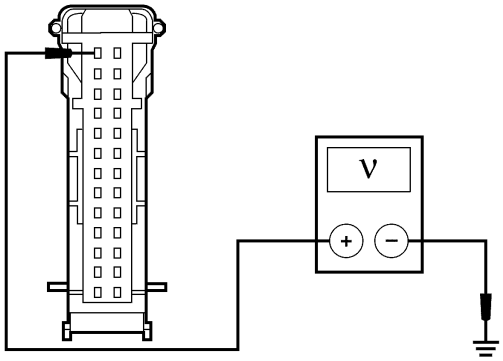
DIAGNOSIS AND TESTING (Continued)

the following:

- Wiring, terminals or connectors
- Key-in-ignition switch (part of the ignition switch)
- Instrument cluster (IC)

PINPOINT TEST AL: THE CHIME SOUNDS WHEN THE DRIVER DOOR IS AJAR (NO KEY IN THE IGNITION AND THE HEADLAMPS ARE OFF)

⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
AL1	**CHECK THE INSTRUMENT CLUSTER (IC) ILLUMINATION**	
	• Check the operation of the instrument cluster (IC) illumination. • **Does the instrument cluster (IC) illumination operate correctly?**	**Yes** GO to **AL2**. **No** REFER to Section 413-00.
AL2	**CHECK THE INPUT TO THE INSTRUMENT CLUSTER (IC)**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220. • Remove the ignition key from the ignition lock cylinder. • Measure the voltage between the instrument cluster (IC) C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is any voltage present?**	**Yes** GO to **AL3**. **No** GO to **AL4**.
AL3	**CHECK CIRCUIT 1414 (LG/VT) FOR A SHORT TO VOLTAGE**	
	• Disconnect: Ignition Switch C250. • Measure the voltage between the instrument cluster (IC) C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is any voltage present?**	**Yes** REPAIR the circuit. TEST the system for normal operation. **No** INSTALL a new ignition switch. REFER to Section 211-05. TEST the system for normal operation.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AL: THE CHIME SOUNDS WHEN THE DRIVER DOOR IS AJAR (NO KEY IN THE IGNITION AND THE HEADLAMPS ARE OFF) (Continued)

Test Step		Result / Action to Take
AL4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AM: The Performance Shift Warning Chime Does Not Operate Correctly

Normal Operation

The performance shift warning chime feature on/off status and the desired rpm for the chime to sound are items that are configured through the message center. The instrument cluster (IC) uses actual engine rpm sent to the instrument cluster (IC) over the high speed controller area network (HS-CAN) communication bus and compares the value against the customer preset engine rpm to determine when to sound the chime. When actual engine rpm matches the preset engine rpm, the instrument cluster (IC) sounds the chime.

This pinpoint test is intended to diagnose the following:

- Instrument cluster (IC) configuration
- Instrument cluster (IC)

PINPOINT TEST AM: THE PERFORMANCE SHIFT WARNING CHIME DOES NOT OPERATE CORRECTLY

Test Step		Result / Action to Take
AM1	**CHECK THE INSTRUMENT CLUSTER (IC) CONFIGURATION**	
	• Verify that the performance shift warning chime (tone) is configured on and that the desired rpm setting is configured. Refer to Message Center Configuration or the Owner's Literature for configuration of the performance shift warning chime. • **Is the performance shift chime (tone) configured on and the desired rpm selected?**	**Yes** GO to **AM2**. **No** CONFIGURE the performance warning shift chime (tone) on and configure the desired rpm setting. REFER to Message Center Configuration in this section or the Owner's Literature for additional information. TEST the system for normal operation.
AM2	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test AN: The Safety Belt Warning Chime Does Not Operate Correctly/The Belt-Minder® Feature Does Not Operate Correctly

Normal Operation

The instrument cluster (IC) receives the safety belt and Belt-Minder® requests from the restraints control module (RCM) over the high speed controller area network (HS-CAN). The safety belt warning chime sounds for approximately 6 seconds when the driver safety belt is not fastened and the ignition lock cylinder is turned from the OFF/LOCK or ACC to the ON or START position.

The Belt-Minder® feature supplements the safety belt warning function and is enabled after the safety belt warning is complete. The Belt-Minder® simultaneously sounds the chime and illuminates the safety belt warning lamp in the instrument cluster (IC) once the vehicle speed has exceeded 5 km/h (3 mph).

NOTE: Make sure that the safety belt/Belt-Minder® chime operation is verified with the vehicle moving at least 5 km/h (3 mph).

This pinpoint test is intended to diagnose the following:

- Belt-Minder® deactivated
- Safety belt warning indication concern
- Speedometer concern
- Instrument cluster (IC)

PINPOINT TEST AN: THE SAFETY BELT WARNING CHIME IS INOPERATIVE/THE BELT-MINDER® FEATURE DOES NOT OPERATE CORRECTLY

Test Step		Result / Action to Take
AN1	**CHECK THE KEY-IN-IGNITION WARNING CHIME OPERATION**	
	• Key in OFF position. • With the ignition switch in the OFF position and the key in the ignition lock cylinder, open the LH front door and observe the key-in-ignition warning chime operation. • **Does the key-in-ignition warning chime operate correctly?**	**Yes** GO to **AN2**. **No** GO to **AN6**.
AN2	**CHECK THE SAFETY BELT WARNING INDICATOR FOR CORRECT OPERATION**	
	• Buckle then unbuckle the LH front safety belt. • With the key in the ON position, verify the safety belt warning indicator illuminates with the safety belt unbuckled and turns off when buckled. • **Does the safety belt warning indicator operate correctly?**	**Yes** GO to **AN3**. **No** REFER to GO to Pinpoint Test P.
AN3	**CHECK THE SPEEDOMETER OPERATION**	
	• Drive the vehicle and verify that the speedometer is operating correctly. • **Does the speedometer operate correctly?**	**Yes** GO to **AN4**. **No** REFER to GO to Pinpoint Test H.
AN4	**CHECK THE BELT-MINDER® CONFIGURATION**	
	• Verify that the Belt-Minder® is activated or configured on for the seating position in question. Refer to Belt-Minder® Deactivating/Activating in this section to configure without a scan tool. • **Is the Belt-Minder® activated for the seating position in question?**	**Yes** GO to **AN5**. **No** ACTIVATE the Belt-Minder® for the seating position in question. REFER to Belt-Minder® Deactivating/Activating in this section. TEST the system for normal operation.
AN5	**CHECK FOR CORRECT RCM OPERATION**	
	• Disconnect all the RCM connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the RCM connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new RCM. REFER to Section 501-20B. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AN: THE SAFETY BELT WARNING CHIME IS INOPERATIVE/THE BELT-MINDER® FEATURE DOES NOT OPERATE CORRECTLY (Continued)

Test Step		Result / Action to Take
AN6	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AO: DTC B1318 — Battery Voltage Low

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

Normal Operation

The instrument cluster sets DTC B1318 in continuous memory and on-demand if the instrument cluster detects low battery voltage on the B+ keep alive voltage input, circuit 1001 (LG/RD).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- High circuit resistance
- Instrument cluster

PINPOINT TEST AO: DTC B1318 — BATTERY VOLTAGE LOW

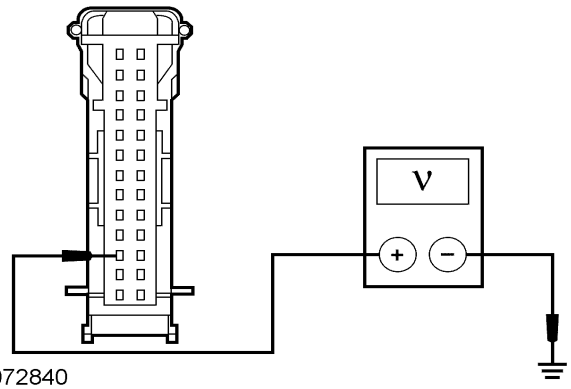
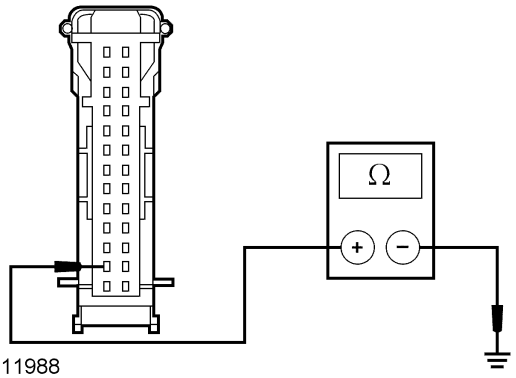
⚠ **CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

Test Step		Result / Action to Take
AO1	**RECHECK THE INSTRUMENT CLUSTER DTCs**	
	• Enter the following diagnostic mode on the scan tool: Instrument Cluster Self-Test. • Clear the DTCs. Repeat the instrument cluster self-test. • **Is DTC B1318 still present?**	**Yes** GO to **AO2**. **No** The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.
AO2	**CHECK THE BATTERY CONDITION AND STATE OF CHARGE**	
	• Check the battery condition and verify that the battery is fully charged. Refer to Section 414-01. • **Is the battery OK and fully charged?**	**Yes** GO to **AO3**. **No** REFER to Section 414-01.
AO3	**CHECK THE INSTRUMENT CLUSTER VOLTAGE SUPPLY**	
	• Key in OFF position. • Disconnect: Instrument Cluster C220. • Key in ON position.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AO: DTC B1318 — BATTERY VOLTAGE LOW (Continued)

Test Step		Result / Action to Take
AO3	**CHECK THE INSTRUMENT CLUSTER VOLTAGE SUPPLY (Continued)**	
	• Measure the voltage between the instrument cluster C220-3, circuit 1001 (LG/RD), harness side and ground.  N0072840 • **Is the voltage greater than 10 volts?**	**Yes** GO to **AO4**. **No** REPAIR the circuit for high resistance. CLEAR the DTC. REPEAT the self-test.
AO4	**CHECK THE INSTRUMENT CLUSTER GROUND CIRCUIT**	
	• Key in OFF position. • Measure the resistance between the instrument cluster C220-2, circuit 1205 (BK), harness side and ground.  N0011988 • **Is the resistance less than 5 ohms?**	**Yes** GO to **AO5**. **No** REPAIR the circuit for high resistance. TEST the system for normal operation.
AO5	**CHECK FOR CORRECT INSTRUMENT CLUSTER OPERATION**	
	• Disconnect the instrument cluster connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster. REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test AP: DTC B1557 — Ignition RUN/START Circuit Short To Battery

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

DIAGNOSIS AND TESTING (Continued)

Normal Operation

With the ignition switch in the START or RUN position, the instrument cluster (IC) receives voltage from the smart junction box (SJB) through circuits 489 (PK/BK) and 1266 (RD/YE). With the ignition switch in the OFF position, the instrument cluster (IC) receives its keep-alive voltage from the SJB through circuit 1001 (WH/YE). The instrument cluster (IC) is grounded through circuit 1205 (BK).

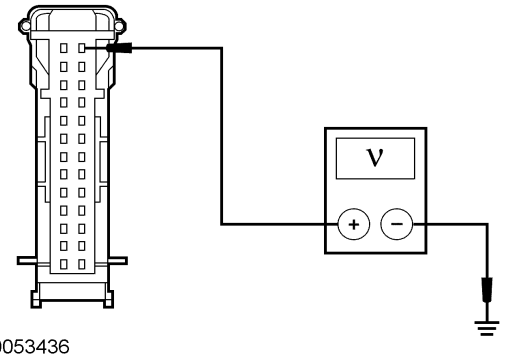
- DTC B1557 (Ignition RUN/START Circuit Short to Battery) — is a continuous DTC that sets in the instrument cluster (IC) if the instrument cluster (IC) receives a voltage input on circuit 489 (PK/BK) and a message from the SJB indicating that the ignition switch has transitioned to the OFF or ACC position.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- SJB
- Instrument cluster (IC)

PINPOINT TEST AP: DTC B1557 — IGNITION RUN/START CIRCUIT SHORT TO BATTERY

⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
AP1	**CHECK THE INSTRUMENT CLUSTER (IC) VOLTAGE SUPPLY**	
	• Key in OFF position. • Disconnect: Instrument Cluster (IC) C220. • Measure the voltage between the instrument cluster (IC) C220-26, circuit 489 (PK/BK), harness side and ground.  N0053436 • **Is any voltage present?**	**Yes** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. **No** GO to **AP2**.
AP2	**CHECK THE SJB IGNITION SWITCH PIDs**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB ignition switch (IGN__SW) PID while moving the ignition switch from the RUN/START position to the OFF and ACC positions. • **Does the PID agree with the ignition switch position?**	**Yes** GO to **AP4**. **No** VERIFY that all SJB controlled systems function correctly. GO to **AP3**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST AP: DTC B1557 — IGNITION RUN/START CIRCUIT SHORT TO BATTERY (Continued)

Test Step		Result / Action to Take
AP3	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.
AP4	**CHECK FOR CORRECT INSTRUMENT CLUSTER (IC) OPERATION**	
	• Disconnect the instrument cluster (IC) connector. • Check for: — corrosion — damaged pins — pushed-out pins • Connect the instrument cluster (IC) connector and make sure it seats correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new instrument cluster (IC). REFER to Instrument Cluster (IC) in this section. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

GENERAL PROCEDURES

Message Center Configuration

Performance Shift Indicator, Shift Tone and Shift Point

1. **NOTE:** The vehicle must be at a complete stop before configuring the performance shift indicator, shift tone or shift point.

   Press and release the SETUP button until the message center displays PRESS RESET TO SET SHIFTPOINT.

2. Press the RESET button to toggle the performance shift indicator on or off. Once the performance shift indicator has been selected on or off, press the SETUP BUTTON.

3. Press the RESET button to toggle the shift tone on or off. Once the shift tone has been selected on or off, press the SETUP BUTTON.

4. **NOTE:** The shift points can be configured from 1,500-6,000 rpm.

   Press the INFO button to lower the shift points in increments of 100 rpm.

5. Press the RESET button to raise the shift points in increments of 100 rpm.

GENERAL PROCEDURES

Belt-Minder® Deactivating/Activating

Preparation

NOTE: The Belt-Minder® can also be configured on or off using the scan tool.

1. Before deactivating/activating the Belt-Minder®, set the parking brake.
2. Place the gearshift in PARK (P) (automatic transmission) or the NEUTRAL (N) position (manual transmission).
3. Place the ignition switch in the OFF position.
4. Unbuckle the driver and passenger safety belt.

Deactivating/Activating

NOTE: Steps 1-7 using only the driver safety belt permanently enables/disables the Belt-Minder® feature.

NOTE: Steps 1-7 using only the passenger safety belt permanently enables/disables the Belt-Minder® feature.

NOTE: Only one side (driver or passenger) can be enabled/disabled per ignition switch cycle. While programming the driver side, any activity on the passenger side terminates the programming sequence. While programming the passenger side, any activity on the driver side terminates the programming sequence.

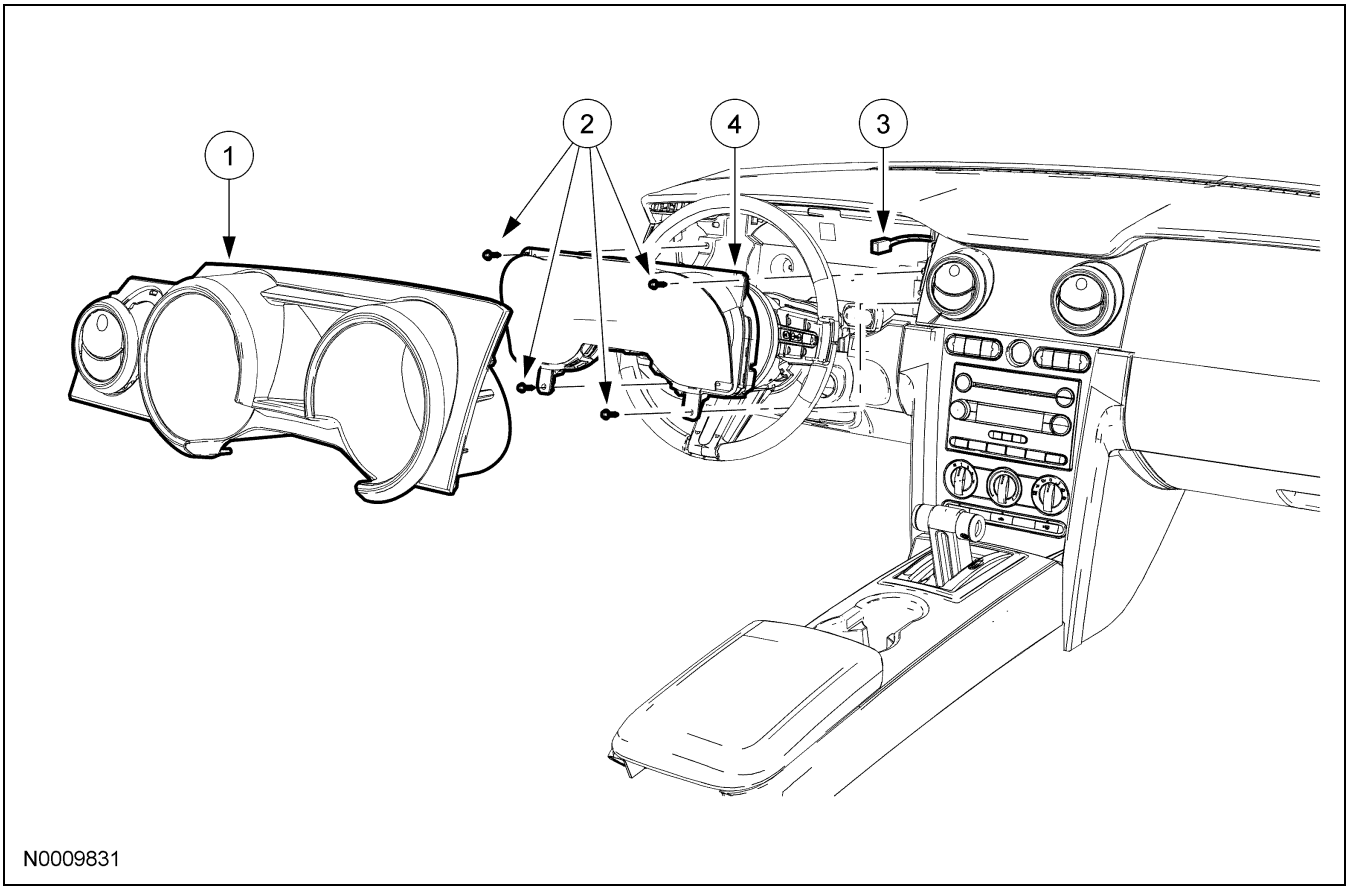
NOTE: The programming sequence terminates if a system fault occurs that requires the illumination of the safety belt, or air bag warning indicator at any time during the programming or confirmation.

1. Turn the ignition switch to the RUN position (do not start the engine).
2. Wait until the safety belt warning indicator turns off (approximately one minute).
3. **NOTE:** Step 3 must be completed within 50 seconds after the safety belt warning indicator turns off.

   Buckle and unbuckle the driver or passenger safety belt 9 times, ending with the safety belt unbuckled. The air bag warning indicator illuminates for 3 seconds after this step.
4. After the air bag warning indicator turns off, buckle and unbuckle the safety belt again. This enables the Belt-Minder® if disabled or disables the Belt-Minder® if enabled.
5. Confirmation of the Belt-Minder® being enabled is by the air bag warning indicator flashing 4 times per second for 3 seconds, followed by 3 seconds again.
6. Confirmation of the Belt-Minder® being disabled is by the air bag warning indicator flashing 4 times per second for 3 seconds.
7. After confirmation, the deactivation/activation procedure is complete.

REMOVAL AND INSTALLATION

Instrument Cluster (IC)



Item	Part Number	Description
1	63044D70	Instrument cluster (IC) finish panel
2	W705314	Instrument cluster (IC) screws (4 required)
3	—	Instrument cluster (IC) electrical connector (part of 14401)
4	10849	Instrument cluster (IC)

Removal and Installation

1. **NOTE:** If installing a new instrument cluster (IC), it is necessary to upload the instrument cluster (IC) configuration information to the scan tool. For additional information, refer to Section 418-01.

   Depower the supplemental restraint system (SRS). For additional information, refer to Section 501-20B.

2. **NOTE:** The instrument cluster (IC) finish panel is held in place with retaining clips that are attached to the bezel.

   Remove the instrument cluster (IC) finish panel.

3. Remove the 4 screws and the instrument cluster (IC).
   - Disconnect the electrical connector.

4. To install, reverse the removal procedure.
   - If a new instrument cluster (IC) was installed, download the instrument cluster (IC) configuration information from the scan tool into the new instrument cluster (IC). For additional information, refer to Section 418-01.

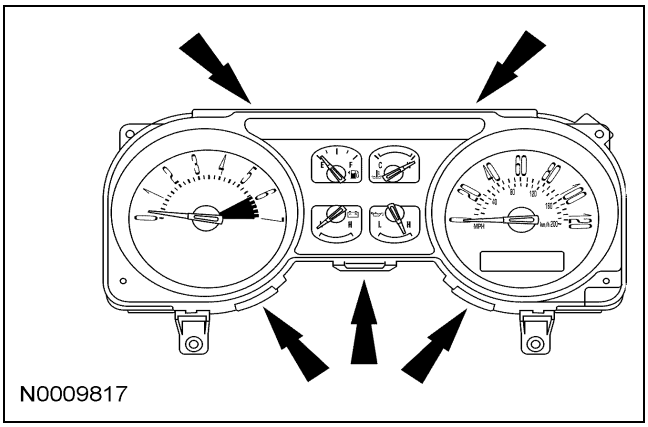
REMOVAL AND INSTALLATION

Instrument Cluster (IC) Lens

Removal and Installation

1. Remove the instrument cluster (IC). For additional information, refer to Instrument Cluster (IC) in this section.

2. Release the retaining tabs and remove the instrument cluster (IC) lens.



3. To install, reverse the removal procedure.

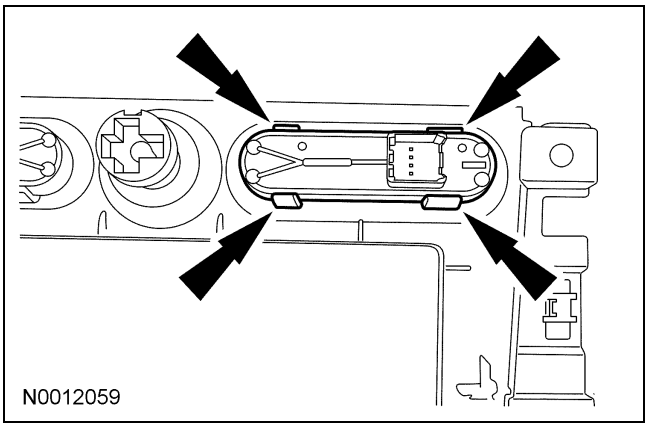
REMOVAL AND INSTALLATION

Message Center Switch

Removal and Installation

1. Remove the instrument panel center finish panel. For additional information, refer to Section 501-12.

2. Press the retaining tabs and remove the message center switches.



3. To install, reverse the removal procedure.

SPECIFICATIONS

Torque Specifications

Description	Nm	lb-in
Horn bracket nut	9	80

Torque Specifications (Continued)

Description	Nm	lb-in
Radiator bracket bolts	10	89

DESCRIPTION AND OPERATION

Horn

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

The horn system consists of the following:

- Dual tone horns
- Horn switch (part of the steering wheel)
- Horn relay, located in the bussed electrical center (BEC)
- SJB

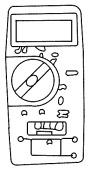
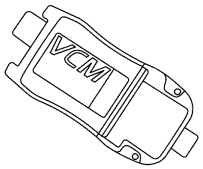
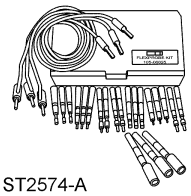
Horn Location

The horn is mounted on the RH side of the core support behind the radiator grille.

DIAGNOSIS AND TESTING

Horn

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2834-A	Vehicle Communications Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit 105-R025C or equivalent

Principles of Operation

NOTE: The smart junction box (SJB) is also known as the generic electronic module (GEM).

The horn switch is incorporated within the steering wheel. When the switch is closed, ground is supplied through the clockspring from the vehicle harness. The horn relay is than energized, supplying voltage to the horn enabling the horn to sound. The horn relay is located in the bussed electrical center (BEC).

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Horns • Horn switch (part of the steering wheel) • Clockspring	• Bussed electrical center (BEC) fuse 46 (25A) • Wiring, terminals or connectors • Horn relay • Horn switch (part of the steering wheel)

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. **NOTE:** Make sure to use the latest scan tool release software.

   If the cause is not visually evident, connect the scan tool to the data link connector (DLC).
5. **NOTE:** The vehicle communication module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

   If the scan tool does not communicate with the VCM:
   - Check the VCM connection to the vehicle.
   - Check the scan tool connection to the VCM.
   - Refer to Section 418-00, No Power To The Scan Tool, to diagnose no communication with the vehicle.
6. If the scan tool does not communicate with the vehicle:
   - Verify the ignition key is in the ON position.
   - Verify the scan tool operation with a known good vehicle.
   - Refer to Section 418-00 to diagnose no response from the PCM.
7. Carry out the network test.
   - If the scan tool responds with no communication with one or more modules, refer to Section 418-00.
   - If the network test passes, retrieve and record the continuous memory DTCs.
8. Clear the continuous DTCs and carry out the self-test diagnostics for the SJB.

DIAGNOSIS AND TESTING (Continued)

9. If the DTCs retrieved are related to the concern, go to DTC Charts. For all other DTCs, refer to Section 419-10.
10. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

DTC Charts

Smart Junction Box (SJB) DTC Chart

DTC	Description	Action
B1217	Horn Relay Coil Circuit Failure	GO to Pinpoint Test A.
B1897	Horn Switch Circuit Failure	GO to Pinpoint Test B.
All other DTCs	—	REFER to Section 419-10.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The horn is inoperative	• Fuse • Wiring, terminals or connectors • Horn relay • Horn switch (part of the steering wheel) • Horns • Clockspring • Bussed electrical center (BEC) • Smart junction box (SJB)	• GO to Pinpoint Test A.
• The horn is always on	• Wiring, terminals or connectors • Horn switch (part of the steering wheel) • Clockspring • Horn relay • BEC • SJB	• GO to Pinpoint Test B.

Pinpoint Tests

Pinpoint Test A: The Horn Is Inoperative

Refer to Wiring Diagrams Cell 44, Horn/Cigar Lighter for schematic and connector information.

DIAGNOSIS AND TESTING (Continued)

Normal Operation

The horn relay control and switched voltage is supplied by the bussed electrical center (BEC) through fuse 46 (25A). The SJB receives the horn signal through circuit 1 (DB) from the horn switch (part of the steering wheel). When the horn switch is pressed, ground is supplied through the clockspring to the vehicle harness through circuit 1205 (BK). The SJB then activates the horn relay through circuit 1323 (OG/RD). Voltage is then sent to the horn through circuit 6 (YE/LG), enabling the horns to sound. Ground is provided to the horns through circuit 1205 (BK).

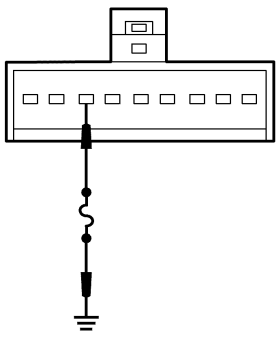
- DTC B1217 (Horn Relay Coil Circuit Failure) — is a continuous and on-demand DTC that sets when the SJB detects a short to voltage on circuit 1323 (OG/RD) or circuit 1 (DB).

This pinpoint test is intended to diagnose the following:

- Fuse
- Wiring, terminals or connectors
- Horn relay
- Horn switch (part of the steering wheel)
- Horns
- Clockspring
- BEC
- SJB

PINPOINT TEST A: THE HORN IS INOPERATIVE

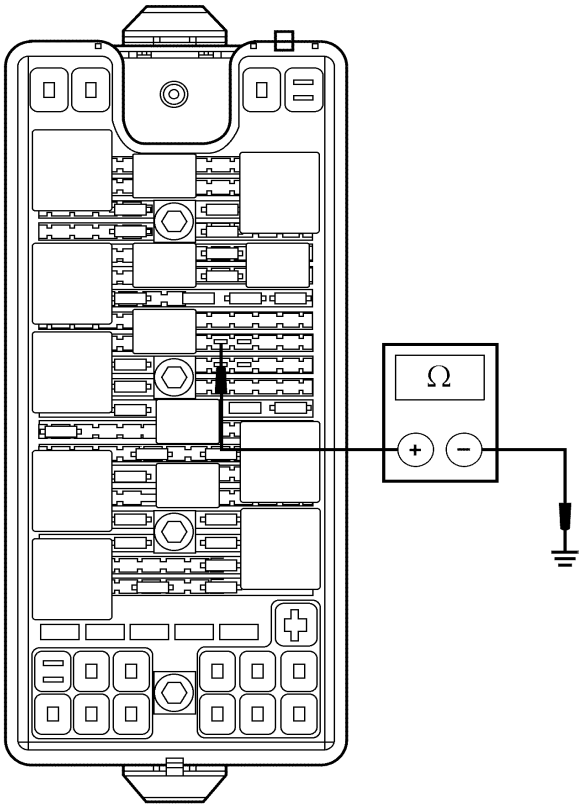
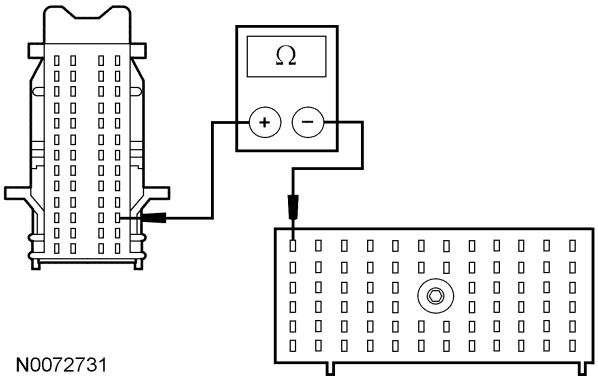
CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
A1	**CHECK THE HORN CONTROL COMMAND**	
	• Key in ON position. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Select the SJB PID (HORN), and command the HORN ON. • **Does the horn sound?**	**Yes** GO to **A10**. **No** GO to **A2**.
A2	**CHECK THE HORN RELAY FOR CORRECT OPERATION**	
	• Key in OFF position. • Disconnect: Horn Relay. • Install a known functioning relay and retest the system. • **Does the known functioning relay fix the problem?**	**Yes** INSTALL a new horn relay. TEST the system for normal operation. **No** GO to **A3**.
A3	**CHECK THE HORN SWITCH**	
	• Connect: Horn Relay. • Disconnect: Clockspring C2274. • **NOTE:** If the jumper wire fails, repair circuit 1323 (OG/RD) or 1 (DB) for a short to voltage. Connect a fused (5A) jumper wire between the clockspring C2274-7, circuit 1 (DB), harness side and ground.  N0072741 • **Does the horn sound?**	**Yes** REMOVE the jumper wire. GO to **A14**. **No** LEAVE the jumper wire connected. GO to **A4**.

(Continued)

DIAGNOSIS AND TESTING (Continued)

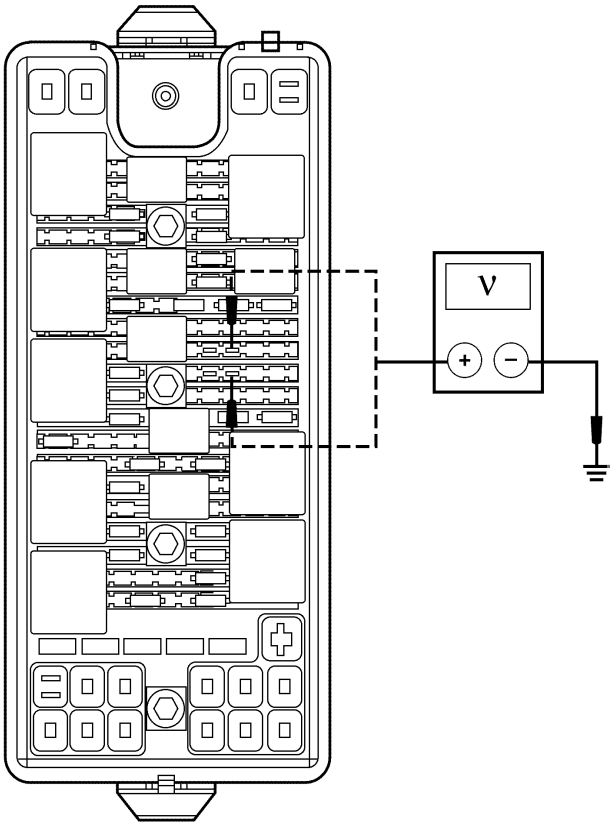
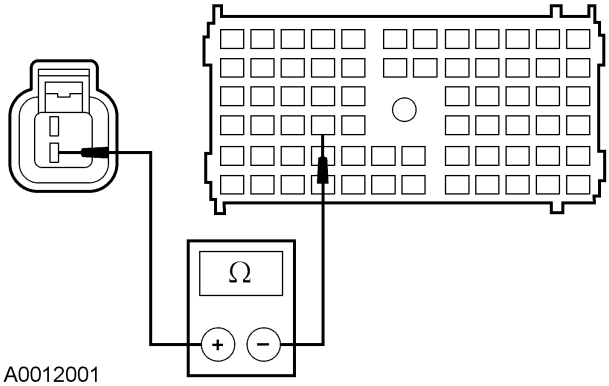
PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A4	CHECK THE HORN RELAY CONTROL FOR AN OPEN	
	• Disconnect: Horn Relay. • Measure the resistance between the horn relay pin 85, harness side and ground.  N0072729 • **Is the resistance less than 5 ohms?**	**Yes** REMOVE the jumper wire. GO to **A6**. **No** REMOVE the jumper wire. GO to **A5**.
A5	CHECK CIRCUIT 1323 (OG/RD) FOR AN OPEN	
	• Disconnect: BEC C1035a. • Disconnect: SJB C2280c. • Measure the resistance between the SJB C2280c-29, circuit 1323 (OG/RD), harness side and the BEC C1035a-A1, circuit 1323 (OG/RD), harness side.  N0072731 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new BEC. TEST the system for normal operation. **No** REPAIR the circuit. TEST the system for normal operation.

(Continued)

DIAGNOSIS AND TESTING (Continued)

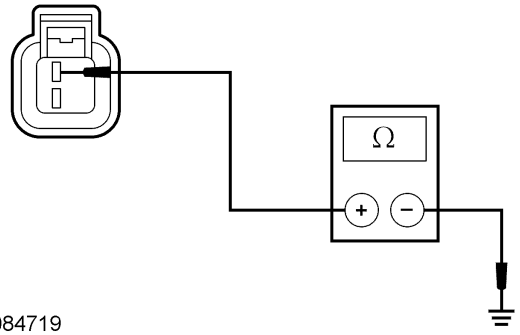
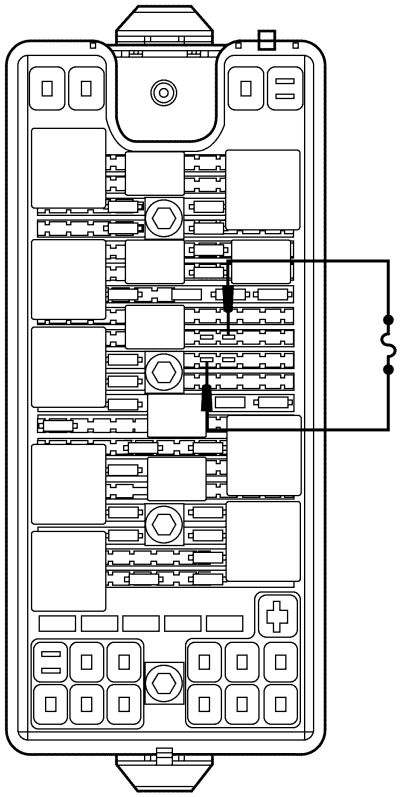
PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A6	**CHECK THE VOLTAGE SUPPLY TO THE HORN RELAY** • Measure the voltage between the horn relay pin 86, harness side and ground; and between the horn relay pin 87, harness side and ground.  N0072732 • **Are the voltages greater than 10 volts?**	**Yes** GO to **A7**. **No** VERIFY the BEC fuse 46 (25A) is OK. If OK, INSTALL a new BEC. TEST the system for normal operation.
A7	**CHECK CIRCUIT 6 (YE/LG) FOR AN OPEN** • Disconnect: BEC C1035c. • Disconnect: Horn C131. • Measure the resistance between the horn C131-2, circuit 6 (YE/LG), harness side and the BEC C1035c-D4, circuit 6 (YE/LG), harness side.  A0012001 • **Is the resistance less than 5 ohms?**	**Yes** GO to **A8**. **No** REPAIR the circuit. TEST the system for normal operation.

(Continued)

DIAGNOSIS AND TESTING (Continued)

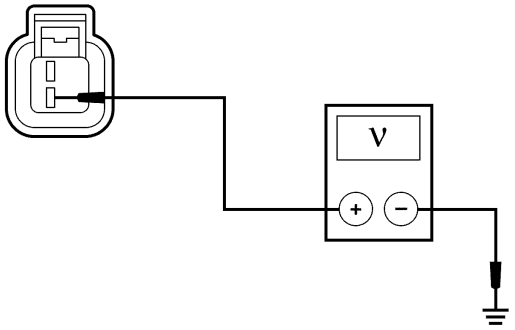
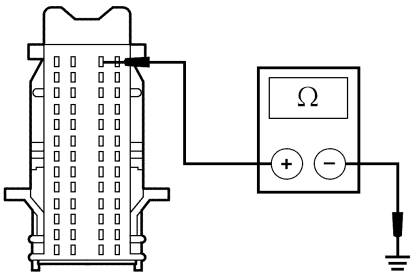
PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A8	**CHECK CIRCUIT 1205 (BK) FOR AN OPEN**	
	• Measure the resistance between the horn C131-1, circuit 1205 (BK), harness side and ground.  A0084719 • **Is the resistance less than 5 ohms?**	**Yes** GO to **A9**. **No** REPAIR the circuit. TEST the system for normal operation.
A9	**CHECK THE BEC FOR AN INTERNAL OPEN**	
	• Connect: BEC C1035c. • Connect a fused (5A) jumper wire between the horn relay pin 30, harness side and the horn relay pin 87, harness side.  N0027054	

(Continued)

DIAGNOSIS AND TESTING (Continued)

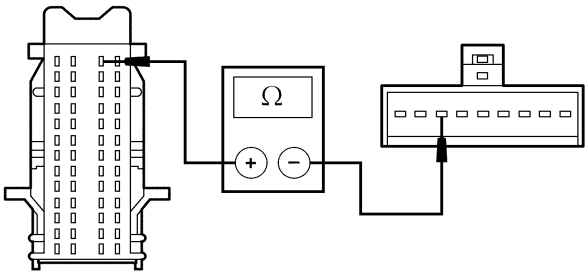
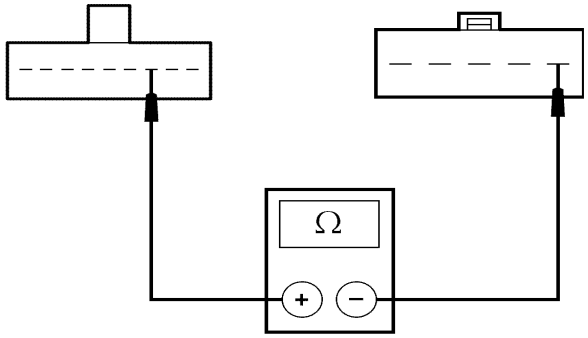
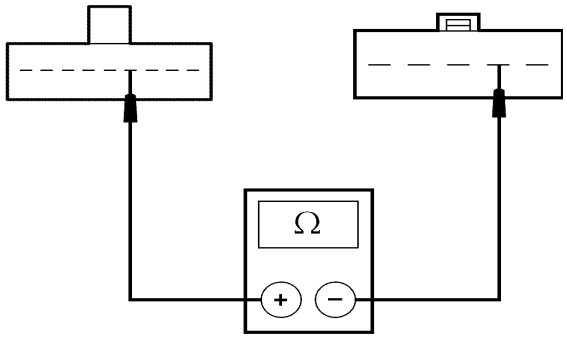
PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A9	**CHECK THE BEC FOR AN INTERNAL OPEN (Continued)**	
	• Measure the voltage between the horn C131-2, circuit 6 (YE/LG), harness side and ground.  N0012006 • **Is the voltage greater than 10 volts?**	**Yes** INSTALL a new horn. REFER to Horn in this section. TEST the system for normal operation. **No** INSTALL a new BEC. TEST the system for normal operation.
A10	**CHECK THE HORN SIGNAL TO THE SJB**	
	• Key in OFF position. • Disconnect: SJB C2280b. • Measure the resistance between the SJB C2280b-39, circuit 1 (DB), harness side and ground, while pressing and releasing the horn switch.  N0072733 • **Is the resistance less than 5 ohms with the horn switch pressed, and greater than 10,000 ohms with the horn switch released?**	**Yes** GO to **A14**. **No** GO to **A11**.
A11	**CHECK CIRCUIT 1 (DB) FOR AN OPEN**	
	• Depower the supplemental restraint system (SRS). Refer to Section 501-20B. • Disconnect: Clockspring C2274.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

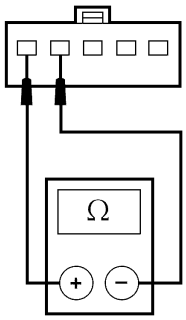
PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A11	**CHECK CIRCUIT 1 (DB) FOR AN OPEN (Continued)**	
	• Measure the resistance between the SJB C2280b-39, circuit 1 (DB), harness side and the clockspring C2274-7, circuit 1 (DB), harness side.  N0072734 • **Is the resistance less than 5 ohms?**	**Yes** GO to A12. **No** REPAIR the circuit. REPOWER the SRS. REFER to Section 501-20B. TEST the system for normal operation.
A12	**CHECK THE CLOCKSPRING FOR AN OPEN**	
	• Remove the driver side air bag module. Refer to Section 501-20B. • Disconnect: Upper Clockspring Connector. • Measure the resistance between the upper clockspring connector pin 5, component side and the clockspring C2274 pin 7, component side.  N0072735 • Measure the resistance between the upper clockspring connector pin 4, component side and the clockspring C2274 pin 6, component side.  N0072736 • **Are the resistances less than 5 ohms?**	**Yes** GO to A13. **No** INSTALL a new clockspring. REFER to Section 501-20B. TEST the system for normal operation.

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: THE HORN IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
A13	**CHECK THE HORN SWITCH FOR CORRECT OPERATION**	
	• Measure the resistance between the upper clockspring connector pin 5, circuit 1 (BK), harness side and the upper clockspring connector pin 4, circuit 1205 (GN), harness side, while pressing and releasing the horn switch.  N0012003 • **Is the resistance less than 5 ohms with the horn switch pressed, and greater than 10,000 ohms with the horn switch released?**	**Yes** REPAIR circuit 1205 (BK) between the clockspring and ground. INSTALL the driver air bag module. REFER to Section 501-20B. TEST the system for normal operation. **No** INSTALL a new steering wheel. REFER to Section 211-04. INSTALL the driver air bag module. REFER to Section 501-20B. TEST the system for normal operation.
A14	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test B: The Horn Is Always On

Refer to Wiring Diagrams Cell 44, Horn/Cigar Lighter for schematic and connector information.

Normal Operation

The horn relay control and switched voltage is supplied by the bussed electrical center (BEC) through fuse 46 (25A). The SJB receives the horn signal through circuit 1 (DB) from the horn switch (part of the steering wheel). When the horn switch is pressed, ground is supplied through the clockspring to the vehicle harness through circuit 1205 (BK). The SJB then activates the horn relay through circuit 1323 (OG/RD). Voltage is then sent to the horn through circuit 6 (YE/LG), enabling the horns to sound. Ground is provided to the horns through circuit 1205 (BK).

- DTC B1897 (Horn Switch Circuit Failure) — is an on-demand DTC that sets when the SJB detects a short to ground on circuit 1 (DB).

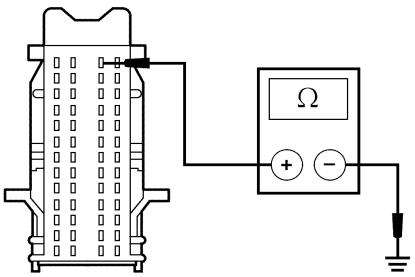
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Horn switch (part of the steering wheel)
- Clockspring
- Horn relay
- BEC
- SJB

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: THE HORN IS ALWAYS ON

⚠ CAUTION: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step		Result / Action to Take
B1	**RETRIEVE THE SJB DTCs**	
	• Check the recorded results from the SJB on-demand self-test. • **Is DTC B1897 retrieved?**	**Yes** GO to **B2**. **No** GO to **B7**.
B2	**CHECK THE HORN SWITCH FOR A SHORT TO GROUND**	
	• Remove the driver air bag module. Refer to Section 501-20B. • Disconnect: Horn Switch Connector. • Repeat the SJB on-demand self-test. • **Is DTC B1897 retrieved again?**	**Yes** GO to **B3**. **No** INSTALL a new steering wheel. REFER to Section 211-04. INSTALL the driver air bag module. REFER to Section 501-20B. CLEAR the DTCs. REPEAT the self-test.
B3	**CHECK THE CLOCKSPRING FOR A SHORT TO GROUND**	
	• Disconnect: Clockspring C2274. • Repeat the SJB on-demand self-test. • **Is DTC B1897 retrieved again?**	**Yes** GO to **B4**. **No** INSTALL a new clockspring. REFER to Section 501-20B. INSTALL the driver air bag module. REFER to Section 501-20B. CLEAR the DTCs. REPEAT the self-test.
B4	**CHECK CIRCUIT 1 (DB) FOR A SHORT TO GROUND**	
	• Disconnect: SJB C2280b. • Install the driver air bag module. Refer to Section 501-20B. • Measure the resistance between the SJB C2280b-39, circuit 1 (DB), harness side and ground.  N0072733 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to **B5**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B5	**CHECK THE SJB FOR CORRECT OPERATION**	
	• Key in OFF position. • Disconnect: SJB C2280c. • **Does the horn continue to sound?**	**Yes** GO to **B6**. **No** GO to **B9**.
B6	**CHECK CIRCUIT 1323 (OG/RD) FOR A SHORT TO GROUND**	
	• Disconnect: BEC C1035a. • **Does the horn continue to sound?**	**Yes** INSTALL a new BEC. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. TEST the system for normal operation.

(Continued)

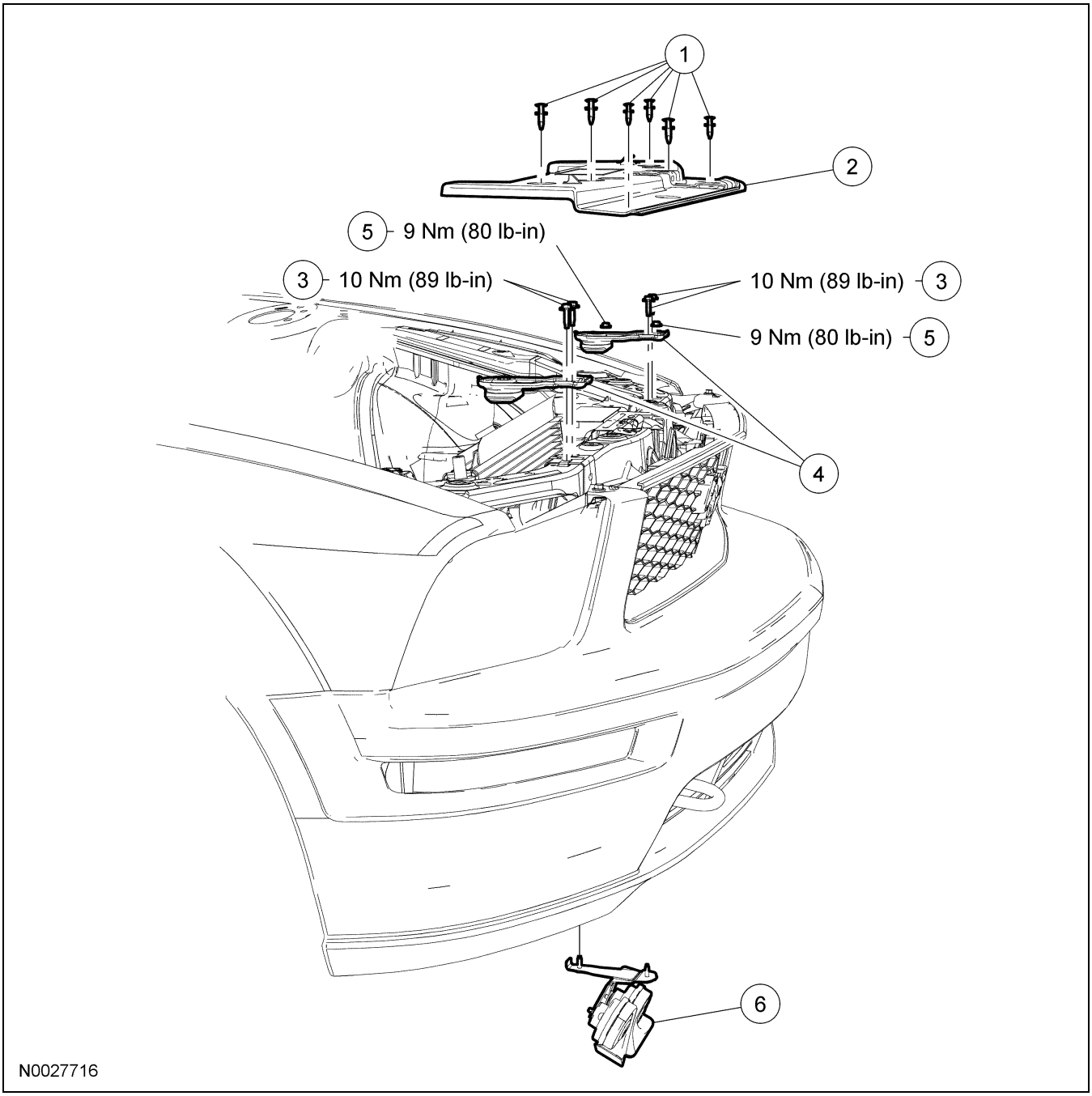
DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: THE HORN IS ALWAYS ON (Continued)

Test Step		Result / Action to Take
B7	**CHECK THE HORN RELAY FOR CORRECT OPERATION**	
	• Disconnect: Horn Relay. • Install a known functioning relay and retest the system. • **Does the known functioning relay fix the problem?**	**Yes** INSTALL a new horn relay. TEST the system for normal operation. **No** GO to **B8**.
B8	**CHECK CIRCUIT 6 (YE/LG) FOR A SHORT TO VOLTAGE**	
	• Disconnect: BEC C1035c. • **Does the horn continue to sound?**	**Yes** REPAIR the circuit. TEST the system for normal operation. **No** INSTALL a new BEC. TEST the system for normal operation.
B9	**CHECK FOR CORRECT SJB OPERATION**	
	• Disconnect all the SJB connectors. • Check for: — corrosion — damaged pins — pushed-out pins • Connect all the SJB connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

REMOVAL AND INSTALLATION

Horn



Item	Part Number	Description
1	W705436	Upper radiator sight shield pin-type retainers (6 required)
2	8C291	Upper radiator sight shield
3	W505424	Radiator support bracket bolts (4 required)

Item	Part Number	Description
4	8226	Radiator support brackets (2 required)
5	W709450	Horn bracket nuts (2 required)
6	13832	Horn

(Continued)

REMOVAL AND INSTALLATION (Continued)

Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
2. Remove the 6 pin-type retainers and the upper radiator sight shield.
3. Remove the 4 bolts and the 2 radiator support brackets.
   - To install, tighten to 10 Nm (89 lb-in).
4. Position the top of the radiator and condenser assembly toward the engine.
5. Remove the 2 horn bracket nuts.
   - To install, tighten to 9 Nm (80 lb-in).
6. If equipped, remove the 6 front bumper cover-to-valance panel screws and remove the valance panel.
7. Disconnect the electrical connector and remove the horn.
8. To install, reverse the removal procedure.