Headlamps

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 SJB monitors the headlamp switch position by sending voltage reference signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is routed to ground. If the SJB does not detect any of the inputs to the headlamp switch is active (routed to ground) for 5 seconds, the SJB turns on the exterior lights and keeps them on for 10 minutes after the ignition switch is turned off (or 10 minutes from the time the SJB does not detect any headlamp switch input if the ignition switch was already off).

If the SJB detects multiple circuits short to ground, the SJB implements a planned strategy depending on the inputs received. Based on the multiple inputs received, the headlamps and/or the parking lamps are turned on.

If either of these situations occur, the SJB should **NOT** be ruled immediately as being at fault. This is normal behavior of the SJB design as it has detected a fault with the inputs from the headlamp switch.

Headlamp Functionality — Halogen

When the low beams are requested (based on inputs to the SJB), the SJB provides voltage to the low beams.

When the high beams are requested, the SJB energizes an internal relay which routes voltage to the high beams and terminates voltage to the low beams.

When the flash-to-pass feature is requested, the SJB energizes an internal high beam relay which routes voltage to the high beams as long as the multifunction switch is held in the FLASH-TO-PASS position.

Headlamp Functionality — High Intensity Discharge (HID)

Relays are utilized to control the voltage to the High Intensity Discharge (HID) ballasts. The ballasts are located on the side of each headlamp assembly.

When the low beams are requested (based on inputs to the SJB), the HID relays are energized and voltage is routed to the HID ballasts to illuminate the HID bulbs.

When the high beams are requested, the HID relays stay energized and the SJB energizes an internal high beam relay which routes voltage to the headlamps to actuate a shutter located within each headlamp. This changes the headlamp beam pattern to illuminate a greater distance.

The flash-to-pass feature is unique for HID -equipped vehicles. If the low beams are off when the flash-to-pass is requested, the SJB provides voltage to the HID relays and energizes the internal high beam relay for the shutters within the headlamps for less than 0.5 second. If the SJB is already providing voltage to the HID relays (low beams) when the flash-to-pass is requested, the SJB energizes the internal high beam relay as long as the multifunction switch is held in the FLASH-TO-PASS position.

Inspection and Verification

1. Verify the customer concern.

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

   Visual Inspection Chart

Mechanical	Electrical

• Headlamp switch	• Bussed Electrical Center (BEC) fuse(s):
	  ▪ 50 (15A) (high beams)
	  ▪ 67 (30A)
	• Wiring, terminals or connectors
	• Bulb(s)
	• Smart Junction Box (SJB)

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

NOTE: Make sure the headlamp switch is in the OFF position.

NOTE: Make sure the multifunction switch is in the LOW BEAM position.

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 power to 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.

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 the Diagnostic Trouble Code (DTC) Chart in this section. For all other DTCs, refer to the Diagnostic Trouble Code (DTC) Chart in Section 419-10 .

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

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• Both low beams are inoperative	• Fuse • Wiring, terminals or connectors • Bussed Electrical Center (BEC) • Smart Junction Box (SJB)	• GO to Pinpoint Test A .
• Both high beams are inoperative	• Fuse • Wiring, terminals or connectors • SJB configuration • High beam relay • Multifunction switch • BEC • SJB	• GO to Pinpoint Test B .
• One low beam headlamp is inoperative — halogen headlamps	• Wiring, terminals or connectors • BEC • SJB	• GO to Pinpoint Test C .
• One low beam headlamp is inoperative — High Intensity Discharge (HID) headlamps	• Wiring, terminals or connectors • HID relay • BEC • Ballast • HID bulb • Headlamp assembly • SJB	• GO to Pinpoint Test D .
• One high beam headlamp is inoperative	• Wiring, terminals or connectors • Headlamp assembly • BEC	• GO to Pinpoint Test E .
• The headlamps are on continuously	• Wiring, terminals or connectors • High beam relay • HID relay • Headlamp switch • Multifunction switch • BEC • SJB	• GO to Pinpoint Test F .
• The flash-to-pass feature is inoperative	• Wiring, terminals or connectors • Multifunction switch • SJB	• GO to Pinpoint Test G .

Pinpoint Tests

Pinpoint Test A: Both Low Beams Are Inoperative

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Normal Operation

The Smart Junction Box (SJB) is supplied voltage for the low beams through circuit 1052 (TN/BK) from the Bussed Electrical Center (BEC). When a request for the low beams is detected, the SJB provides voltage to the low beams or High Intensity Discharge (HID) relays (if equipped). The headlamps share a common ground through circuit 1205 (BK).

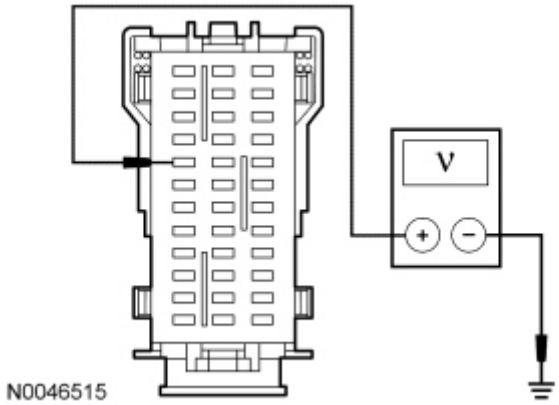
This pinpoint test is intended to diagnose the following:

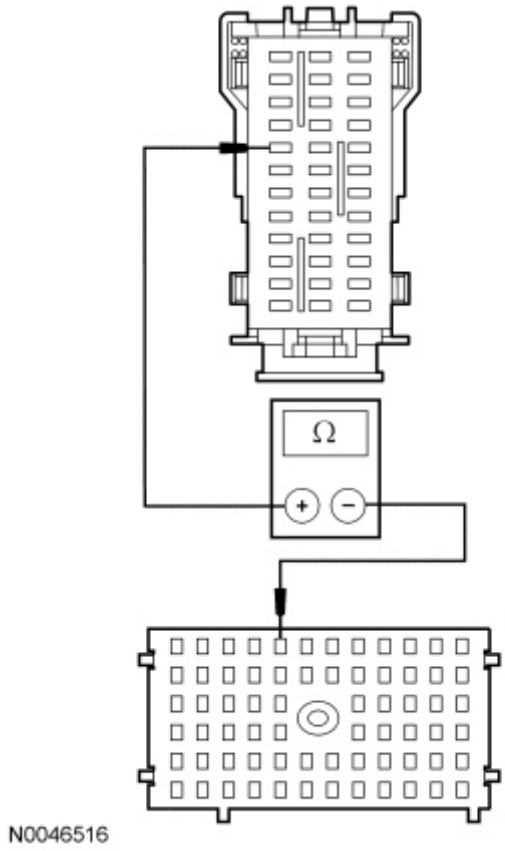
- Fuse
- Wiring, terminals or connectors
- BEC
- SJB

PINPOINT TEST A: BOTH LOW BEAMS ARE INOPERATIVE

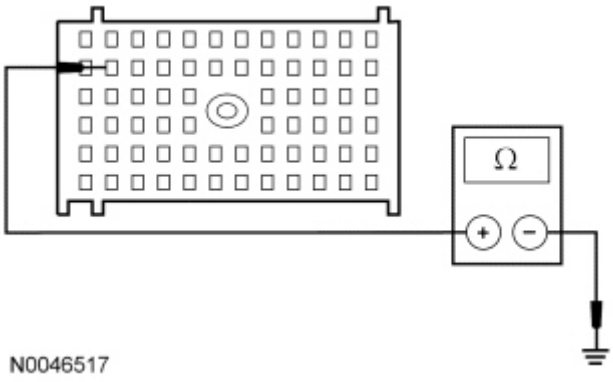
NOTICE: **Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.**

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
A1 CHECK CIRCUIT 1052 (TN/BK) FOR A VOLTAGE • Ignition OFF. • Disconnect: SJB C2280h. • Measure the voltage between the SJB C2280h-32, circuit 1052 (TN/BK), harness side and ground.  • **Is the voltage greater than 10 volts?**	**Yes** GO to A3 . **No** VERIFY the BEC fuse 67 (30A) is OK. If OK, GO to A2 . If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.
A2 CHECK CIRCUIT 1052 (TN/BK) FOR AN OPEN • Disconnect: BEC C1035a. • Measure the resistance between the SJB C2280h-32, circuit 1052 (TN/BK), harness side and the BEC C1035a-A5, circuit 1052 (TN/BK), harness side.	**Yes** INSTALL a new BEC . TEST the system for normal operation. **No** REPAIR the circuit. TEST the system for normal operation.



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

A3 CHECK CIRCUIT 1205 (BK) FOR AN OPEN • Disconnect: BEC C1035c. • Disconnect: Negative Battery Cable. • Measure the resistance between the BEC C1035c-E11, circuit 1205 (BK), harness side and ground.  • **Is the resistance less than 5 ohms?**	**Yes** GO to A4 . **No** REPAIR the circuit. TEST the system for normal operation.

A4 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: Both High Beams Are Inoperative

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Refer to Wiring Diagrams Cell 11 , Fuse and Relay Information for schematic and connector information.

Normal Operation

When the headlamp switch is placed in the HEADLAMPS ON position, the Smart Junction Box (SJB) monitors the multifunction switch by sending a voltage reference signal through circuit 1394 (WH/RD). When the multifunction switch is placed in the HIGH BEAM position, the signal is routed to an internal ground within the SJB through circuit 1396 (VT/WH). The SJB then supplies ground for the high beam relay coil through circuit 1708 (LG/BK). The high beam relay is supplied voltage at all times from the Bussed Electrical Center (BEC). When the high beam relay is energized, voltage is routed to the high beams.

If the SJB is not configured for the correct headlamp type, the high beams may be inoperative.

- DTC B2586 (Headlamp Mode Select Circuit Failure) — an on-demand DTC that sets when the SJB detects a short to ground from the multifunction switch input (headlamp mode select) circuit.
- DTC B2598 (Headlamp Relay Circuit Failure) — a continuous and on-demand DTC that sets when the SJB detects an open or short to voltage from the high beam relay coil ground controlled circuit.

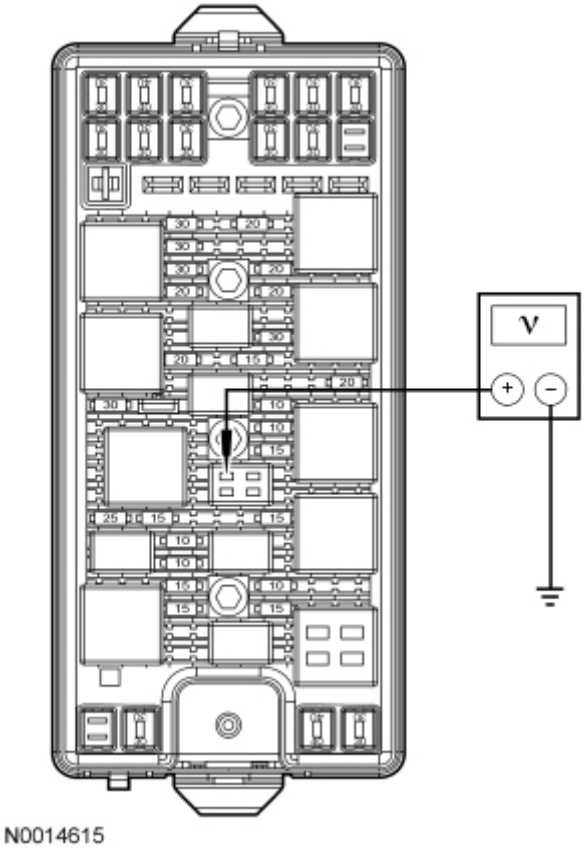
This pinpoint test is intended to diagnose the following:

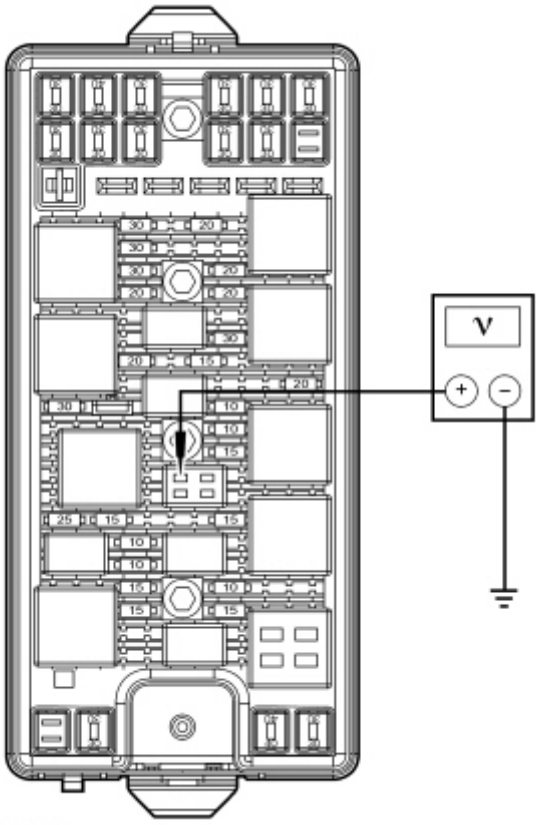
- Fuse
- Wiring, terminals or connectors
- SJB configuration
- High beam relay
- Multifunction switch
- BEC
- SJB

PINPOINT TEST B: BOTH HIGH BEAMS ARE INOPERATIVE

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 CHECK THE LOW BEAMS	
• Ignition OFF. • Place the headlamp switch in the HEADLAMPS ON position. • **Do the low beams illuminate?**	**Yes** GO to B2 . **No** GO to Pinpoint Test A .
B2 USE THE RECORDED DTCs FROM THE SJB SELF-TEST	
• Place the headlamp switch in the OFF position. • Retrieve the recorded results from the SJB self-test. • **Was DTC B2598 or B2586 present?**	**Yes** For DTC B2598, GO to B3 . For DTC B2586, GO to B9 . **No** GO to B11 .
B3 CHECK THE HIGH BEAM RELAY (DTC B2598)	
• Disconnect: High Beam Relay.	**Yes** REMOVE the known good

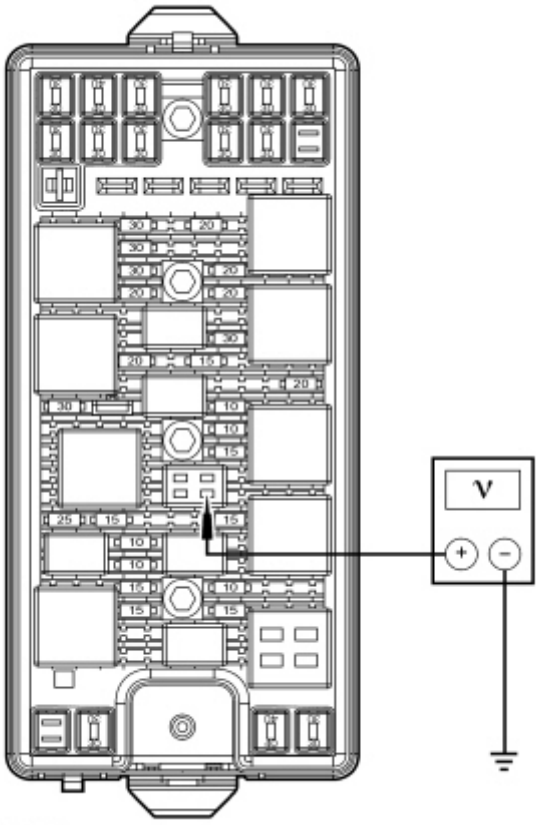
• Substitute a known good relay and recheck the operation of the high beams. • **Do the high beams operate correctly?**	relay. INSTALL a new high beam relay. CLEAR the DTCs. REPEAT the self-test. **No** REMOVE the known good relay. GO to B4 .
B4 CHECK THE HIGH BEAM RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE	
• Disconnect: SJB C2280c. • Ignition ON. • Measure the voltage between the high beam relay pin 86, circuit 1708 (LG/BK), BEC face side and ground.  N0014615 • **Is any voltage present?**	**Yes** GO to B5 . **No** GO to B6 .
B5 CHECK CIRCUIT 1708 (LG/BK) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: BEC C1035a. • Ignition ON. • Measure the voltage between the high beam relay pin 86, circuit 1708 (LG/BK), BEC face side and ground.	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.



N0014615

- **Is any voltage present?**

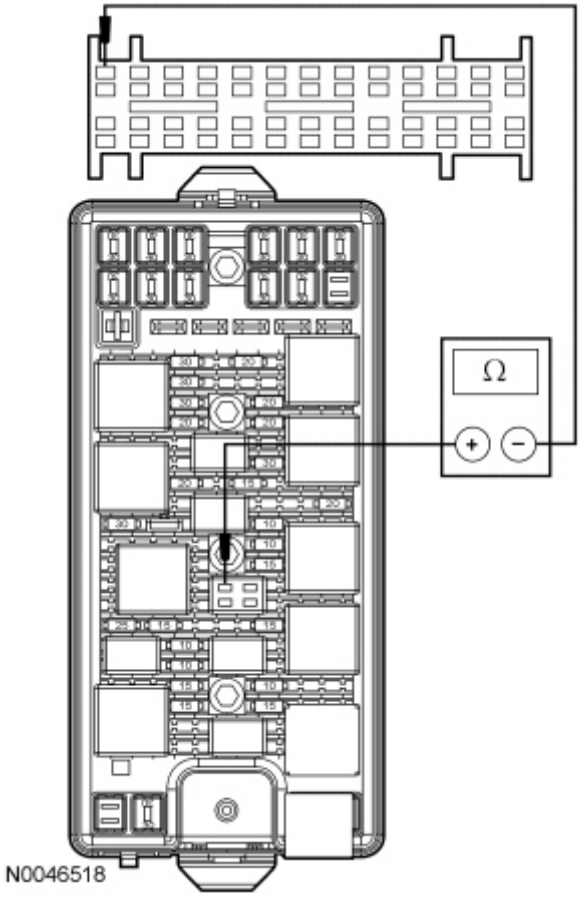
B6 CHECK THE VOLTAGE FEED TO THE HIGH BEAM RELAY COIL	
• Ignition OFF. • Measure the voltage between the high beam relay pin 85, BEC face side and ground.	**Yes** GO to B7 . **No** VERIFY the BEC fuse 50 (15A) is OK. If OK, INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.



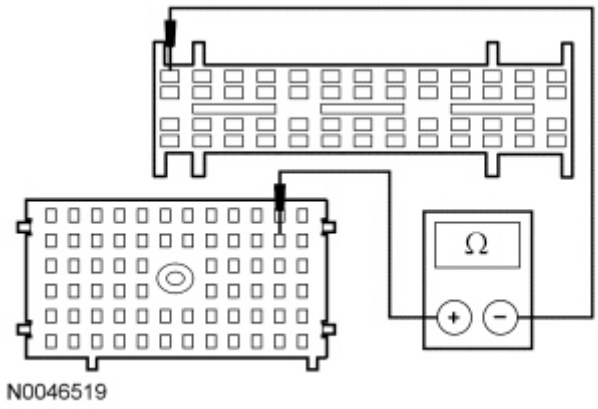
N0014616-

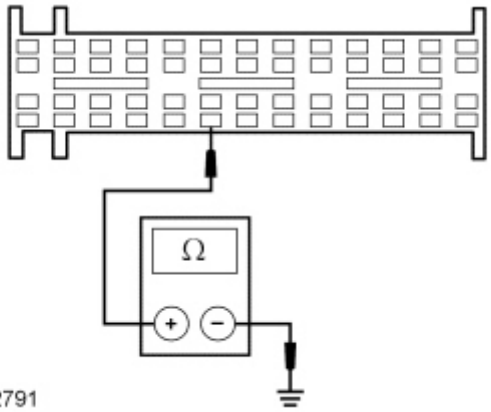
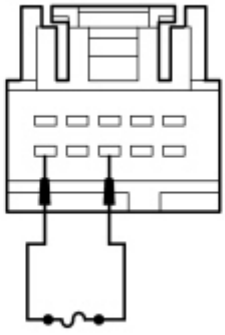
- **Is the voltage greater than 10 volts?**

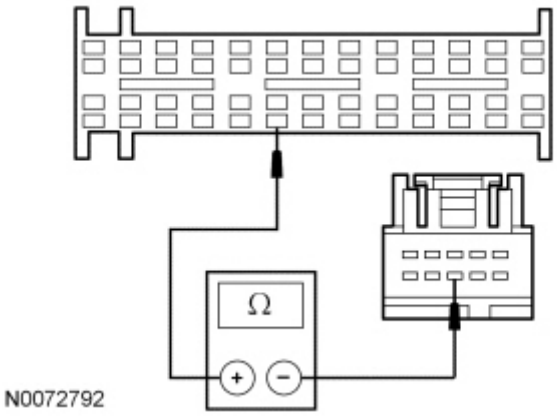
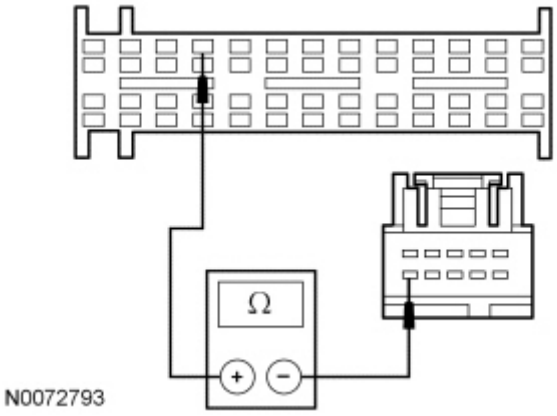
B7 CHECK THE HIGH BEAM RELAY CONTROL CIRCUIT FOR AN OPEN	
• Measure the resistance between the high beam relay pin 86, circuit 1708 (LG/BK), BEC face side and the SJB C2280c-1, circuit 1708 (LG/BK), harness side.	**Yes** GO to B15 . **No** GO to B8 .



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

B8 CHECK CIRCUIT 1708 (LG/BK) FOR AN OPEN	
• Disconnect: BEC C1035a. • Measure the resistance between the BEC C1035a-B11, circuit 1708 (LG/BK), harness side and the SJB C2280c-1, circuit 1708 (LG/BK), harness side.  • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B9 CHECK THE MULTIFUNCTION SWITCH	
• Disconnect: Multifunction Switch C202. • Ignition ON. • Enter the following diagnostic mode on the scan tool: SJB Self-Test. • Repeat the SJB on-demand self-test. • **Is DTC B2586 retrieved again?**	**Yes** GO to B10 . **No** INSTALL a new multifunction switch. REFER to Section 211-05 . TEST the system for normal operation.
B10 CHECK CIRCUITS 1394 (WH/RD) FOR A SHORT TO GROUND	
• Ignition OFF.	**Yes**

• Place the headlamp switch in the OFF position. • Disconnect: SJB C2280b. • Measure the resistance between the SJB C2280b-45, circuit 1394 (WH/RD), harness side and ground.  N0072791 • **Is the resistance greater than 10,000 ohms?**	GO to B15 . **No** REPAIR the circuit. TEST the system for normal operation.
B11 CHECK THE HIGH BEAM SWITCH INPUT	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB multifunction switch status PID (HBEAMSW) while placing the multifunction switch in the HIGH BEAM position. • **Does the PID indicate HIGH BEAM position is active?**	**Yes** GO to B12 . **No** GO to B13 .
B12 CHECK THE HIGH BEAM RELAY (NO DTCs)	
• Ignition OFF. • Place the headlamp switch in the OFF position • Disconnect: High Beam Relay. • Substitute a known good relay and recheck the operation on the high beams. • **Do the high beams operate correctly?**	**Yes** REMOVE the known good relay. INSTALL a new high beam relay. TEST the system for normal operation. **No** REMOVE the known good relay. INSTALL a new BEC . TEST the system for normal operation.
B13 CHECK THE MULTIFUNCTION SWITCH	
• Ignition OFF. • Disconnect: Multifunction Switch C202. • Ignition ON. • Connect a fused jumper wire between the multifunction switch C202-8, circuit 1394 (WH/RD), harness side and the multifunction switch C202-10, circuit 1396 (VT/WH), harness side.  N0046520 • Enter the following diagnostic mode on the scan tool: SJB DataLogger.	**Yes** REMOVE the jumper wire. INSTALL a new multifunction switch. REFER to Section 211-05 . TEST the system for normal operation. **No** REMOVE the jumper wire. GO to B14 .

• Monitor the SJB multifunction switch status PID (HBEAMSW). • **Does the PID indicate HIGH BEAM position is active?**	
B14 CHECK CIRCUITS 1394 (WH/RD) AND 1396 (VT/WH) FOR AN OPEN	
• Ignition OFF. • Disconnect: SJB C2280b. • Measure the resistance between the SJB C2280b-45, circuit 1394 (WH/RD), harness side and the multifunction switch C202-8, circuit 1394 (WH/RD), harness side.  N0072792 • Measure the resistance between the SJB C2280b-4, circuit 1396 (VT/WH) and the multifunction switch C202-10, circuit 1396 (VT/WH).  N0072793 • **Are the resistances less than 5 ohms?**	**Yes** GO to B15 . **No** REPAIR the circuit in question. TEST the system for normal operation.
B15 CHECK THE HIGH BEAM SWITCH INPUT	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • **NOTE:** Vehicles equipped with halogen headlamps should display Non HID . Vehicles with HID headlamp should display HID Active Mode. • • Monitor the SJB headlamp configuration PID (HID Status). • **Is the configuration correct for the vehicle build?**	**Yes** GO to B16 . **No** CONFIGURE the module using as-built data. TEST the system for normal operation.
B16 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.

Pinpoint Test C: One Low Beam Headlamp Is Inoperative — Halogen Headlamps

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Refer to Wiring Diagrams Cell 11 , Fuse and Relay Information for schematic and connector information.

Normal Operation

When the Smart Junction Box (SJB) receives a request for the low beams, the SJB provides voltage to circuits 1338 (WH) and 1336 (LG/WH), through the Bussed Electrical Center (BEC)), to the LH and RH low beams, respectively. Ground for the low beams is provided through circuit 1205 (BK), which is routed through the BEC .

- DTC B2501 (LF Lamp Low Beam Circuit Failure) — a continuous and on-demand DTC that sets when the SJB detects an open or short to ground from the LH headlamp voltage supply circuit.
- DTC B2503 (RF Lamp Low Beam Circuit Failure) — a continuous and on-demand DTC that sets when the SJB detects an open or short to ground from the RH headlamp voltage supply circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- BEC
- SJB

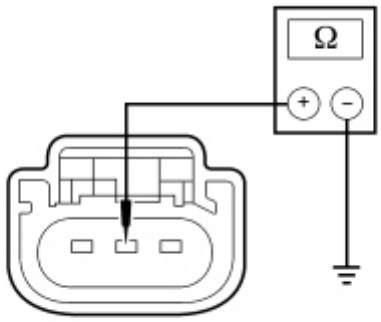
PINPOINT TEST C: ONE LOW BEAM HEADLAMP IS INOPERATIVE — HALOGEN HEADLAMPS

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

NOTE: Make sure the bulb is good before continuing diagnostics.

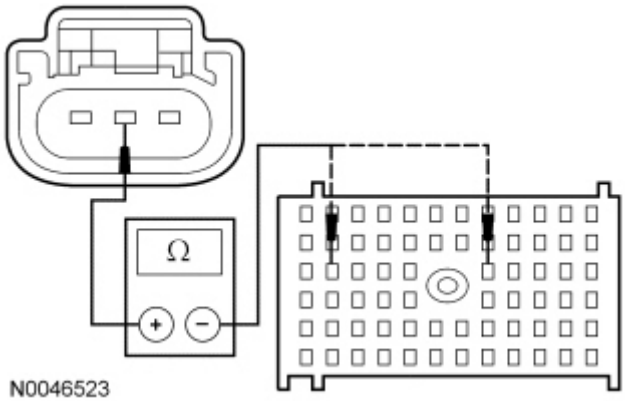
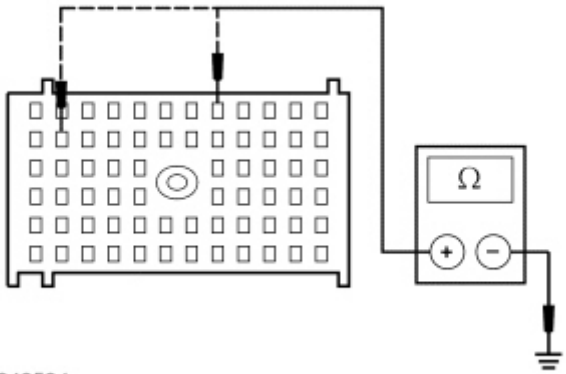
NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

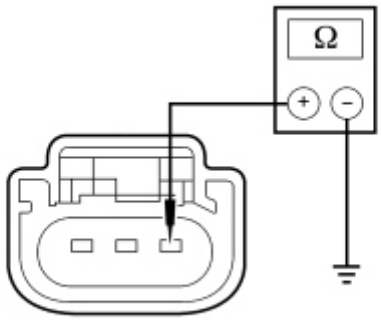
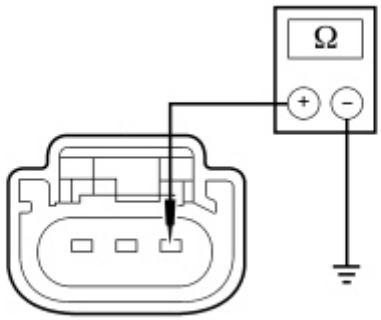
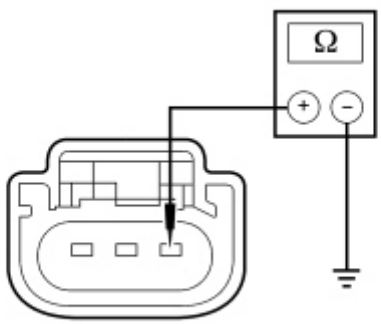
Test Step	Result / Action to Take
C1 CHECK THE HEADLAMP GROUND CIRCUIT	
• Ignition OFF. • Disconnect: Negative Battery Cable. • Disconnect: Inoperative Headlamp. • Measure the resistance between the LH headlamp C1021-2, circuit 1205 (BK), harness side and ground; or between the RH headlamp C1041-2, circuit 1205 (BK), harness side and ground.	**Yes** GO to C4 . **No** GO to C2 .

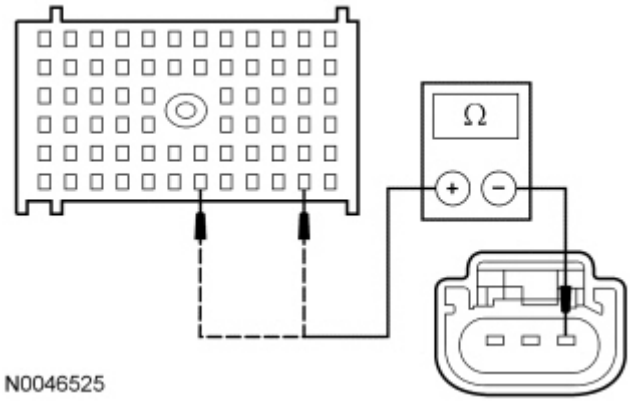
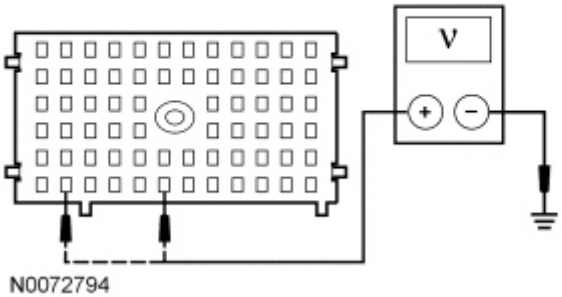


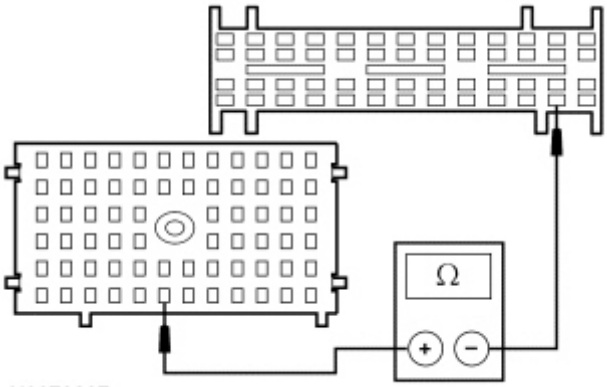
N0010865

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

C2 CHECK CIRCUIT 1205 (BK) FOR AN OPEN (HEADLAMP TO BEC)	
• Disconnect: BEC C1035c. • Measure the resistance between the LH headlamp C1021-2, circuit 1205 (BK), harness side and the BEC C1035c-D5, circuit 1205 (BK), harness side; or between the RH headlamp C1041-2, circuit 1205 (BK), harness side and the BEC C1035c-D11, circuit 1205 (BK), harness side.  N0046523 • **Is the resistance less than 5 ohms?**	**Yes** GO to C3 . **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
C3 CHECK CIRCUIT 1205 (BK) FOR AN OPEN (BEC TO GROUND)	
• Measure the resistance between the BEC C1035c-F5 (LH headlamp), circuit 1205 (BK), harness side and ground; or between the BEC C1035c-E11 (RH headlamp), circuit 1205 (BK), harness side and ground.  N0046524 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
C4 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND	
• Connect: Negative Battery Cable. • Disconnect: SJB C2280d. • Measure the resistance between the LH headlamp C1021-1, circuit 1338	**Yes** GO to C7 .

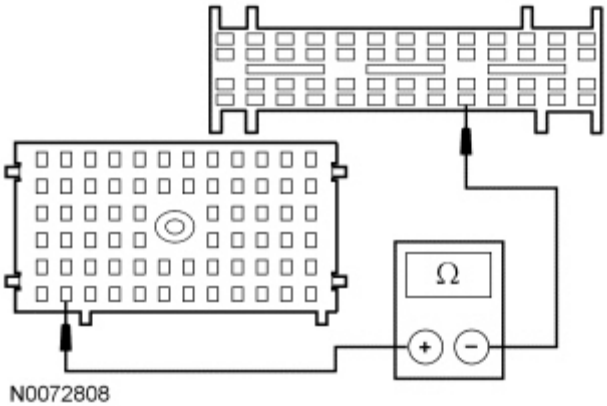
(WH), harness side and ground; or between the RH headlamp C1041-1, circuit 1336 (LG/WH), harness side and ground.  N0010866 • **Is the resistance greater than 10,000 ohms?**	**No** GO to C5 .
C5 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND (SJB TO BEC)	
• Disconnect: BEC C1035a. • Measure the resistance between the LH headlamp C1021-1, circuit 1338 (WH), harness side and ground; or between the RH headlamp C1041-1, circuit 1336 (LG/WH), harness side and ground.  N0010866 • **Is the resistance greater than 10,000 ohms?**	**Yes** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test. **No** GO to C6 .
C6 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND (BEC TO HEADLAMP)	
• Disconnect: BEC C1035c. • Measure the resistance between the LH headlamp C1021-1, circuit 1338 (WH), harness side and ground; or between the RH headlamp C1041-1, circuit 1336 (LG/WH), harness side and ground.  N0010866 • **Is the resistance greater than 10,000 ohms?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
C7 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR AN OPEN	

(BEC TO HEADLAMP)	
• Disconnect: BEC C1035c. • Measure the resistance between the BEC C1035c-A6, circuit 1338 (WH), harness side and the LH headlamp C1021-1, circuit 1338 (WH), harness side; or between the BEC C1035c-A2, circuit 1336 (LG/WH), harness side and the RH headlamp C1041-1, circuit 1336 (LG/WH), harness side.  N0046525 • **Is the resistance less than 5 ohms?**	**Yes** GO to C8 . **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
C8 CHECK FOR VOLTAGE TO THE BEC	
• Disconnect: BEC C1035a. • Connect: SJB C2280d. • Place the headlamp switch in the HEADLAMPS ON position. • Measure the voltage between the BEC C1035a-F6 (LH headlamp), circuit 1338 (WH), harness side and ground; or between the BEC C1035a-F2 (RH headlamp), circuit 1336 (LG/WH), harness side and ground.  N0072794 • **Is the voltage greater than 10 volts?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** GO to C9 .
C9 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR AN OPEN (SJB TO BEC)	
• Place the headlamp switch in the OFF position. • Disconnect: SJB C2280d. • Measure the resistance between the BEC C1035a-F6 (LH headlamp), circuit 1338 (WH), harness side and the SJB C2280d-51, circuit 1338 (WH), harness side.	**Yes** GO to C10 . **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.



N0072807

- Measure the resistance between the BEC C1035a-F2 (RH headlamp), circuit 1336 (LG/WH), harness side and the SJB C2280d-48, circuit 1336 (LG/WH), harness side.



N0072808

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

C10 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.

Pinpoint Test D: One Low Beam Headlamp Is Inoperative — High Intensity Discharge (HID) Headlamps

Refer to Wiring Diagrams Cell 85, Headlamps for schematic and connector information.

Refer to Wiring Diagrams Cell 11, Fuse and Relay Information for schematic and connector information.

Normal Operation

When the Smart Junction Box (SJB) receives a request for the low beams, the SJB provides voltage to circuits 1338 (WH) and 1336 (LG/WH), through the Bussed Electrical Center (BEC), to the LH and RH High Intensity Discharge (HID) relays, respectively. Ground for the HID relays is provided through circuit 1205 (BK), which is routed through the BEC.

Voltage is supplied to the LH and RH HID relay switches through circuits 1055 (WH/LG) and 1056 (DB/LG).

When the HID relays are energized, voltage is routed to the LH and RH headlamps through circuits 2008 (PK/WH) (PK/BK for 5.4L) and 2009 (PK/WH).

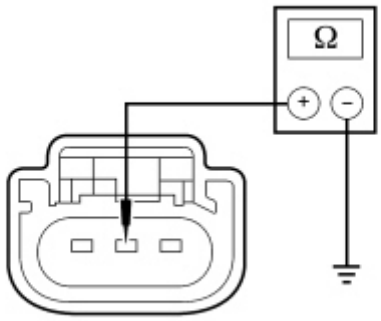
This pinpoint test is intended to diagnose the following:

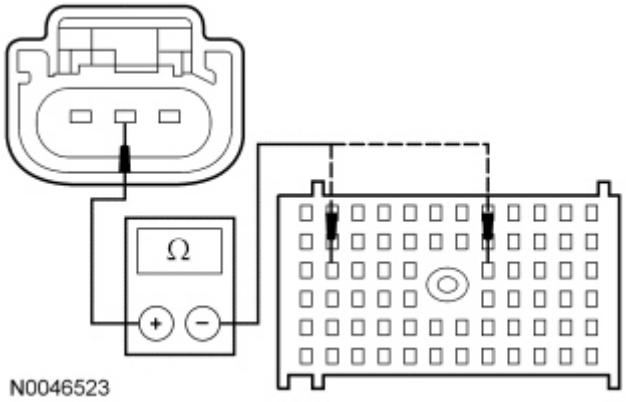
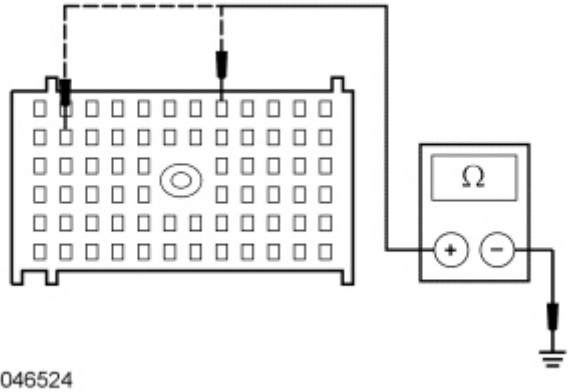
- Wiring, terminals or connectors
- HID relay
- BEC
- Ballast
- HID bulb
- Headlamp assembly
- SJB

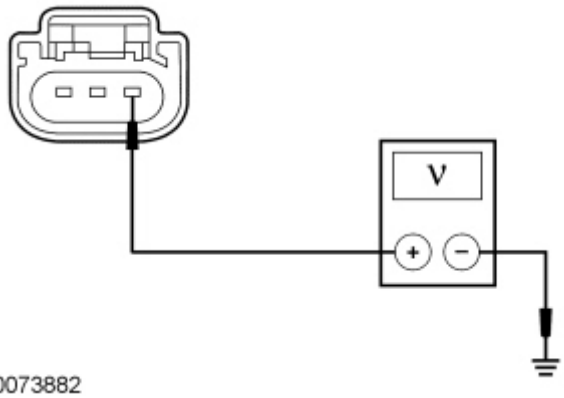
PINPOINT TEST D: ONE LOW BEAM HEADLAMP IS INOPERATIVE — HID HEADLAMPS

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

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
D1 CHECK THE HID RELAY	
• Ignition OFF. • Disconnect: Suspect HID Relay. • Substitute a known good relay and recheck the low beam operation. • **Does the headlamp in question illuminate?**	**Yes** REMOVE the known good relay. INSTALL a new HID relay in question. TEST the system for normal operation. **No** REMOVE the known good relay. GO to D2 .
D2 CHECK THE HEADLAMP GROUND CIRCUIT	
• Disconnect: Inoperative Headlamp. • Disconnect: Negative Battery Cable. • Measure the resistance between the LH headlamp C1284-2, circuit 1205 (BK), harness side and ground; or between the RH headlamp C1285-2, circuit 1205 (BK), harness side and ground.  N0010865 • **Is the resistance less than 5 ohms?**	**Yes** GO to D5 . **No** GO to D3 .

D3 CHECK CIRCUIT 1205 (BK) FOR AN OPEN (HEADLAMP TO BEC)	
• Disconnect: BEC C1035c. • Measure the resistance between the LH headlamp C1284-2, circuit 1205 (BK), harness side and the BEC C1035c-D5, circuit 1205 (BK), harness side; or between the RH headlamp C1285-2, circuit 1205 (BK), harness side and the BEC C1035c-D11, circuit 1205 (BK), harness side.  N0046523 • **Is the resistance less than 5 ohms?**	**Yes** GO to D4 . **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
D4 CHECK CIRCUIT 1205 (BK) FOR AN OPEN (BEC TO GROUND)	
• Measure the resistance between the BEC C1035c-F5 (LH headlamp), circuit 1205 (BK), harness side and ground; or between the BEC C1035c-E11 (RH headlamp), circuit 1205 (BK), harness side and ground.  N0046524 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
D5 CHECK FOR VOLTAGE TO THE HEADLAMP	
• Connect: Negative Battery Cable. • Connect: Suspect HID Relay. • Place the headlamp switch in the HEADLAMPS ON position. • Measure the voltage between the LH headlamp C1284-1, circuit 2008 (PK/WH) (PK/BK for 5.4L), harness side and ground; or between the RH headlamp C1285-1, circuit 2009 (PK/WH), harness side and ground.	**Yes** GO to D17 . **No** GO to D6 .

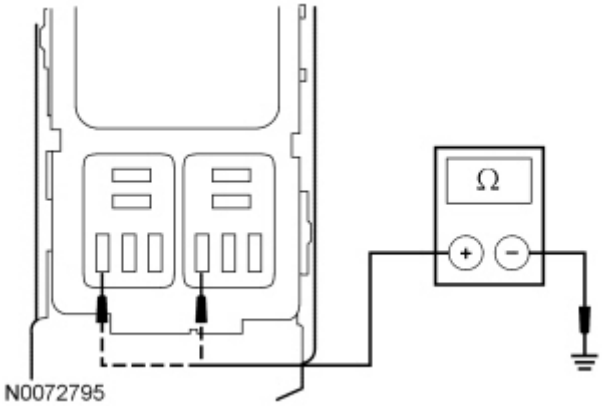


A0073882

- **Is the voltage greater than 10 volts?**

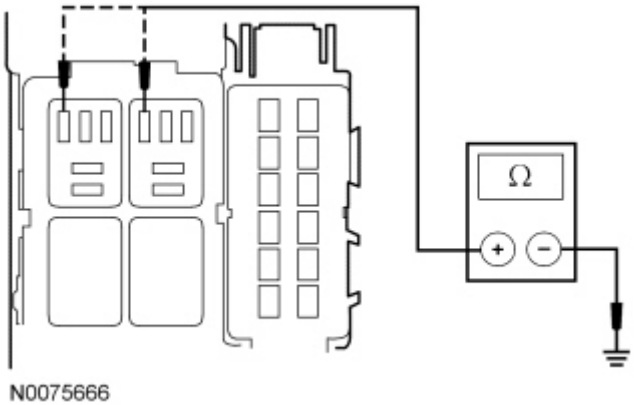
D6 CHECK THE HID RELAY GROUND CIRCUIT

- Place the headlamp switch in the OFF position.
- Disconnect: Negative Battery Cable.
- Disconnect: Suspect HID Relay.
- For 4.0L or 4.6L vehicles, measure the resistance between the LH HID relay pin 1, circuit 1205 (BK), harness side and ground; or between the RH HID relay pin 1, circuit 1205 (BK), harness side and ground.



N0072795

- For 5.4L vehicles, measure the resistance between the LH HID relay pin 2, circuit 1205 (BK), harness side and ground; or between the RH HID relay pin 2, circuit 1205 (BK), harness side and ground.



N0075666

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

Yes
GO to D8.

No
GO to D7.

D7 CHECK CIRCUIT 1205 (BK) FOR AN OPEN (HID RELAY TO BEC)

- Disconnect: BEC C1035c.
- Measure the resistance between the suspect HID relay pin, harness side and the BEC, harness side as follows:

HID Relay Pin	BEC Connector-Pin	Circuit
4.0L or 4.6L		

Yes
INSTALL a new BEC.
CLEAR the DTCs.
REPEAT the self-test.

No
REPAIR the circuit.

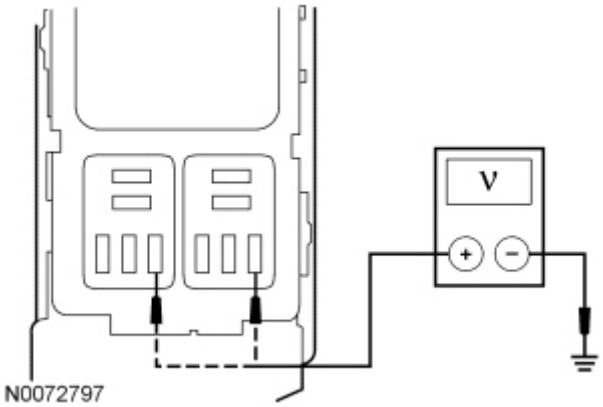
LH HID relay pin 1	C1035c-F3	1205 (BK)
RH HID relay pin 1	C1035c-F10	1205 (BK)
5.4L		
LH HID relay pin 2	C1035c-F3	1205 (BK)
RH HID relay pin 2	C1035c-F10	1205 (BK)

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

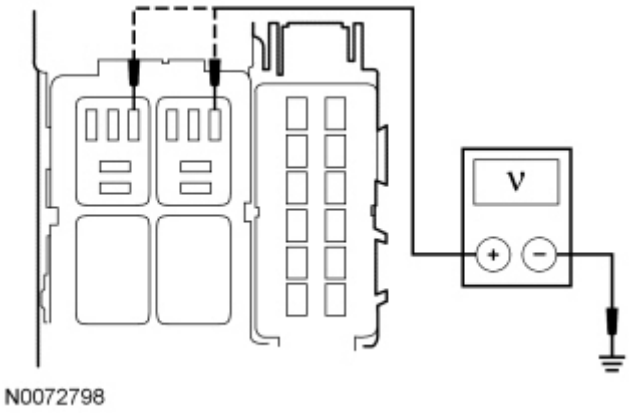
CLEAR the DTCs.
REPEAT the self-test.

D8 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR VOLTAGE

- Connect: Negative Battery Cable.
- Place the headlamp switch in the HEADLAMPS ON position.
- For 4.0L or 4.6L vehicles, measure the voltage between the LH HID relay pin 2, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 2, circuit 1336 (LG/WH), harness side and ground.



- For 5.4L vehicles, measure the voltage between the LH HID relay pin 1, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 1, circuit 1336 (LG/WH), harness side and ground.



- **Is the voltage greater than 10 volts?**

Yes
GO to D15.

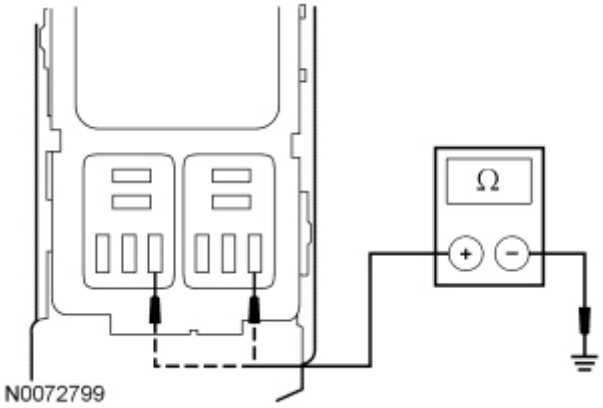
No
GO to D9.

D9 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND

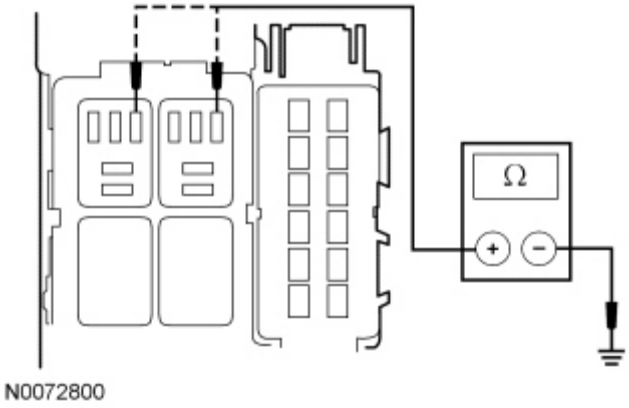
- Place the headlamp switch in the OFF position.
- Disconnect: SJB C2280d.
- For 4.0L or 4.6L vehicles, measure the resistance between the LH HID relay pin 2, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 2, circuit 1336 (LG/WH), harness side and ground.

Yes
GO to D12.

No
GO to D10.



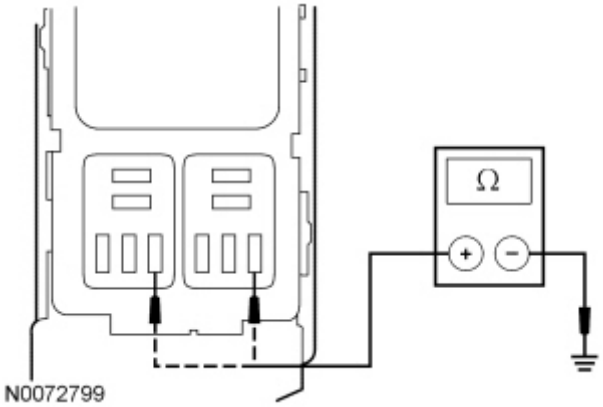
- For 5.4L vehicles, measure the resistance between the LH HID relay pin 1, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 1, circuit 1336 (LG/WH), harness side and ground.



- **Is the resistance greater than 10,000 ohms?**

D10 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND (SJB TO BEC)

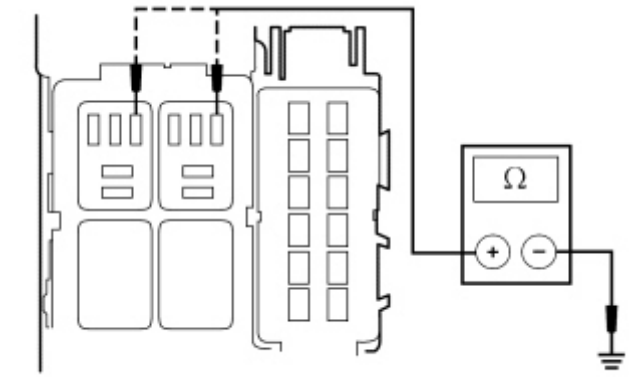
- Disconnect: BEC C1035a.
- For 4.0L or 4.6L vehicles, measure the resistance between the LH HID relay pin 2, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 2, circuit 1336 (LG/WH), harness side and ground.



- For 5.4L vehicles, measure the resistance between the LH HID relay pin 1, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 1, circuit 1336 (LG/WH), harness side and ground.

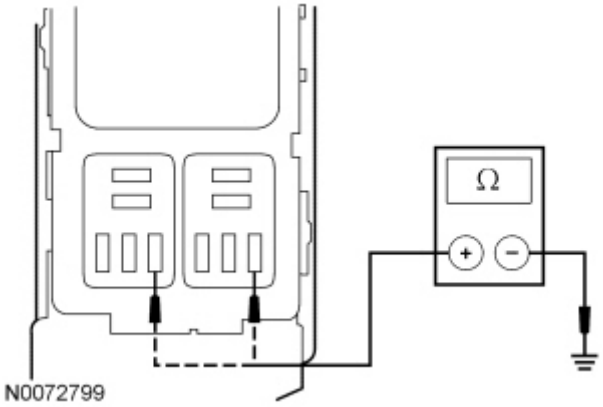
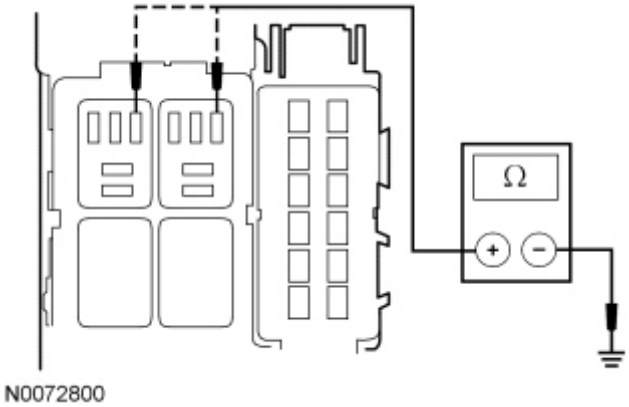
Yes
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

No
GO to D11 .



N0072800

- **Is the resistance greater than 10,000 ohms?**

D11 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR A SHORT TO GROUND (BEC TO HEADLAMP) - Disconnect: BEC C1035c. - For 4.0L or 4.6L vehicles, measure the resistance between the LH HID relay pin 2, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 2, circuit 1336 (LG/WH), harness side and ground.  N0072799 - For 5.4L vehicles, measure the resistance between the LH HID relay pin 1, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 1, circuit 1336 (LG/WH), harness side and ground.  N0072800 - **Is the resistance greater than 10,000 ohms?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
D12 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR AN OPEN (BEC TO HID RELAY) - Disconnect: BEC C1035c. - Measure the resistance between the suspect HID relay pin, harness side and the BEC , harness side as follows: **HID Relay Pin** / **BEC Connector-Pin** / **Circuit**	**Yes** GO to D13 . **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-

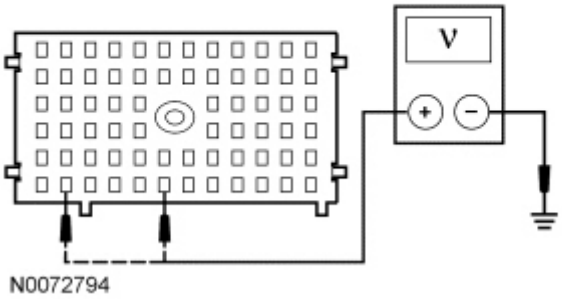
4.0L or 4.6L		
LH HID relay pin 2	C1035c-A6	1338 (WH)
RH HID relay pin 2	C1035c-A2	1336 (LG/WH)
5.4L		
LH HID relay pin 1	C1035c-A6	1338 (WH)
RH HID relay pin 1	C1035c-A2	1336 (LG/WH)

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

test.

D13 CHECK FOR VOLTAGE TO THE BEC

- Disconnect: BEC C1035a.
- Place the headlamp switch in the HEADLAMPS ON position.
- Measure the voltage between the BEC C1035a-F6 (LH headlamp), circuit 1338 (WH), harness side and ground; or between the BEC C1035a-F2 (RH headlamp), circuit 1336 (LG/WH), harness side and ground.



N0072794

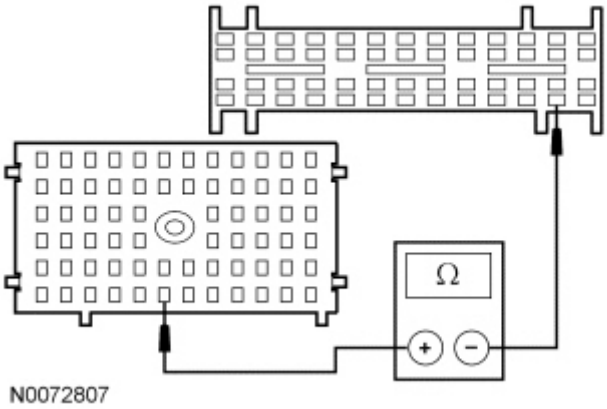
- **Is the voltage greater than 10 volts?**

Yes
INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test.

No
GO to D14 .

D14 CHECK CIRCUIT 1336 (LG/WH) OR CIRCUIT 1338 (WH) FOR AN OPEN (SJB TO BEC)

- Place the headlamp switch in the OFF position.
- Disconnect: SJB C2280d.
- For an inoperative LH headlamp, measure the resistance between the BEC C1035a-F6, circuit 1338 (WH), harness side and the SJB C2280d-51, circuit 1338 (WH), harness side.

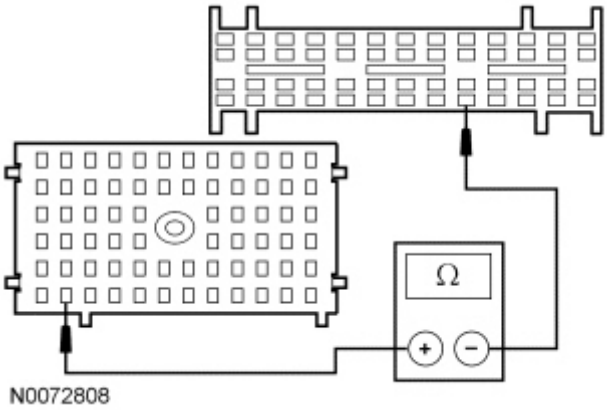


N0072807

- For an inoperative RH headlamp, measure the resistance between the BEC C1035a-F2, circuit 1336 (LG/WH), harness side and the SJB C2280d-48, circuit 1336 (LG/WH), harness side.

Yes
GO to D19 .

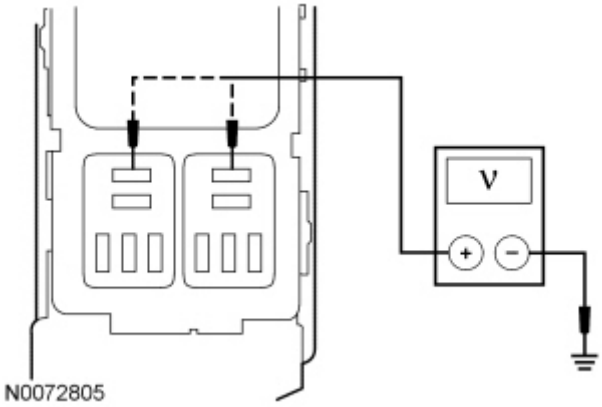
No
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.



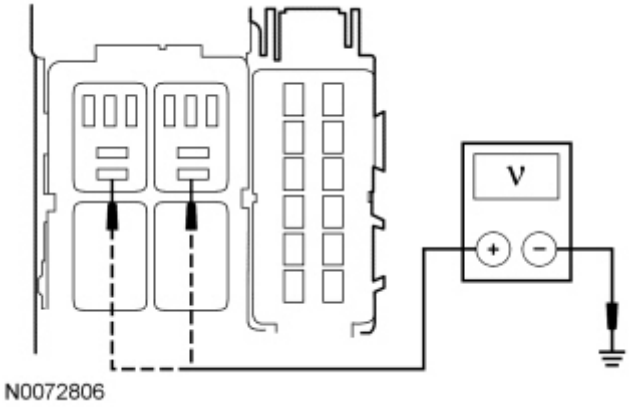
- **Is the resistance less than 5 ohms?**

D15 CHECK CIRCUIT 1055 (WH/LG) OR CIRCUIT 1056 (DB/LG) FOR VOLTAGE

- Place the headlamp switch in the OFF position.
- For 4.0L or 4.6L vehicles, measure the voltage between the LH HID relay pin 3, circuit 1055 (WH/LG), harness side and ground; or between the RH HID relay pin 3, circuit 1056 (DB/LG), harness side and ground.



- For 5.4L vehicles, measure the voltage between the LH HID relay pin 3, circuit 1055 (WH/LG), harness side and ground; or between the RH HID relay pin 3, circuit 1056 (DB/LG), harness side and ground.



- **Is the voltage greater than 10 volts?**

Yes
REPAIR circuit 2008 (PK/WH) (PK/BK for 5.4L) (LH headlamp) or circuit 2009 (PK/WH) (RH headlamp) for an open.

No
VERIFY the BEC fuse 54 (15A) (LH headlamp) or fuse 55 (15A) (RH headlamp) is OK. If OK, GO to D16. If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.

D16 CHECK CIRCUIT 1055 (WH/LG) OR CIRCUIT 1056 (DB/LG) FOR AN OPEN

- Disconnect: BEC C1035c.
- Measure the resistance between the suspect HID relay pin, harness side and the BEC, harness side as follows:

HID Relay Pin	BEC Connector-Pin	Circuit

Yes
INSTALL a new BEC. CLEAR the DTCs. REPEAT the self-test.

No
REPAIR the circuit in

4.0L or 4.6L LH HID relay pin 3 — C1035c-B8 — 1055 (WH/LG) RH HID relay pin 3 — C1035c-A9 — 1056 (DB/LG) **5.4L** LH HID relay pin 3 — C1035c-B8 — 1055 (WH/LG) RH HID relay pin 3 — C1035c-A9 — 1056 (DB/LG) • **Is the resistance less than 5 ohms?**	question. CLEAR the DTCs. REPEAT the self-test.
D17 CHECK THE HEADLAMP HARNESS • Place the headlamp switch in the OFF position. • Inspect the headlamp harness for an open between the ballast and the vehicle harness connector. • **Is the headlamp harness OK?**	**Yes** GO to D18. **No** REPAIR or INSTALL a new headlamp assembly. REFER to Headlamp Assembly in this section. TEST the system for normal operation.
D18 CHECK THE BALLAST • Substitute a known good ballast. • Connect: Inoperative Headlamp. • Place the headlamp switch in the HEADLAMPS ON position. • **Does the inoperative headlamp now illuminate?**	**Yes** INSTALL a new ballast. REFER to Headlamp Assembly in this section. TEST the system for normal operation. **No** INSTALL a new HID bulb. REFER to Headlamp Bulb in this section. TEST the system for normal operation.

D19 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.

Pinpoint Test E: One High Beam Headlamp Is Inoperative

Refer to Wiring Diagrams Cell 85, Headlamps for schematic and connector information.

Normal Operation

When the high beam relay is energized, voltage is provided from the Bussed Electrical Center (BEC) through circuits 1337 (VT/YE) and 1335 (YE/WH) to the LH and RH headlamps.

Vehicles equipped with High Intensity Discharge (HID) headlamps utilize a shutter within the headlamp assembly to increase the beam pattern.

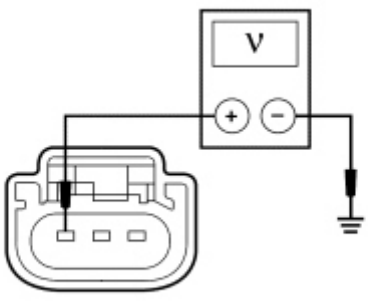
This pinpoint test is intended to diagnose the following:

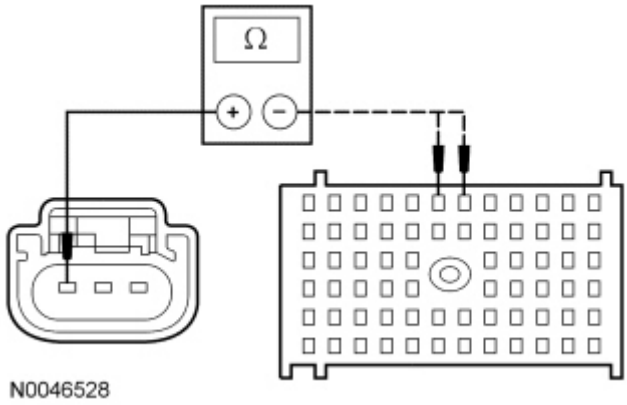
- Wiring, terminals or connectors
- Headlamp assembly
- BEC

PINPOINT TEST E: ONE HIGH BEAM HEADLAMP IS INOPERATIVE

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

NOTE: For halogen headlamps, make sure the bulb is good before continuing diagnostics.

Test Step	Result / Action to Take
E1 CHECK THE LOW BEAMS • Ignition OFF. • **NOTE:** Make sure the multifunction switch is in the LOW BEAM position. • Place the headlamp switch in the HEADLAMPS ON position. • **Does the low beam illuminate in the headlamp in question?**	**Yes** For HID headlamps, GO to E2. For halogen headlamps, GO to E3. **No** For halogen headlamps, GO to Pinpoint Test C. For HID headlamps, GO to Pinpoint Test D.
E2 CHECK CIRCUIT 1335 (YE/WH) OR CIRCUIT 1337 (VT/YE) FOR VOLTAGE • Disconnect: Inoperative Headlamp. • Place the headlamp switch in the HEADLAMPS ON position. • Place the multifunction switch is in the HIGH BEAM position. • Measure the voltage between the LH headlamp C1284-3, circuit 1337 (VT/YE), harness side and ground; or between the RH headlamp C1285-3, circuit 1335 (YE/WH), harness side and ground.  N0072803 • **Is the voltage greater than 10 volts?**	**Yes** REPAIR or INSTALL a new headlamp assembly. REFER to Headlamp Assembly in this section. TEST the system for normal operation. **No** GO to E3.
E3 CHECK CIRCUIT 1335 (YE/WH) OR CIRCUIT 1337 (VT/YE) FOR AN OPEN	

• Place the headlamp switch in the OFF position. • Disconnect: Inoperative Headlamp. • Disconnect: BEC C1035c. • Measure the resistance between the LH headlamp C1021-3 or C1284-3, circuit 1337 (VT/YE), harness side and the BEC C1035c-F6, circuit 1337 (VT/YE), harness side; or between the RH headlamp C1041-3 or C1285-3, circuit 1335 (YE/WH), harness side and the BEC C1035c-F7, circuit 1335 (YE/WH), harness side.  N0046528 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new BEC . TEST the system for normal operation. **No** REPAIR the circuit in question. TEST the system for normal operation.

Pinpoint Test F: The Headlamps Are On Continuously

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Refer to Wiring Diagrams Cell 11 , Fuse and Relay Information for schematic and connector information.

Normal Operation

The Smart Junction Box (SJB) sends voltage reference signals to the headlamp switch through circuits 1400 (TN/WH), 1401 (BK/LG), and 1402 (RD/WH). At any given time, the headlamp switch routes one of the input circuits to ground through circuit 1205 (BK).

When the SJB detects the headlamp switch in the HEADLAMPS ON position (or a fault with the headlamp switch inputs) and the multifunction switch in the LOW BEAM position, the SJB sends voltage through circuits 1338 (WH) and 1336 (LG/WH) to the LH and RH low beams, or the LH and RH High Intensity Discharge (HID) relays (if equipped).

When the HID relays are energized, voltage is routed to the LH and RH headlamps through circuits 2008 (PK/WH) (PK/BK for 5.4L) and 2009 (PK/WH).

The SJB also sends a voltage reference signal to the multifunction switch through circuits 1394 (WH/RD) and 1395 (RD/PK). When the multifunction switch is placed in the FLASH-TO-PASS or HIGH BEAM position, the signal is routed back to the SJB (ground internal to the SJB). When the SJB detects a request for flash-to-pass or high beams, the SJB provides ground to the high beam relay through circuit 1708 (LG/BK). When the high beam relay is energized, voltage is routed through circuits 1337 (VT/YE) and 1335 (YE/WH) to the LH and RH headlamps.

DTC Description	Fault Trigger Conditions
• B1470 — Lamp Headlamp Input Circuit Failure	A continuous and on-demand DTC that sets when the SJB detects an unexpected or conflicting value from the headlamp switch input circuits, such as an open or short to ground.
• B2501 — LF Lamp Low Beam Circuit Failure	A continuous and on-demand DTC that sets when the SJB detects a short to voltage from the LH headlamp voltage supply circuit.

• B2503 — RF Lamp Low Beam Circuit Failure	A continuous and on-demand DTC that sets when the SJB detects a short to voltage from the RH headlamp voltage supply circuit.
• B2586 — Headlamp Mode Select Circuit Failure	An on-demand DTC that sets when the SJB detects a short to ground from either of the multifunction switch input circuits.
• B2598 — Headlamp Relay Circuit Failure	A continuous and on-demand DTC that sets when the SJB detects a short to ground from the high beam relay coil ground controlled circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- High beam relay
- HID relay
- Headlamp switch
- Multifunction switch
- Bussed Electrical Center (BEC)
- SJB

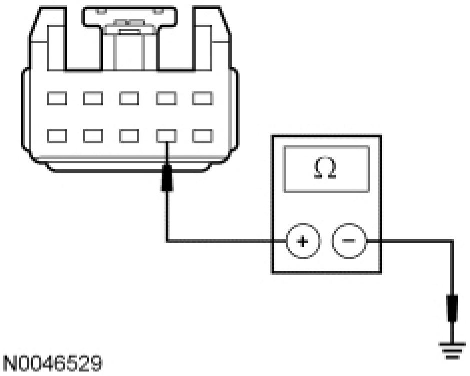
PINPOINT TEST F: THE HEADLAMPS ARE ON CONTINUOUSLY

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

NOTE: Failure to disconnect the battery when instructed will result in false resistance readings. Refer to Section 414-01 .

Test Step	Result / Action to Take
F1 DETERMINE IF THE HIGH BEAMS ARE ALWAYS ON	
• Ignition ON. • While observing the headlamps, engage the flash-to-pass feature. • **Does the headlamp brightness increase?**	**Yes** GO to F2 . **No** GO to F13 .
F2 USE THE RECORDED DTCs FROM THE SJB SELF-TEST (LOW BEAMS ALWAYS ON)	
• Record the results from the SJB self-test. • **Was DTC B1470 recorded?**	**Yes** GO to F3 . **No** GO to F8 .
F3 CHECK THE SJB HEADLAMP SWITCH PIDs	
• Enter the following diagnostic mode on the scan tool: SJB DataLogger. • **NOTE:** Make sure the headlamp switch is correctly lined up (in a detent position) when checking each PID. • Monitor the SJB headlamp switch PIDs (HD_LMP_SW, P_LMP_SW, LAMP_SW) while moving the headlamp switch through all positions. • **Do the headlamp switch positions agree with the PIDs?**	**Yes** The system is operating correctly. The concern may have been caused by the headlamp switch between detent positions. **No** GO to F4 .
F4 CHECK CIRCUIT 1205 (BK) FOR AN OPEN	
• Ignition OFF. • Disconnect: Negative Battery Cable. • Disconnect: Headlamp Switch C205. • Measure the resistance between the headlamp switch C205-7, circuit	**Yes** GO to F5 . **No**

1205 (BK), harness side and ground.



N0046529

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

REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

F5 CHECK THE HEADLAMP SWITCH

- Carry out the headlamp switch component test.

  Refer to Wiring Diagrams Cell 149 for component testing.

- **Is the headlamp switch OK?**

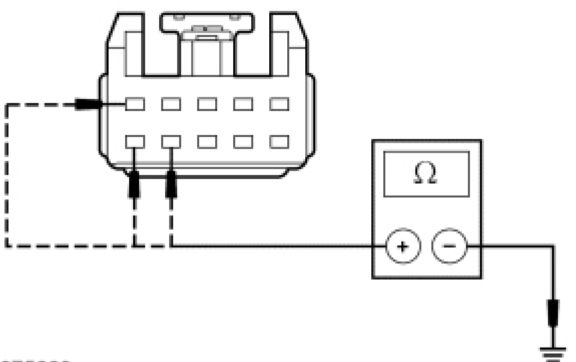
Yes
GO to F6 .

No
INSTALL a new headlamp switch. REFER to Headlamp Switch in this section. CLEAR the DTCs. REPEAT the self-test.

F6 CHECK THE HEADLAMP SWITCH INPUT CIRCUITS FOR A SHORT TO GROUND

- Disconnect: SJB C2280b.
- Measure the resistance between the headlamp switch, harness side and ground as follows:

Connector-Pin	Circuit
C205-9	1400 (TN/WH)
C205-5	1401 (BK/LG)
C205-10	1402 (RD/WH)



N0075663

- **Are the resistances greater than 10,000 ohms?**

Yes
GO to F7 .

No
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

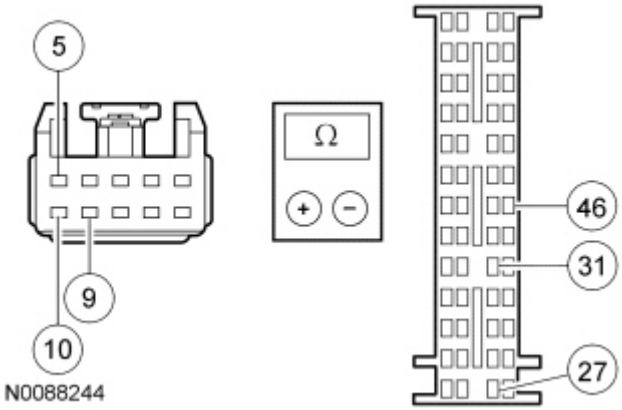
F7 CHECK THE HEADLAMP SWITCH INPUT CIRCUITS FOR AN OPEN

- Measure the resistance between the headlamp switch, harness side and the SJB , harness side as follows:

Yes
GO to F21 .

No

Headlamp Switch Connector-Pin	SJB Connector-Pin	Circuit
C205-9	C2280b-27	1400 (TN/WH)
C205-5	C2280b-31	1401 (BK/LG)
C205-10	C2280b-46	1402 (RD/WH)



- **Are the resistances less than 5 ohms?**

REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

F8 CHECK THE SJB

- Ignition OFF.
- Disconnect: SJB C2280d.
- Ignition ON.
- **Does either headlamp continue to illuminate?**

Yes
GO to F9.

No
GO to F21.

F9 CHECK CIRCUITS 1336 (LG/WH) AND 1338 (WH) FOR A SHORT TO VOLTAGE (SJB TO BEC)

- Ignition OFF.
- Disconnect: BEC C1035a.
- Ignition ON.
- **Does either headlamp continue to illuminate?**

Yes
GO to F10.

No
REPAIR circuit 1338 (WH) (LH headlamp) or circuit 1336 (LG/WH) (RH headlamp). CLEAR the DTCs. REPEAT the self-test.

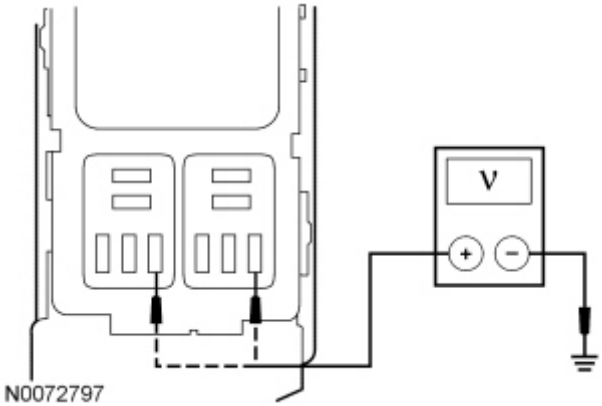
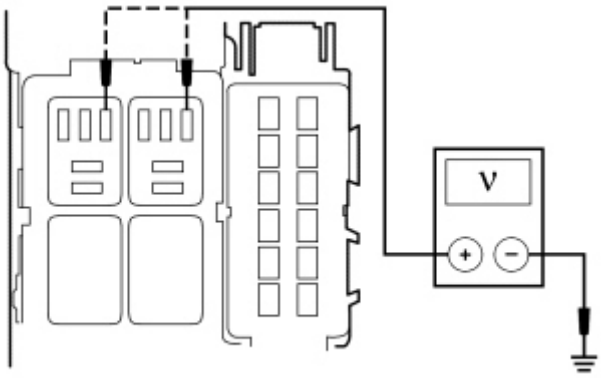
F10 CHECK CIRCUITS 1336 (LG/WH) AND 1338 (WH) FOR A SHORT TO VOLTAGE (BEC TO HEADLAMP) (HALOGEN HEADLAMPS)

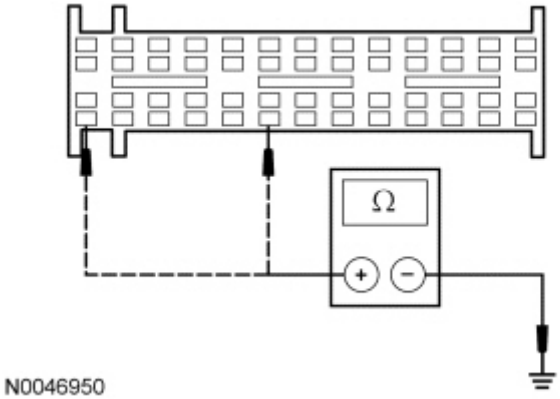
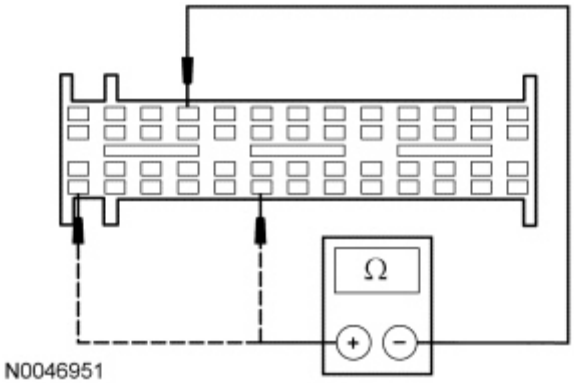
- Ignition OFF.
- Disconnect: BEC C1035c.
- Ignition ON.
- **Does either headlamp continue to illuminate?**

Yes
For halogen headlamps, REPAIR circuit 1338 (WH) (LH headlamp) or circuit 1336 (LG/WH) (RH headlamp). CLEAR the DTCs. REPEAT the self-test.

For HID headlamps, GO to F11.

No
INSTALL a new BEC. CLEAR the DTCs. REPEAT the self-test.

F11 CHECK CIRCUITS 2008 (PK/BK) (PK/BK FOR 5.4L) AND 2009 (PK/WH) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: Suspect HID Relay. • Ignition ON. • **Does the headlamp in question continue to illuminate?**	**Yes** REPAIR circuit 2008 (PK/WH) (PK/BK for 5.4L) or circuit 2009 (PK/WH) (RH headlamp). TEST the system for normal operation. **No** GO to F12.
F12 CHECK CIRCUITS 1336 (LG/WH) AND 1338 (WH) FOR A SHORT TO VOLTAGE (BEC TO HEADLAMP) (HID HEADLAMPS)	
• For 4.0L or 4.6L vehicles, measure the voltage between the LH HID relay pin 2, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 2, circuit 1336 (LG/WH), harness side and ground.  N0072797 • For 5.4L vehicles, measure the voltage between the LH HID relay pin 1, circuit 1338 (WH), harness side and ground; or between the RH HID relay pin 1, circuit 1336 (LG/WH), harness side and ground.  N0072798 • **Is any voltage present?**	**Yes** REPAIR circuit 1338 (WH) (LH headlamp) or circuit 1336 (LG/WH) (RH headlamp). CLEAR the DTCs. REPEAT the self-test. **No** INSTALL a new HID relay. TEST the system for normal operation.
F13 USE THE RECORDED DTCs FROM THE SJB SELF-TEST (HIGH BEAMS ALWAYS ON)	
• Retrieve the recorded results from the SJB self-test. • **Was DTC B2586 or B2598 recorded?**	**Yes** For DTC B2586, GO to F14. For DTC B2598, GO to F17. **No** GO to F19.

F14 CHECK THE MULTIFUNCTION SWITCH	
• Ignition OFF. • Disconnect: Multifunction Switch C202. • Ignition ON. • Enter the following diagnostic mode on the scan tool: SJB Self-Test. • Clear the SJB DTCs. Repeat the SJB on-demand self-test. • **Is DTC B2586 still present?**	**Yes** GO to F15 . **No** INSTALL a new multifunction switch. REFER to Section 211-05 . CLEAR the DTCs. REPEAT the self-test.
F15 CHECK CIRCUITS 1394 (WH/RD) AND 1395 (RD/PK) FOR A SHORT TO GROUND	
• Ignition OFF. • Disconnect: SJB C2280b. • Measure the resistance between the SJB C2280b-45, circuit 1394 (WH/RD), harness side and ground; and between the SJB C2280b-40, circuit 1395 (RD/PK), harness side and ground.  N0046950 • **Are the resistances greater than 10,000 ohms?**	**Yes** GO to F16 . **No** REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.
F16 CHECK CIRCUITS 1394 (WH/RD) AND 1395 (RD/PK) FOR A SHORT TO CIRCUIT 1396 (VT/WH)	
• Measure the resistance between the SJB C2280b-45, circuit 1394 (WH/RD), harness side and the SJB C2280b-4, circuit 1396 (VT/WH), harness side; and between the SJB C2280b-40, circuit 1395 (RD/PK), harness side and the SJB C2280b-4, circuit 1396 (VT/WH), harness side.  N0046951 • **Are the resistances greater than 10,000 ohms?**	**Yes** GO to F21 . **No** REPAIR the circuits in question. CLEAR the DTCs. REPEAT the self-test.
F17 CHECK THE SJB HIGH BEAM CONTROL	
• Disconnect: SJB C2280c. • Ignition ON. • **Do the headlamps continue to illuminate?**	**Yes** GO to F18 . **No** GO to F21 .

F18 CHECK CIRCUIT 1708 (LG/BK) FOR A SHORT TO GROUND	
• Ignition OFF. • Disconnect: BEC C1035a. • Ignition ON. • **Do the headlamps continue to illuminate?**	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
F19 CHECK THE HIGH BEAM RELAY	
• Disconnect: High Beam Relay. • Ignition ON. • **Do the headlamps continue to illuminate?**	**Yes** GO to F20 . **No** INSTALL a new high beam relay. TEST the system for normal operation.
F20 CHECK CIRCUITS 1335 (YE/WH) AND 1337 (VT/YE) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: BEC C1035c. • Ignition ON. • **Does either headlamp continue to illuminate?**	**Yes** REPAIR circuit 1337 (VT/YE) (LH headlamp) or circuit 1335 (YE/WH) (RH headlamp). TEST the system for normal operation. **No** INSTALL a new BEC . TEST the system for normal operation.
F21 CHECK FOR CORRECT SJB OPERATION	

• Ignition OFF.
• 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.

Pinpoint Test G: The Flash-to-Pass Feature is Inoperative

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Normal Operation

The Smart Junction Box (SJB) sends a voltage reference signal to the multifunction switch through circuit 1395 (RD/PK). When the flash-to-pass feature is activated, the multifunction switch routes the signal back to the SJB . The SJB then provides voltage to the high beams.

Vehicles equipped with High Intensity Discharge (HID) headlamps utilize a shutter within the headlamp assembly to increase the beam pattern. When the flash-to-pass feature is activated, the SJB activates the low beams and

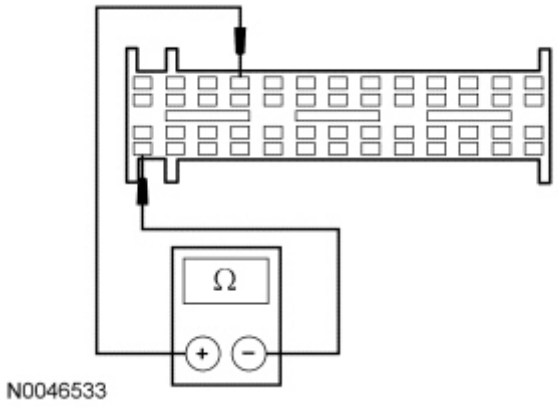
the shutters momentarily (less than 0.5 seconds).

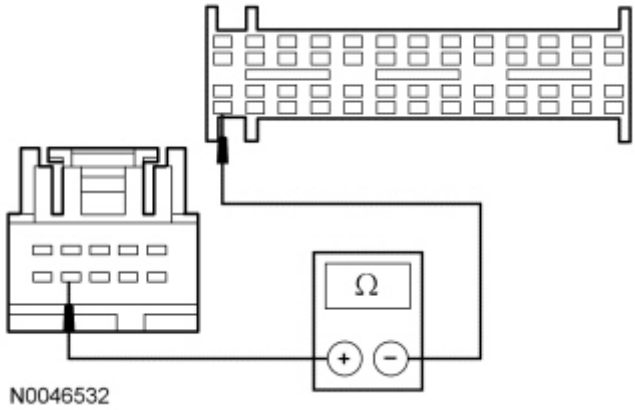
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Multifunction switch
- SJB

PINPOINT TEST G: THE FLASH-TO-PASS FEATURE IS INOPERATIVE

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
G1 CHECK THE HIGH BEAM OPERATION	
• Ignition OFF. • Place the headlamp switch in the HEADLAMPS ON position. • Place the multifunction switch in the HIGH BEAM position. • **Do the high beams illuminate?**	**Yes** GO to G2. **No** GO to Pinpoint Test B.
G2 CHECK THE INPUT FROM THE MULTIFUNCTION SWITCH	
• Place the headlamp switch in the OFF position. • Disconnect: SJB C2280b. • Place the multifunction switch in the FLASH-TO-PASS position. • Measure the resistance between the SJB C2280b-40, circuit 1395 (RD/PK), harness side and the SJB C2280b-4, circuit 1396 (VT/WH), harness side.  N0046533 • **Is the resistance less than 5 ohms?**	**Yes** GO to G4. **No** GO to G3.
G3 CHECK CIRCUIT 1395 (RD/PK) FOR AN OPEN	
• Disconnect: Multifunction Switch C202. • Measure the resistance between the multifunction switch C202-9, circuit 1395 (RD/PK), harness side and the SJB C2280b-40, circuit 1395 (RD/PK), harness side.	**Yes** INSTALL a new multifunction switch. REFER to Section 211-05. TEST the system for normal operation. **No** REPAIR the circuit. TEST the system for normal operation.



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

G4 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.