Fog Lamps

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 fog lamp switch input by sending a voltage reference signal to the headlamp switch. When the fog lamp switch is engaged, the voltage reference signal is routed to ground.

The fog lamps can be turned on when the following conditions are met:

- The ignition switch is in the RUN or START position.
- The low beam headlamps or the parking lamps are on.
- The high beams are off.

When the SJB receives an input from the headlamp switch indicating a request for the fog lamps, the SJB provides ground for the fog lamp relay coil. When the fog lamp relay is energized, voltage is routed to the fog lamps and the fog lamps on indicator located within the headlamp switch.

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 58 (15A) (fog lamp relay) • Wiring, terminals or connectors • Fog lamp relay • Bulb(s) • BEC • 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
• The fog lamps are inoperative	• Fuse • Wiring, terminals or connectors • Fog lamp relay • Headlamp switch • Bussed Electrical Center (BEC) • Smart Junction Box (SJB)	• GO to Pinpoint Test P.
• An individual fog lamp is	• Wiring, terminals or	• GO to Pinpoint

inoperative	connectors • BEC	Test Q .
• The fog lamps are on continuously	• Wiring, terminals or connectors • Fog lamp relay • Headlamp switch • BEC • SJB	• GO to Pinpoint Test R .
• The fog lamp on indicator is inoperative	• Wiring, terminals or connectors • Headlamp switch • BEC	• GO to Pinpoint Test S .

Pinpoint Tests

Pinpoint Test P: The Fog Lamps Are Inoperative

Refer to Wiring Diagrams Cell 86 , Fog Lamps 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 a voltage reference signal to the headlamp switch through circuit 1669 (OG/LG). When the fog lamp switch is engaged, the voltage signal is routed to ground. The fog lamp relay is provided voltage through the Bussed Electrical Center (BEC). When the ignition switch is in the ON position, the parking lamps are on and the SJB detects a request for the fog lamps, the SJB provides a ground for the fog lamp relay coil through circuit 1347 (DB/WH). When the relay is energized, voltage is routed through circuits 1721 (LB/BK) and 1776 (TN/OG) to the LH and RH fog lamps, respectively. The fog lamps share the ground circuit with the headlamps.

- DTC B2030 (Front Fog Lamp Relay Ckt Failure) — a continuous and on-demand DTC that sets when the SJB detects an open or short to voltage from the fog lamp relay coil ground controlled circuit.

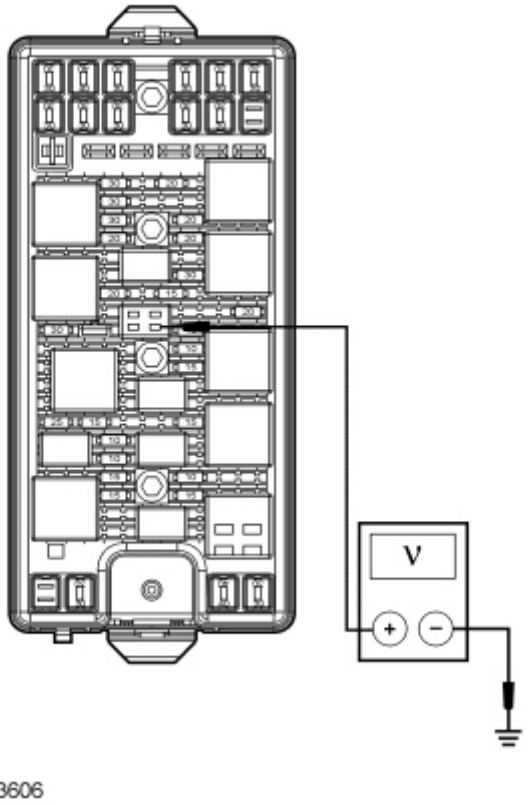
This pinpoint test is intended to diagnose the following:

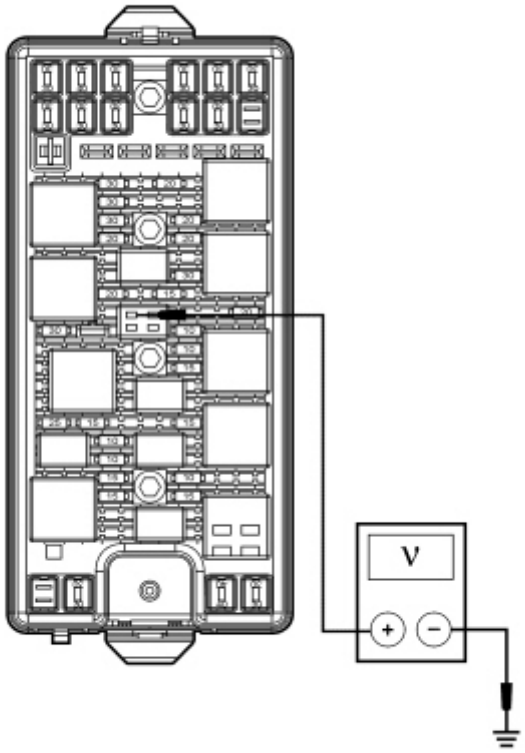
- Fuse
- Wiring, terminals or connectors
- Fog lamp relay
- Headlamp switch
- BEC
- SJB

PINPOINT TEST P: THE FOG LAMPS 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
P1 USE THE RECORDED DTCs FROM THE SJB SELF-TEST	
• Ignition OFF. • Retrieve the recorded results from the SJB self-test. • **Is DTC B2030 present?**	**Yes** GO to P2 . **No**

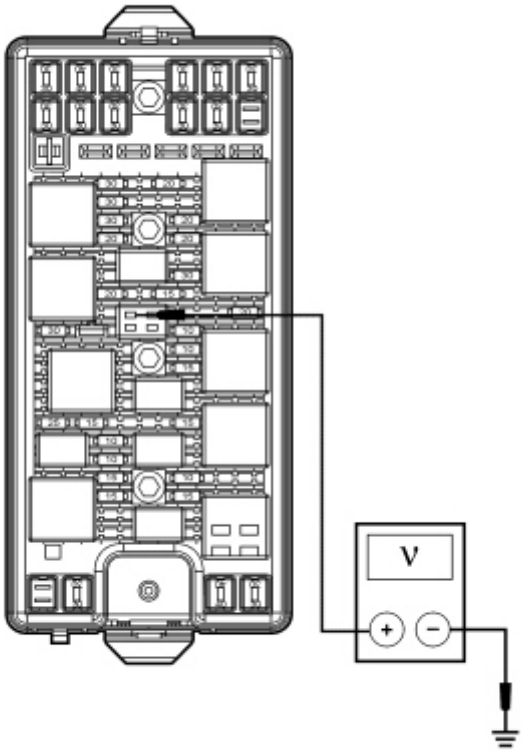
	GO to P8 .
P2 CHECK THE FOG LAMP RELAY (DTC B2030)	
• Disconnect: Fog Lamp Relay. • Substitute a known good relay and recheck the system. • **Do the fog lamps operate correctly?**	**Yes** REMOVE the known good relay. INSTALL a new fog lamp relay. CLEAR the DTCs. REPEAT the self-test. **No** REMOVE the known good relay. GO to P3 .
P3 CHECK VOLTAGE TO THE RELAY COIL	
• Measure the voltage between the fog lamp relay pin 86, BEC face side and ground.  N0053606 • **Is the voltage greater than 10 volts?**	**Yes** GO to P4 . **No** VERIFY the BEC fuse 58 (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 cause of the circuit short.
P4 CHECK THE FOG LAMP RELAY COIL GROUND CONTROL CIRCUIT FOR SHORT TO VOLTAGE	
• Disconnect: SJB C2280c. • Ignition ON. • Measure the voltage between the fog lamp relay pin 85, circuit 1347 (DB/WH), BEC face side and ground.	**Yes** GO to P5 . **No** GO to P6 .



N0053605

- **Is any voltage present?**

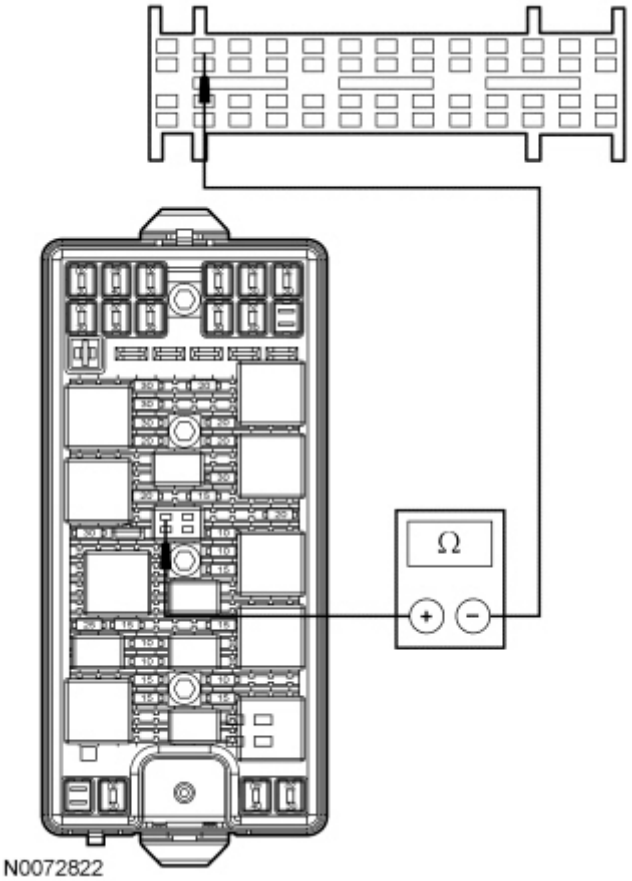
P5 CHECK CIRCUIT 1347 (DB/WH) FOR SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: BEC C1035a. • Ignition ON. • Measure the voltage between the fog lamp relay pin 85, circuit 1347 (DB/WH), BEC face side and ground.	**Yes** INSTALL a new BEC . CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.



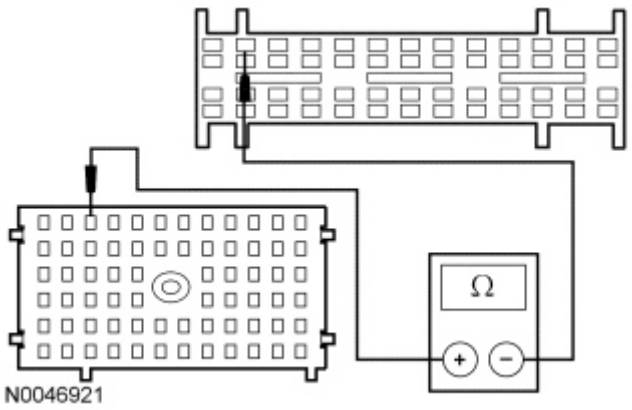
N0053605

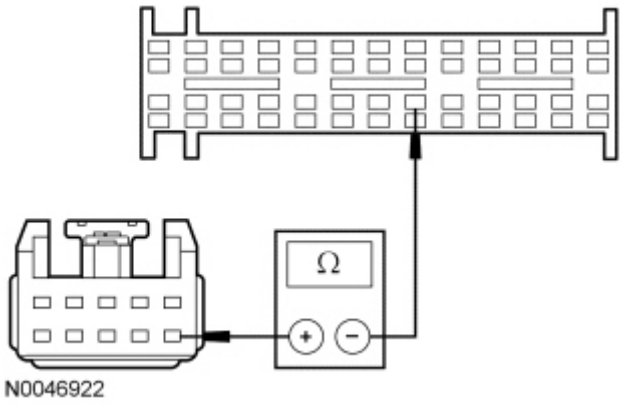
- **Is any voltage present?**

P6 CHECK THE FOG LAMP RELAY COIL GROUND CONTROL CIRCUIT FOR AN OPEN	
• Ignition OFF. • Measure the resistance between the fog lamp relay pin 85, circuit 1347 (DB/WH), BEC face side and the SJB C2280c-2, circuit 1347 (DB/WH), harness side.	**Yes** GO to P12 . **No** GO to P7 .



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

P7 CHECK CIRCUIT 1347 (DB/WH) FOR AN OPEN	
• Disconnect: BEC C1035a. • Measure the resistance between the BEC C1035a-A3, circuit 1347 (DB/WH), harness side and the SJB C2280c-2, circuit 1347 (DB/WH), 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.
P8 CHECK THE FOG LAMP SWITCH INPUT	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Monitor the SJB headlamp switch PID (FOG_SW) while placing the headlamp switch in the PARKING LAMPS ON position and engaging the fog lamp switch. • **Does the PID indicate the fog lamp switch is active?**	**Yes** GO to P11 . **No** GO to P9 .
P9 CHECK THE HEADLAMP SWITCH	
• Ignition OFF. • Place the headlamp switch in the OFF position.	**Yes** GO to P10 .

• Disconnect: Headlamp Switch C205. • Carry out the headlamp switch component test. Refer to Wiring Diagrams Cell 149 for component testing. • **Is the headlamp switch OK?**	**No** INSTALL a new headlamp switch. REFER to Headlamp Switch in this section. TEST the system for normal operation.
P10 CHECK CIRCUIT 1669 (OG/LG) FOR AN OPEN	**Yes** GO to P12. **No** REPAIR the circuit. TEST the system for normal operation.
• Disconnect: SJB C2280b. • Measure the resistance between the headlamp switch C205-6, circuit 1669 (OG/LG), harness side and the SJB C2280b-34, circuit 1669 (OG/LG), harness side.  N0046922 • **Is the resistance less than 5 ohms?**	
P11 CHECK THE FOG LAMP RELAY (NO DTCs)	**Yes** REMOVE the known good relay. INSTALL a new fog lamp relay. TEST the system for normal operation. **No** REMOVE the known good relay. INSTALL a new BEC. TEST the system for normal operation.
• Ignition OFF. • Place the headlamp switch in the OFF position. • Substitute a known good relay and recheck the system. • **Do the fog lamps operate correctly?**	
P12 CHECK FOR CORRECT SJB OPERATION	**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.

• 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?**	

Pinpoint Test Q: An Individual Fog Lamp Is Inoperative

Refer to Wiring Diagrams Cell 86, Fog Lamps for schematic and connector information.

Normal Operation

When the fog lamp relay is energized, voltage is routed through circuits 1721 (LB/BK) and 1776 (TN/OG) to the LH and RH fog lamps. The fog lamps are provided ground through circuit 1205 (BK).

This pinpoint test is intended to diagnose the following:

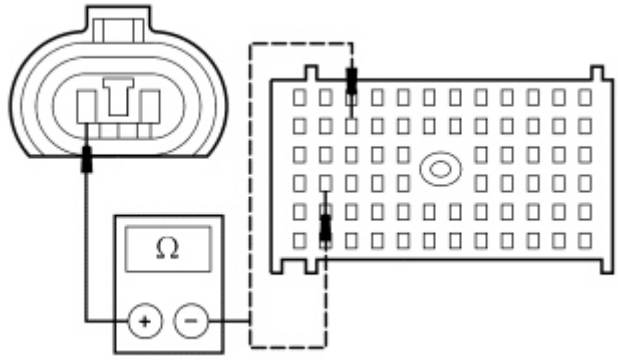
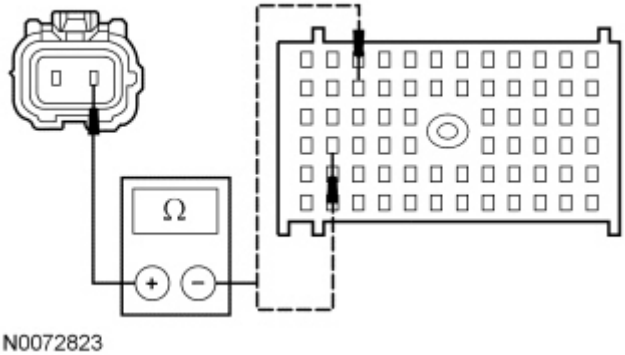
- Wiring, terminals or connectors
- BEC

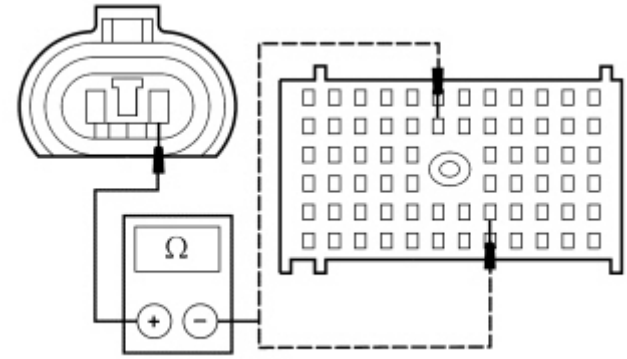
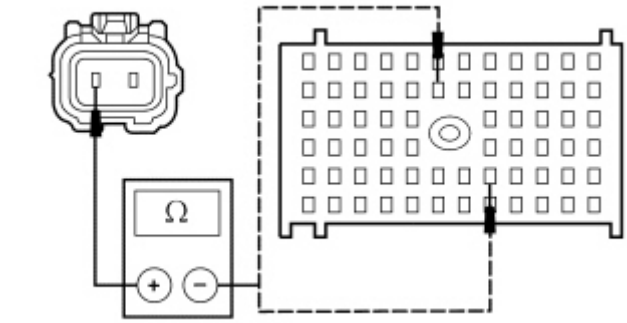
PINPOINT TEST Q: AN INDIVIDUAL FOG LAMP IS INOPERATIVE

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

NOTE: Make sure the fog lamp 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
Q1 CHECK CIRCUIT 1205 (BK) FOR AN OPEN • Ignition OFF. • Disconnect: Negative Battery Cable. • Disconnect: Inoperative Fog Lamp. • Disconnect: BEC C1035c. • For 4.0L or 4.6L, measure the resistance between the LH fog lamp C152-2, circuit 1205 (BK), harness side and the BEC C1035c-E10, circuit 1205 (BK), harness side; or between the RH fog lamp C162-2, circuit 1205 (BK), harness side and the BEC C1035c-C11, circuit 1205 (BK), harness side.  N0046924 • For 5.4L, measure the resistance between the LH fog lamp C1322-B, circuit 1205 (BK), harness side and the BEC C1035c-E10, circuit 1205 (BK), harness side; or between the RH fog lamp C1323-B, circuit 1205 (BK), harness side and the BEC C1035c-C11, circuit 1205 (BK), harness side.  N0072823 • **Is the resistance less than 5 ohms?**	**Yes** GO to Q2 . **No** REPAIR the circuit. TEST the system for normal operation.

Q2 CHECK CIRCUIT 1776 (TN/OG) OR CIRCUIT 1721 (LB/BK) FOR AN OPEN	
• For 4.0L or 4.6L, measure the resistance between the LH fog lamp C152-1, circuit 1721 (LB/BK), harness side and the BEC C1035c-B5, circuit 1721 (LB/BK), harness side; or between the RH fog lamp C162-1, circuit 1776 (TN/OG), harness side and the BEC C1035c-E7, circuit 1776 (TN/OG), harness side.  N0046925 • For 5.4L, measure the resistance between the LH fog lamp C1322-A, circuit 1721 (LB/BK), harness side and the BEC C1035c-B5, circuit 1721 (LB/BK), harness side; or between the RH fog lamp C1323-A, circuit 1776 (TN/OG), harness side and the BEC C1035c-E7, circuit 1776 (TN/OG), harness side.  N0072824 • **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 R: The Fog Lamps Are On Continuously

Refer to Wiring Diagrams Cell 86 , Fog Lamps 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 a voltage reference signal to the headlamp switch through circuit 1669 (OG/LG). When the fog lamp switch is engaged, the voltage signal is routed to ground. The fog lamp relay is provided voltage through the Bussed Electrical Center (BEC). When the ignition switch is in the ON position, the parking lamps are on, and the SJB detects a request for the fog lamps, the SJB provides a ground for the fog lamp relay coil through circuit 1347 (DB/WH). When the relay is energized, voltage is routed through circuits 1721 (LB/BK) and 1776 (TN/OG) to the LH and RH fog lamps, respectively.

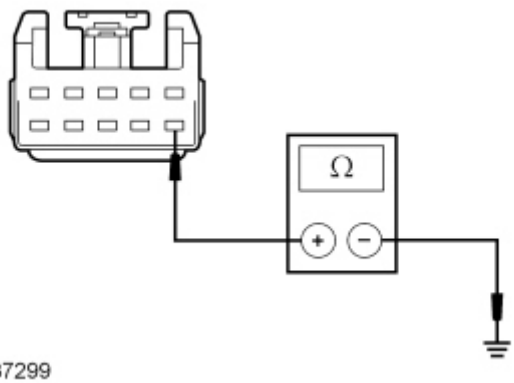
- DTC B2030 (Front Fog Lamp Relay Ckt Failure) — a continuous and on-demand DTC that sets when the SJB detects a short to ground from the fog lamp relay coil ground controlled circuit.
- DTC B2254 (Front Fog Lamp Switch Failure) — an on-demand DTC that sets when the SJB detects a short to ground from the fog lamp switch input circuit.

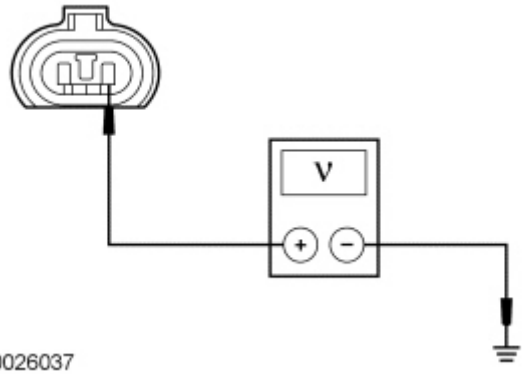
This pinpoint test is intended to diagnose the following:

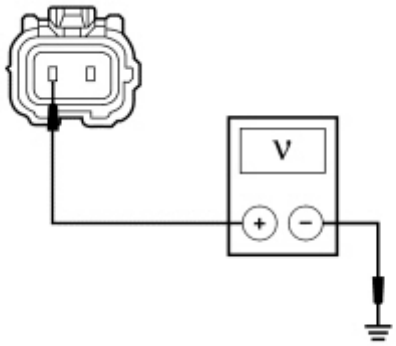
- Wiring, terminals or connectors
- Fog lamp relay
- Headlamp switch
- BEC
- SJB

PINPOINT TEST R: THE FOG LAMPS 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.**

Test Step	Result / Action to Take
R1 RETRIEVE THE RECORDED DTCs FROM THE SJB SELF-TEST • Ignition OFF. • Retrieve the recorded results from the SJB self-test. • **Was DTC B2030 or B2254 present?**	**Yes** For DTC B2254, GO to R2. For DTC B2030, GO to R4. **No** GO to R6.
R2 CHECK THE HEADLAMP SWITCH • Ignition OFF. • Disconnect: Headlamp Switch C205. • Carry out the headlamp switch component test. Refer to Wiring Diagrams Cell 149 for component testing. • **Is the headlamp switch OK?**	**Yes** GO to R3. **No** INSTALL a new headlamp switch. CLEAR the DTCs. REPEAT the self-test.
R3 CHECK CIRCUIT 1669 (OG/LG) FOR A SHORT TO GROUND • Disconnect: SJB C2280b. • Measure the resistance between the headlamp switch C205-6, circuit 1669 (OG/LG), harness side and ground.  N0037299 • **Is the resistance greater than 10,000 ohms?**	**Yes** GO to R9. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
R4 CHECK THE SJB • Disconnect: SJB C2280c. • Ignition ON. • **Do the fog lamps continue to illuminate?**	**Yes** GO to R5. **No** GO to R9.
R5 CHECK CIRCUIT 1347 (DB/WH) FOR A SHORT TO GROUND	

• Ignition OFF. • Disconnect: BEC C1035a. • Ignition ON. • **Do the fog lamps 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.
R6 CHECK THE FOG LAMP RELAY	
• Disconnect: Fog Lamp Relay. • Ignition ON. • **Do the fog lamps continue to illuminate?**	**Yes** GO to R7 . **No** INSTALL a new fog lamp relay. TEST the system for normal operation.
R7 CHECK CIRCUIT 2024 (VT/OG) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: BEC C1035a. • Ignition ON. • **Do the fog lamps continue to illuminate?**	**Yes** GO to R8 . **No** REPAIR the circuit. TEST the system for normal operation.
R8 CHECK CIRCUITS 1721 (LB/BK) (LH FOG LAMP) AND 1776 (TN/OG) (RH FOG LAMP) FOR A SHORT TO VOLTAGE	
• Ignition OFF. • Disconnect: BEC C1035c. • Ignition ON. • For 4.0L or 4.6L, measure the voltage between the LH fog lamp C152-1, circuit 1721 (LB/BK), harness side and ground; or between the RH fog lamp C162-1, circuit 1776 (TN/OG), harness side and ground.  A0026037 • For 5.4L, measure the voltage between the LH fog lamp C1322-A, circuit 1721 (LB/BK), harness side and ground; or between the RH fog lamp C1323-A, circuit 1776 (TN/OG), harness side and ground.	**Yes** REPAIR the circuit in question. TEST the system for normal operation. **No** INSTALL a new BEC . TEST the system for normal operation.

 N0072825 • **Is any voltage present?**	
R9 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 S: The Fog Lamp On Indicator Is Inoperative

Refer to Wiring Diagrams Cell 86 , Fog Lamps for schematic and connector information.

Normal Operation

When the fog lamp relay is energized, the Bussed Electrical Center (BEC) routes voltage through circuit 2024 (VT/OG) to the headlamp switch.

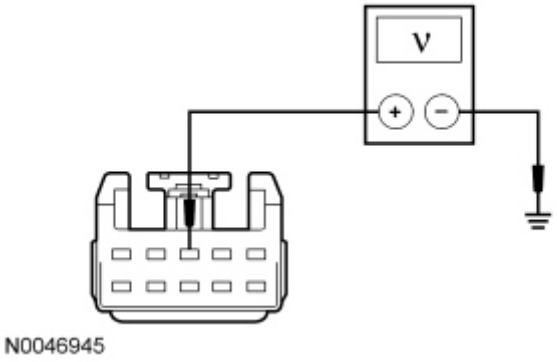
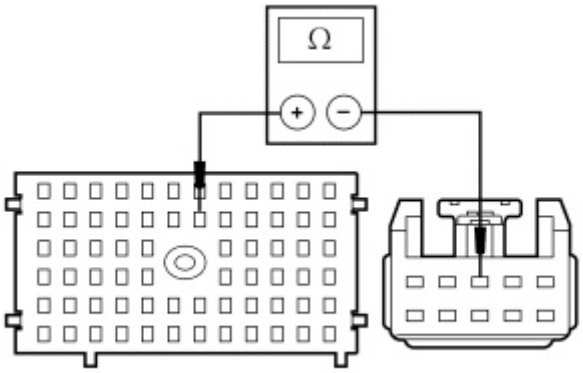
This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Headlamp switch
- BEC

PINPOINT TEST S: THE FOG LAMPS ON INDICATOR 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
S1 CHECK CIRCUIT 2024 (VT/OG) FOR VOLTAGE	
• Ignition OFF. • Disconnect: Headlamp Switch C205. • Enter the following diagnostic mode on the scan tool: SJB DataLogger. • Select the SJB fog lamp relay (FOG_RLY) active command. Command	**Yes** INSTALL a new headlamp switch. REFER to Headlamp Switch in this section. TEST the system

the fog lamps on. • Measure the voltage between the headlamp switch C205-3, circuit 2024 (VT/OG), harness side and ground.  N0046945 • **Is the voltage greater than 10 volts?**	for normal operation. **No** GO to S2 .
S2 CHECK CIRCUIT 2024 (VT/OG) FOR AN OPEN • Disconnect: BEC C1035a. • Measure the resistance between the BEC C1035a-B7, circuit 2024 (VT/OG), harness side and the headlamp switch C205-3, circuit 2024 (VT/OG), harness side.  N0072849 • **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.