




Reversing 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 digital Transmission Range (TR) sensor (automatic transmission) or the reversing lamp switch (manual transmission) is hardwired to the PCM, which monitors the transmission gear status. When the PCM detects the transmission is in REVERSE (R), the PCM sends a message over the network indicating the transmission is in REVERSE (R). When the SJB receives this message, the SJB provides voltage to the reversing lamps.

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none"> • Reversing lamp switch (manual transmission) • Digital Transmission Range (TR) sensor (automatic transmission) 	<ul style="list-style-type: none"> • Bussed Electrical Center (BEC) fuse 62 (20A) • 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
<ul style="list-style-type: none"> • Both reversing lamps are inoperative 	<ul style="list-style-type: none"> • Fuse • Wiring, terminals or connectors • Reversing lamp switch (manual transmission) • Digital Transmission Range (TR) sensor input (automatic transmission) concern • Bussed Electrical Center (BEC) • Smart Junction Box (SJB) • PCM 	<ul style="list-style-type: none"> • GO to Pinpoint Test T.
<ul style="list-style-type: none"> • An individual reversing lamp is inoperative 	<ul style="list-style-type: none"> • Wiring, terminals or connectors • SJB 	<ul style="list-style-type: none"> • GO to Pinpoint Test U.
<ul style="list-style-type: none"> • The reversing lamps are on continuously 	<ul style="list-style-type: none"> • Wiring, terminals or connectors • Reversing lamp switch (manual transmission) • Digital TR sensor input (automatic transmission) concern • SJB • PCM 	<ul style="list-style-type: none"> • GO to Pinpoint Test V.

Pinpoint Tests

Pinpoint Test T: Both Reversing Lamps Are Inoperative

Refer to Wiring Diagrams Cell [93](#), Reversing Lamps for schematic and connector information.

Normal Operation — Manual Transmission

The PCM sends a voltage reference signal to the reversing lamp switch through circuit 1789 (VT/WH). When the transmission is placed in REVERSE (R), the reversing lamp switch closes and routes the signal back to the PCM through circuit 359 (GY/RD). The PCM then sends a message to the Smart Junction Box (SJB), through the Instrument Cluster (IC) gateway function, over the communication network. The [SJB](#) then provides voltage to the reversing lamps. The [SJB](#) is provided voltage from the Bussed Electrical Center (BEC) through circuit 1679 (WH/YE) to power the reversing lamps.

Automatic Transmission

When the PCM detects the transmission is in REVERSE (R), a message is sent to the [SJB](#), through the [IC](#) gateway function, over the communication network. The [SJB](#) then provides voltage to the reversing lamps. The [SJB](#) is provided voltage from the [BEC](#) through circuit 1679 (WH/YE) to power the reversing lamps.

The PCM sets DTCs if any faults with the digital Transmission Range (TR) sensor inputs are detected.

This pinpoint test is intended to diagnose the following:

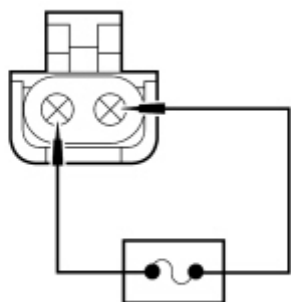
- Fuse
- Wiring, terminals or connectors
- Reversing lamp switch (manual transmission)
- Digital [TR](#) sensor input (automatic transmission) concern
- [BEC](#)
- [SJB](#)
- PCM

PINPOINT TEST T: BOTH REVERSING 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
T1 CHECK THE SJB OUTPUT	
<ul style="list-style-type: none">• Ignition ON.• Enter the following diagnostic mode on the scan tool: SJB DataLogger.• Select the SJB reversing lamps (BACKUP_1, BACKUP_2) active command. Command the reversing lamps on.• Do the reversing lamps illuminate?	<p>Yes For vehicles with an automatic transmission, REFER to Section 307-01 to continue diagnosis of the digital TR sensor.</p> <p>For vehicles with a manual transmission, GO to T2.</p> <p>No GO to T4.</p>
T2 CHECK THE REVERSING LAMP SWITCH	
<ul style="list-style-type: none">• Ignition OFF.• Disconnect: Reversing Lamp Switch C169.• Connect a fused jumper wire between the reversing lamp switch	<p>Yes REMOVE the jumper wire. INSTALL a new reversing</p>

C169-A, circuit 1789 (VT/WH), harness side and the reversing lamp switch C169-B, circuit 359 (GY/RD), harness side.



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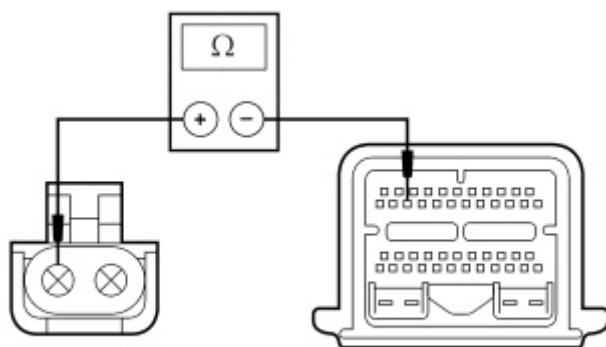
- Ignition ON.
- Do the reversing lamps illuminate?

lamp switch. REFER to [Reversing Lamp Switch](#) in this section. TEST the system for normal operation.

No
REMOVE the jumper wire.
GO to [T3](#).

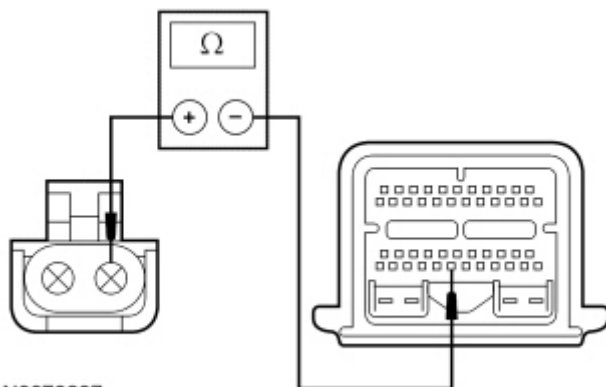
T3 CHECK CIRCUITS 1789 (VT/WH) AND 359 (GY/RD) FOR AN OPEN

- Ignition OFF.
- Disconnect: PCM C175t.
- Measure the resistance between the reversing lamp switch C169-A, circuit 1789 (VT/WH), harness side and the PCM C175t-21, circuit 1789 (VT/WH), harness side.



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- Measure the resistance between the reversing lamp switch C169-B, circuit 359 (GY/RD), harness side and the PCM C175t-41, circuit 359 (GY/RD), harness side.



N0072827

- Are the resistances less than 5 ohms?

Yes
GO to [T7](#).

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

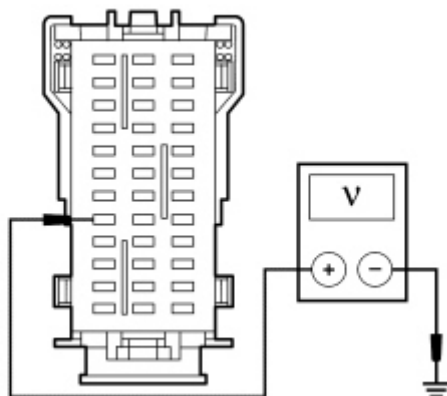
T4 CHECK CIRCUIT 1679 (WH/YE) FOR VOLTAGE

- Ignition OFF.
- Disconnect: [SJB](#) C2280h.
- Measure the voltage between the [SJB](#) C2280h-29, circuit 1679

Yes
GO to [T6](#).

No

(WH/YE), harness side and ground.

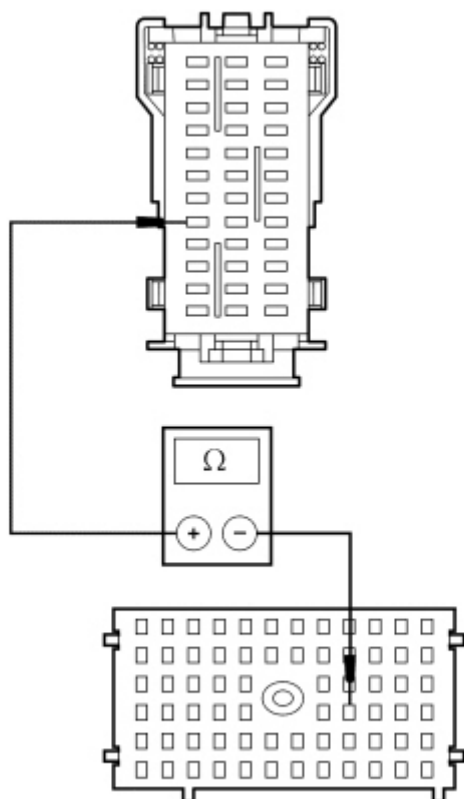


- Is the voltage greater than 10 volts?

VERIFY the [BEC](#) fuse 62 (20A) is OK. If OK, GO to [T5](#). If not OK, REFER to the Wiring Diagrams Manual to identify the possible cause of the causes of the circuit short.

T5 CHECK CIRCUIT 1679 (WH/YE) FOR AN OPEN

- Ignition OFF.
- Disconnect: [BEC](#) C1035a.
- Measure the resistance between the [SJB](#) C2280h-29, circuit 1679 (WH/YE), harness side and the [BEC](#) C1035a-D9, circuit 1679 (WH/YE), harness side.



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- 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.

T6 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.

Yes
INSTALL a new [SJB](#). REFER to [Section 419-10](#). TEST the system for normal operation.

No
The system is operating

<ul style="list-style-type: none"> • Is the concern still present? 	correctly at this time. The concern may have been caused by a loose or corroded connector.
T7 CHECK FOR CORRECT PCM OPERATION	
<ul style="list-style-type: none"> • Disconnect all the PCM connectors. • Check for: <ul style="list-style-type: none"> ▪ 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? 	<p>Yes INSTALL a new PCM. REFER to Section 303-14. TEST the system for normal operation.</p> <p>No The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.</p>

Pinpoint Test U: An Individual Reversing Lamp Is Inoperative

Refer to Wiring Diagrams Cell [93](#), Reversing Lamps for schematic and connector information.

Normal Operation

When the transmission is placed in REVERSE (R), the PCM sends a message to the Smart Junction Box (SJB), through the Instrument Cluster (IC) gateway function, over the communication network. The [SJB](#) then provides voltage through circuits 1362 (DG/OG) and 1367 (WH/YE) to the LH and RH reversing lamps, respectively. Ground for the lamps is provided through circuit 1205 (BK).

- DTC B2525 (Left Rear Backup Lamp Circuit Failure) — a continuous and on-demand DTC that sets when the [SJB](#) detects an open or short to ground from the LH reversing lamp voltage supply circuit.
- DTC B2532 (Right Rear Backup Lamp Circuit Short to Battery) — a continuous and on-demand DTC that sets when the [SJB](#) detects an open or short to ground from the RH reversing lamp voltage supply circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- [SJB](#)

PINPOINT TEST U: AN INDIVIDUAL REVERSING LAMP IS INOPERATIVE

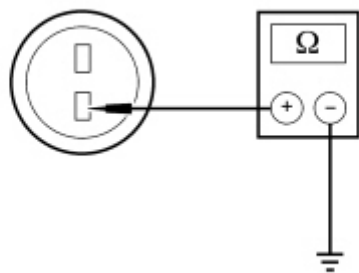
NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: Make sure the 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
U1 CHECK CIRCUIT 1205 (BK) FOR AN OPEN	
<ul style="list-style-type: none"> • Ignition OFF. • Disconnect: Negative Battery Cable. • Disconnect: Inoperative Reversing Lamp. • Measure the resistance between the LH reversing lamp C451-1, circuit 1205 (BK), harness side and ground; or between the RH reversing lamp 	<p>Yes GO to U2.</p> <p>No REPAIR the circuit.</p>

C461-1, circuit 1205 (BK), harness side and ground.



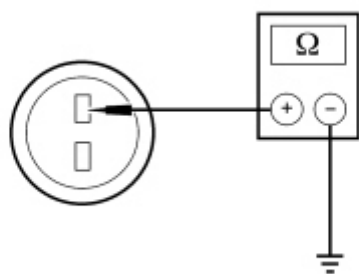
N0011227

- Is the resistance less than 5 ohms?

CLEAR the DTCs.
REPEAT the self-test.

U2 CHECK CIRCUIT 1362 (DG/OG) OR CIRCUIT 1367 (WH/YE) FOR A SHORT TO GROUND

- Disconnect: [SJB C2280d](#).
- Measure the resistance between the LH reversing lamp C451-2, circuit 1367 (WH/YE), harness side and ground; or between the RH reversing lamp C461-2, circuit 1367 (WH/YE), harness side and ground.



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- Is the resistance greater than 10,000 ohms?

Yes
GO to [U3](#).

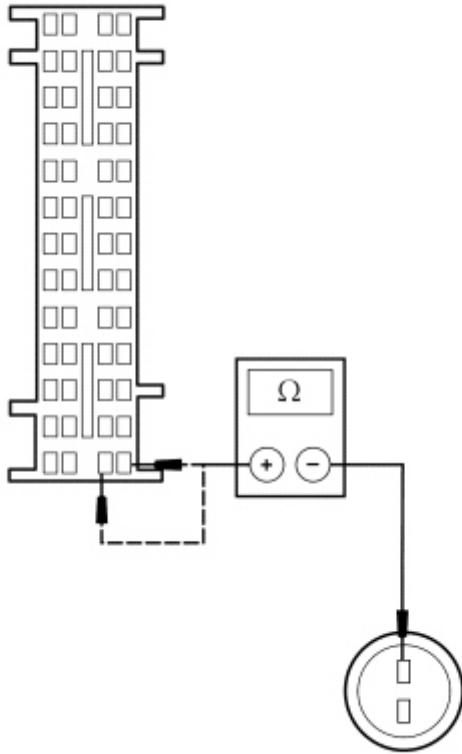
No
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

U3 CHECK CIRCUIT 1362 (DG/OG) OR CIRCUIT 1367 (WH/YE) FOR AN OPEN

- Measure the resistance between the LH reversing lamp C451-2, circuit 1367 (WH/YE), harness side and the [SJB C2280d-26](#), circuit 1362 (DG/OG), harness side; or between the RH reversing lamp C461-2, circuit 1367 (WH/YE), harness side and the [SJB C2280d-13](#), circuit 1367 (WH/YE), harness side.

Yes
GO to [U4](#).

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



N0046934

- Is the resistance less than 5 ohms?

U4 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 V: The Reversing Lamps Are On Continuously

Refer to Wiring Diagrams Cell [93](#), Reversing Lamps for schematic and connector information.

Normal Operation — Manual Transmission

The PCM sends a voltage reference signal to the reversing lamp switch through circuit 1789 (VT/WH). When the transmission is placed in REVERSE (R), the reversing lamp switch closes and routes the signal back to the PCM through circuit 359 (GY/RD). The PCM then sends a message to the Smart Junction Box (SJB), through the Instrument Cluster (IC) gateway function, over the communication network. The **SJB** then provides voltage through circuits 1362 (DG/OG) and 1367 (WH/YE) to the LH and RH reversing lamps.

Automatic Transmission

When the PCM detects the transmission is in REVERSE (R), a message to the Smart Junction Box (SJB), through the [IC](#) gateway function, over the communication network. The [SJB](#) then provides voltage through circuits 1362 (DG/OG) and 1367 (WH/YE) to the LH and RH reversing lamps.

The PCM sets DTCs if any faults with the digital Transmission Range (TR) sensor inputs are detected.

- DTC B2525 (Left Rear Backup Lamp Circuit Failure) — a continuous and on-demand DTC that sets when the [SJB](#) detects a short to voltage on the LH reversing lamp voltage supply circuit.
- DTC B2532 (Right Rear Backup Lamp Circuit Short to Battery) — a continuous and on-demand DTC that sets when the [SJB](#) detects a short to voltage on the RH reversing lamp voltage supply circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Reversing lamp switch (manual transmission)
- Digital [TR](#) sensor input (automatic transmission) concern
- [SJB](#)
- PCM

PINPOINT TEST V: THE REVERSING 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
V1 RETRIEVE THE RECORDED DTCs FROM THE SJB SELF-TEST	
<ul style="list-style-type: none"> • Ignition OFF. • Retrieve the recorded results from the SJB self-test. • Was DTC B2525 or B2532 present? 	<p>Yes GO to V2.</p> <p>No GO to V3.</p>
V2 CHECK CIRCUITS 1362 (DG/OG) AND 1367 (WH/YE) FOR A SHORT TO VOLTAGE	
<ul style="list-style-type: none"> • Disconnect: SJB C2280d. • Ignition ON. • Does either reversing lamp continue to illuminate? 	<p>Yes REPAIR circuit 1362 (DG/OG) (LH reversing lamp) or circuit 1367 (WH/YE) (RH reversing lamp) as necessary. CLEAR the DTCs. REPEAT the self-test.</p> <p>No GO to V6.</p>
V3 CHECK THE PCM	
<ul style="list-style-type: none"> • Disconnect: PCM C175t. • Ignition ON. • Do the reversing lamps continue to illuminate? 	<p>Yes GO to V6.</p> <p>No If equipped with a manual transmission, GO to V4.</p> <p>If equipped with an automatic transmission, REFER to Section 307-01 to continue diagnosis of the digital TR sensor.</p>
V4 CHECK THE REVERSING LAMP SWITCH	
<ul style="list-style-type: none"> • Ignition OFF. 	Yes

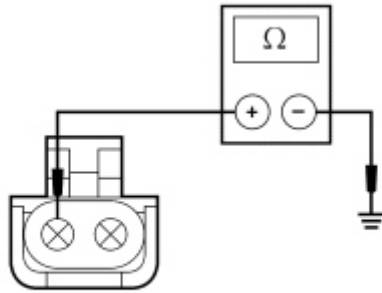
- Connect: PCM C175t.
- Disconnect: Reversing Lamp Switch C169.
- Ignition ON.
- **Do the reversing lamps continue to illuminate?**

GO to [V5](#).

No
 INSTALL a new reversing lamp switch. REFER to [Reversing Lamp Switch](#) in this section. TEST the system for normal operation.

V5 CHECK CIRCUIT 1789 (VT/WH) FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect: PCM C175t.
- Measure the resistance between the reversing lamp switch C169-A, circuit 1789 (VT/WH), harness side and ground.



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

Yes
 GO to [V7](#).

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

V6 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.

V7 CHECK FOR CORRECT PCM OPERATION

- Ignition OFF.
- 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.

