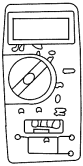
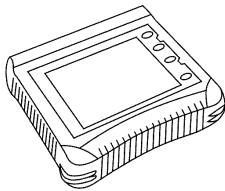
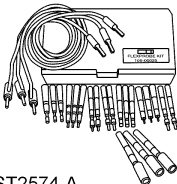


DIAGNOSIS AND TESTING

Reversing Lamps

Refer to Wiring Diagrams Cell 93 for schematic and connector information.

Special Tool(s)

 <p>ST1137-A</p>	<p>73III Automotive Meter 105-R0057 or equivalent</p>
 <p>ST2332-A</p>	<p>Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool</p>
 <p>ST2574-A</p>	<p>Flex Probe Kit 105-R025B or equivalent</p>

Inspection and Verification

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

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none"> • Reversing lamp switch 	<ul style="list-style-type: none"> • Bussed electrical center (BEC) fuse 62 (20A) • Circuitry • Bulbs • 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. If the cause is not visually evident, connect the diagnostic tool to the data link connector (DLC) and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
 - check that the program card is correctly installed.
 - check the connections to the vehicle.
 - check the ignition switch position.
5. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool operating manual.
6. Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
 - CAN circuit fault; all electronic control units no response/not equipped, refer to Section 418-00.
 - No response/not equipped for SJB, refer to Section 419-10.
 - System passed, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out the self-test diagnostics for the SJB.
7. If the DTCs retrieved are related to the concern, go to the Smart Junction Box (SJB) Diagnostic Trouble Code (DTC) Index.
8. If no DTCs related to the concern are retrieved, GO to [Symptom Chart](#).

DIAGNOSIS AND TESTING (Continued)**Smart Junction Box (SJB) Diagnostic Trouble Code (DTC) Index**

DTC	Description	Action
B1342	ECU is Faulted	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved again, INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation.
B2525	Left Rear Backup Lamp Circuit Failure	If the reversing lamp is inoperative, GO to Pinpoint Test U. If the reversing lamp is always on, GO to Pinpoint Test V.
B2532	Right Rear Backup Lamp Circuit Failure	If the reversing lamp is inoperative, GO to Pinpoint Test U. If the reversing lamp is always on, GO to Pinpoint Test V.
All other DTCs	—	REFER to Section 419-10.

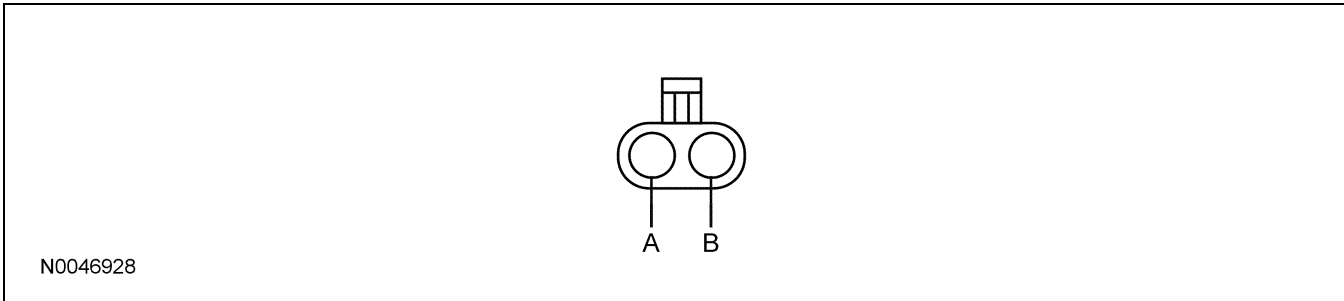
Symptom Chart**Symptom Chart**

Condition	Possible Sources	Action
<ul style="list-style-type: none"> No communication with the smart junction box (SJB) 	<ul style="list-style-type: none"> Circuitry SJB 	<ul style="list-style-type: none"> REFER to Section 419-10.
<ul style="list-style-type: none"> The reversing lamps are inoperative 	<ul style="list-style-type: none"> Fuse Circuitry Reversing lamp switch Bussed electrical center (BEC) SJB Powertrain control module (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"> Circuitry 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"> Circuitry Reversing lamp switch SJB PCM 	<ul style="list-style-type: none"> GO to Pinpoint Test V.

DIAGNOSIS AND TESTING (Continued)

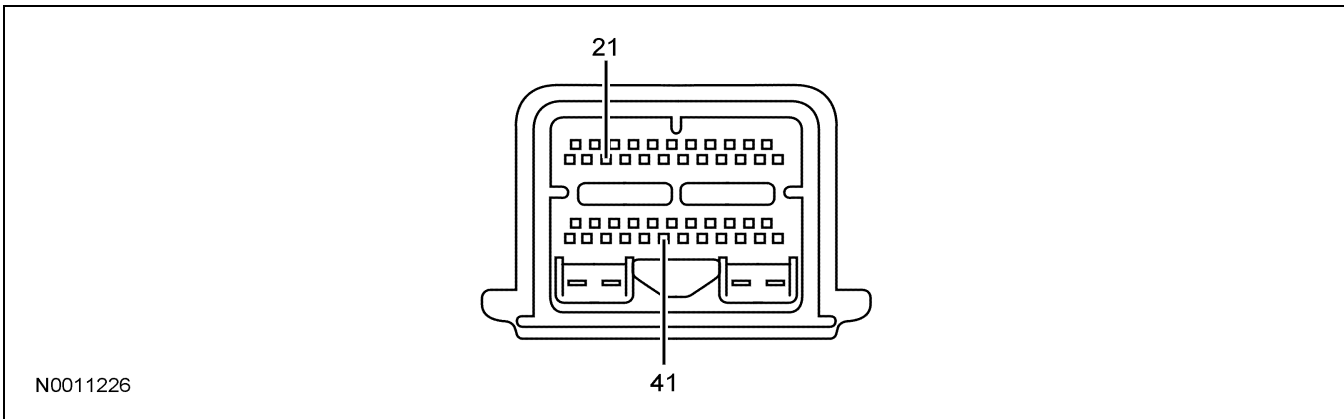
Connector Circuit Reference

Reversing Lamp Switch C169



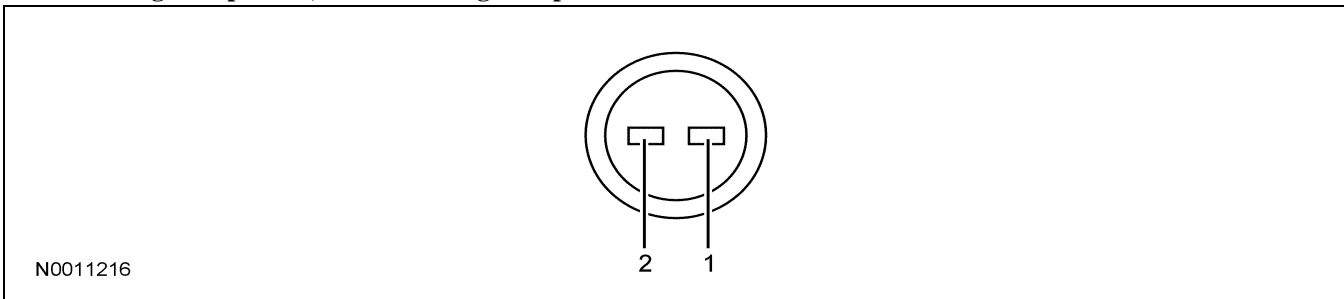
Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
A	1789 (VT/WH) reversing lamp switch input	Less than 5 ohms between the reversing lamp switch and the powertrain control module (PCM).
B	359 (GY/RD) reversing lamp switch return	Less than 5 ohms between the reversing lamp switch and the PCM.

PCM C175t



Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
21	1789 (VT/WH) reversing lamp switch input	0 volts, less than 5 ohms between the PCM and the reversing lamp switch.
41	359 (GY/RD) reversing lamp switch return	0 volts, less than 5 ohms between the PCM and the reversing lamp switch.

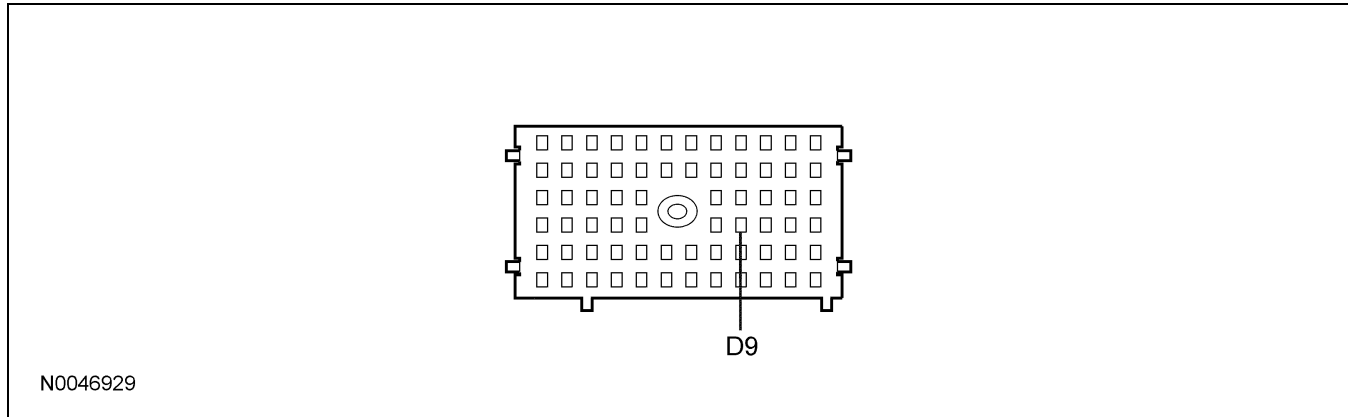
LH Reversing Lamp C451, RH Reversing Lamp C461



DIAGNOSIS AND TESTING (Continued)

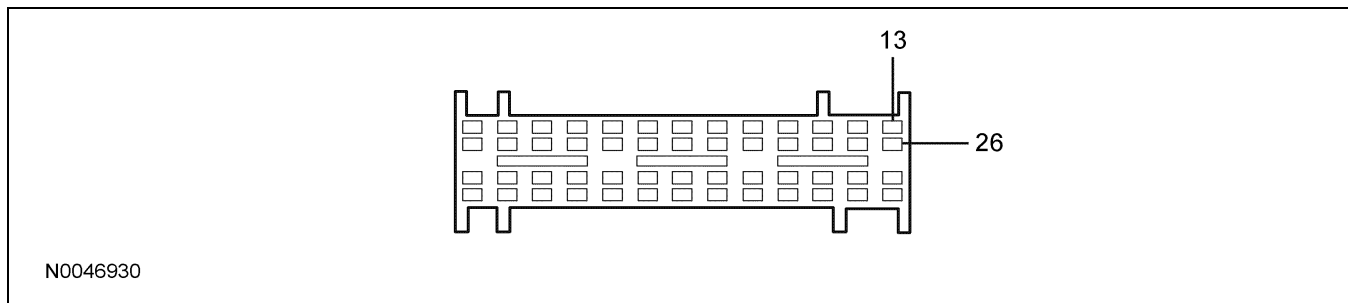
Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
1	1205 (BK) reversing lamp ground	Less than 5 ohms between the reversing lamp and ground.
2 (C451)	1362 (DG/OG) reversing lamp voltage feed	0 volts, less than 5 ohms between the reversing lamp and the smart junction box (SJB).
2 (C461)	1367 (WH/YE) reversing lamp voltage feed	0 volts, less than 5 ohms between the reversing lamp and the SJB.

Bussed Electrical Center (BEC) C1035a



Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
D9	1679 (WH/YE) SJB voltage feed	0 volts, less than 5 ohms between the BEC and the SJB.

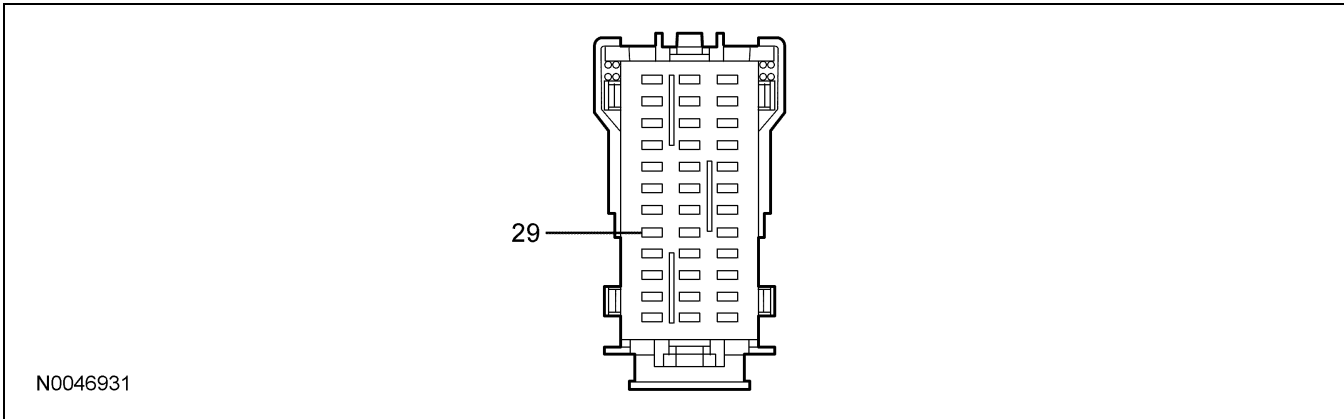
SJB C2280d



Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
13	1367 (WH/YE) RH reversing lamp voltage feed	0 volts, less than 5 ohms between the SJB and the reversing lamp.
26	1362 (DG/OG) LH reversing lamp voltage feed circuit	0 volts, less than 5 ohms between the SJB and the reversing lamp.

DIAGNOSIS AND TESTING (Continued)

SJB C2280h



Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
29	1679 (WH/YE) SJB voltage feed	Greater than 10 volts at all times.

Pinpoint Tests

Pinpoint Test T: The Reversing Lamps Are Inoperative

Normal Operation — Manual Transmission

The powertrain control module (PCM) sends a voltage reference signal to the reversing lamp switch through circuit 1789 (VT/WH). When the transmission is placed in REVERSE, the reversing lamp switch closes and routes the signal back to the PCM through circuit 359 (GY/RD). The PCM then sends a signal to the smart junction box (SJB) 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).

Normal Operation — Automatic Transmission

When the PCM detects the transmission is in REVERSE, a signal is sent to the SJB 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).

Possible Causes

- Fuse
- Circuit 359 (GY/RD) open
- Circuit 1679 (WH/YE) open
- Circuit 1789 (VT/WH) open
- Reversing lamp switch
- BEC
- SJB
- PCM

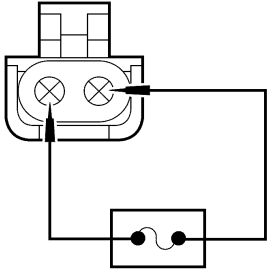
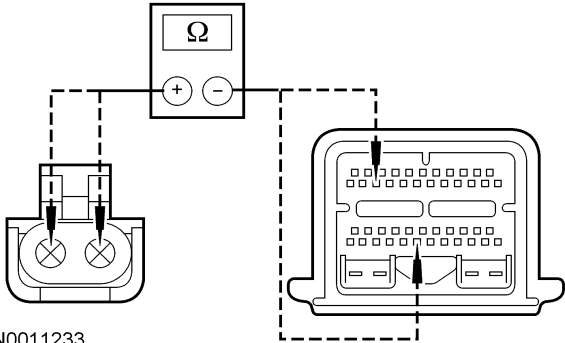
PINPOINT TEST T: THE REVERSING LAMPS ARE INOPERATIVE

Test Step		Result / Action to Take
T1	CHECK THE REVERSING LAMP SWITCH INPUT	<p>Yes GO to T4.</p> <p>No For a manual transmission, GO to T2. For an automatic transmission, REFER to Section 307-01 to continue diagnosis of the transmission inputs.</p>
	<ul style="list-style-type: none"> • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: PCM Transmission Status PID. • Monitor the PCM transmission status PID while placing the transmission in REVERSE. • Does the PID indicate the transmission is in REVERSE? 	
T2	CHECK REVERSING LAMP SWITCH	
	<ul style="list-style-type: none"> • Key in OFF position. • Disconnect: Reversing Lamp Switch C169. 	

(Continued)

DIAGNOSIS AND TESTING (Continued)

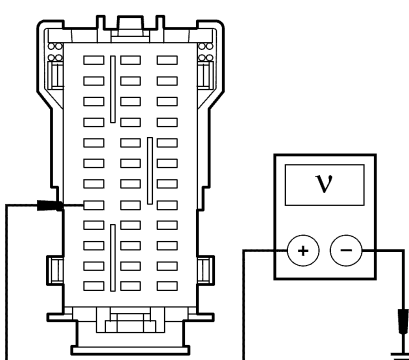
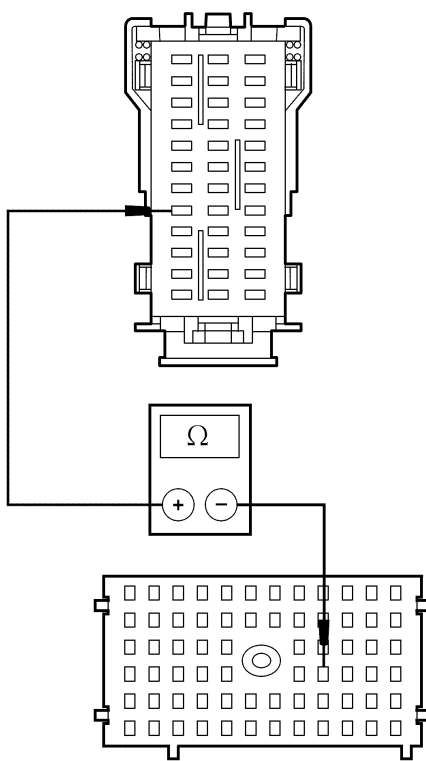
PINPOINT TEST T: THE REVERSING LAMPS ARE INOPERATIVE (Continued)

Test Step		Result / Action to Take
T2	<p>CHECK REVERSING LAMP SWITCH (Continued)</p> <ul style="list-style-type: none"> Connect a fused (5A) jumper wire between the reversing lamp switch C169-A, circuit 1789 (VT/WH), harness side and the reversing lamp switch C169-B, circuit 359 (GY/RD), harness side.  <p>N0011231</p> <ul style="list-style-type: none"> Key in ON position. Do the reversing lamps illuminate? 	<p>Yes INSTALL a new reversing lamp switch. TEST the system for normal operation.</p> <p>No REMOVE the jumper wire. GO to T3.</p>
T3	<p>CHECK CIRCUITS 1789 (VT/WH) AND 359 (GY/RD) FOR AN OPEN</p> <ul style="list-style-type: none"> Key in OFF position. 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; and between the reversing lamp switch C169-B, circuit 359 (GY/RD), harness side and the PCM C175t-41, circuit 359 (GY/RD), harness side.  <p>N0011233</p> <ul style="list-style-type: none"> Is the resistance less than 5 ohms? 	<p>Yes GO to T7.</p> <p>No REPAIR the circuit in question. TEST the system for normal operation.</p>
T4	<p>CHECK CIRCUIT 1679 (WH/YE) FOR VOLTAGE</p> <ul style="list-style-type: none"> Key in OFF position. Disconnect: SJB C2280h. 	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST T: THE REVERSING LAMPS ARE INOPERATIVE (Continued)

	Test Step	Result / Action to Take
<p>T4</p>	<p>CHECK CIRCUIT 1679 (WH/YE) FOR VOLTAGE (Continued)</p> <ul style="list-style-type: none"> Measure the voltage between the SJB C2280h-29, circuit 1679 (WH/YE), harness side and ground.  <p>N0046932</p> <ul style="list-style-type: none"> Is the voltage greater than 10 volts? 	<p>Yes GO to T6.</p> <p>No VERIFY the BEC fuse 62 (20A) is OK. If OK, GO to T5.</p>
<p>T5</p>	<p>CHECK CIRCUIT 1679 (WH/YE) FOR AN OPEN</p> <ul style="list-style-type: none"> Key in OFF position. 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.  <p>N0046933</p> <ul style="list-style-type: none"> Is the resistance less than 5 ohms? 	<p>Yes INSTALL a new BEC. TEST the system for normal operation.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST T: THE REVERSING LAMPS ARE INOPERATIVE (Continued)

Test Step		Result / Action to Take
T6	CHECK FOR CORRECT SJB OPERATION	<p>Yes INSTALL a new SJB. REFER to Section 419-10. 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. CLEAR the DTCs. REPEAT the self-test.</p>
	<ul style="list-style-type: none"> • Disconnect all the SJB connectors. • Check for: <ul style="list-style-type: none"> — corrosion — 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? 	
T7	CHECK FOR CORRECT PCM OPERATION	<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>
	<ul style="list-style-type: none"> • Key in OFF position. • Disconnect all the PCM connectors. • Check for: <ul style="list-style-type: none"> — corrosion — 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? 	

Pinpoint Test U: An Individual Reversing Lamp Is Inoperative

Normal Operation

When the transmission is placed in REVERSE, the powertrain control module (PCM) sends a signal to the smart junction box (SJB) 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).

Possible Causes

- Circuit 1362 (DG/OG) open or short to ground
- Circuit 1367 (WH/YE) open or short to ground
- Circuit 1205 (BK) open
- SJB

PINPOINT TEST U: AN INDIVIDUAL REVERSING LAMP IS INOPERATIVE

Test Step		Result / Action to Take
U1	CHECK CIRCUIT 1205 (BK) FOR AN OPEN	<p>Yes GO to U2.</p> <p>No REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</p>
	<ul style="list-style-type: none"> • Key in OFF position. • 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 C461-1, circuit 1205 (BK), harness side and ground. <div style="text-align: center;"> </div> <p>N0011227</p> <ul style="list-style-type: none"> • Is the resistance less than 5 ohms? 	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST U: AN INDIVIDUAL REVERSING LAMP IS INOPERATIVE (Continued)

	Test Step	Result / Action to Take
<p>U2</p>	<p>CHECK CIRCUIT 1362 (DG/OG) OR CIRCUIT 1367 (WH/YE) FOR A SHORT TO GROUND</p>	
	<ul style="list-style-type: none"> • Disconnect: SJB C2280d. • Measure the resistance between the LH reversing lamp C451-2, circuit 1362 (DG/OG), harness side and ground; or between the RH reversing lamp C461-2, circuit 1367 (WH/YE), harness side and ground. <div data-bbox="381 525 714 766" style="text-align: center;"> <p>The diagram shows a circular reversing lamp with two terminals. A multimeter is connected to the top terminal and a ground symbol. The multimeter display shows the Greek letter Ω (ohms).</p> </div> <p>N0011229</p> <ul style="list-style-type: none"> • Is the resistance greater than 10,000 ohms? 	<p>Yes GO to U3.</p> <p>No REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.</p>
<p>U3</p>	<p>CHECK CIRCUIT 1362 (DG/OG) OR CIRCUIT 1367 (WH/YE) FOR AN OPEN</p>	
	<ul style="list-style-type: none"> • Measure the resistance between the LH reversing lamp C451-2, circuit 1362 (DG/OG), 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. <div data-bbox="316 1144 755 1848" style="text-align: center;"> <p>The diagram shows a Side Junction Block (SJB) with multiple terminals. A multimeter is connected between one terminal on the SJB and a terminal on a reversing lamp. The multimeter display shows the Greek letter Ω (ohms).</p> </div> <p>N0046934</p> <ul style="list-style-type: none"> • Is the resistance less than 5 ohms? 	<p>Yes GO to U4.</p> <p>No REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.</p>

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST U: AN INDIVIDUAL REVERSING LAMP IS INOPERATIVE (Continued)

Test Step		Result / Action to Take
U4	CHECK FOR CORRECT SJB OPERATION	<p>Yes INSTALL a new SJB. REFER to Section 419-10. 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. CLEAR the DTCs. REPEAT the self-test.</p>
	<ul style="list-style-type: none"> • Disconnect all the SJB connectors. • Check for: <ul style="list-style-type: none"> — corrosion — 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 V: The Reversing Lamps Are On Continuously

Normal Operation — Manual Transmission

The powertrain control module (PCM) sends a voltage reference signal to the reversing lamp switch through circuit 1789 (VT/WH). When the transmission is placed in REVERSE, the reversing lamp switch closes and routes the signal back to the PCM through circuit 359 (GY/RD). The PCM then sends a signal to the smart junction box (SJB) 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.

Normal Operation — Automatic Transmission

When the PCM detects the transmission is in REVERSE, a signal is sent to the SJB 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.

Possible Causes

- Circuit 1362 (DG/OG) short to voltage
- Circuit 1367 (WH/YE) short to voltage
- Circuit 1789 (VT/WH) short to ground
- Reversing lamp switch
- SJB
- PCM

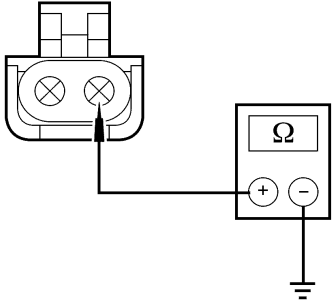
PINPOINT TEST V: THE REVERSING LAMPS ARE ON CONTINUOUSLY

Test Step		Result / Action to Take
V1	USE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCs) FROM THE SJB SELF-TEST	<p>Yes GO to V2.</p> <p>No If equipped with a manual transmission, GO to V3. If equipped with an automatic transmission, GO to V5.</p>
	<ul style="list-style-type: none"> • Key in OFF position. • Using the recorded results from the SJB self-test: • Was DTC B2525 or B2532 present? 	
V2	CHECK CIRCUITS 1362 (DG/OG) AND 1367 (WH/YE) FOR A SHORT TO VOLTAGE	<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>
	<ul style="list-style-type: none"> • Disconnect: SJB C2280d. • Key in ON position. • Do the reversing lamps continue to illuminate? 	
V3	CHECK THE REVERSING LAMPS SWITCH	<p>Yes GO to V4.</p> <p>No INSTALL a new reversing lamp switch. TEST the system for normal operation.</p>
	<ul style="list-style-type: none"> • Disconnect: Reversing Lamp Switch C169. • Key in ON position. • Do the reversing lamps continue to illuminate? 	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST V: THE REVERSING LAMPS ARE ON CONTINUOUSLY (Continued)

Test Step		Result / Action to Take
V4	<p>CHECK CIRCUIT 1789 (VT/WH) FOR A SHORT TO GROUND</p> <ul style="list-style-type: none"> • Key in OFF position. • Disconnect: PCM C175t. • Measure the resistance between the reversing lamp switch C169-A, circuit 1789 (VT/WH), harness side and ground.  <p>N0011234</p> <ul style="list-style-type: none"> • Is the resistance greater than 10,000 ohms? 	<p>Yes GO to V5.</p> <p>No REPAIR circuit 1789 (VT/WH). TEST the system for normal operation.</p>
V5	<p>CHECK THE PCM</p> <ul style="list-style-type: none"> • Disconnect: PCM C175t. • Key in ON position. • Do the reversing lamps continue to illuminate? 	<p>Yes GO to V6.</p> <p>No If equipped with a manual transmission, GO to V7. If equipped with an automatic transmission, REFER to Section 307-01 to continue diagnosis of the transmission inputs.</p>
V6	<p>CHECK FOR CORRECT SJB OPERATION</p> <ul style="list-style-type: none"> • Key in OFF position. • Disconnect all the SJB connectors. • Check for: <ul style="list-style-type: none"> — corrosion — 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? 	<p>Yes INSTALL a new SJB. REFER to Section 419-10. 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. CLEAR the DTCs. REPEAT the self-test.</p>
V7	<p>CHECK FOR CORRECT PCM OPERATION</p> <ul style="list-style-type: none"> • Key in OFF position. • Disconnect all the PCM connectors. • Check for: <ul style="list-style-type: none"> — corrosion — 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>