Parking Aid

Special Tool(s)

 ST3093-A	Fluke 77-IV Digital Multimeter FLU77-4 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 NUD105-R025D or equivalent

Principles of Operation

The parking aid sensors detect objects approximately 152 cm (60 in) from the rear of the vehicle, 50 cm (20 in) from the rear side of the vehicle, and 30 cm (12 in) above the ground. The Parking Aid Module (PAM) calculates the distance to an object within the 170 degree semicircular area around the rear of the vehicle.

A variable-rate warning tone is generated from a speaker attached to the PAM . The speaker increases its warning tone rate as the vehicle gets closer to an obstacle. When an object is detected within 30 cm (12 in) of the sensors, the warning tone becomes continuous. When the PAM sounds the parking aid tone, it sends a volume cutback enabled message over the High Speed Controller Area Network (HS-CAN) to the Instrument Panel Cluster (IPC) . The IPC sends a message over the Medium Speed Controller Area Network (MS-CAN) to the Audio Control Module (ACM) . When the ACM receives the message, it reduces the speaker output so the parking aid tone can be heard.

The parking aid system is enabled when the ignition switch is in the RUN position and the transmission in reverse. The parking aid system is disabled if a fault is detected in 1 of the 4 sensors, the parking aid speaker, or the PAM . This is indicated by a parking aid disabled warning message in the message center.

The parking aid system is enabled and disabled through the message center, located in the Instrument Panel Cluster (IPC) .

If a MyKey® restricted key is in the ignition cylinder, the parking aid menu is not available in the message center and cannot be deactivated.

The PAM communicates on the HS-CAN and can be diagnosed with a scan tool. The PAM communicates with the scan tool, the Body Control Module (BCM) , and the IPC .

Inspection and Verification

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

Visual Inspection Chart

Electrical
• Body Control Module (BCM) fuse 32 (10A) • Wiring, terminals or connectors • Parking aid sensors

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **NOTE:** *Make sure to use the latest scan tool software release.*

   If the cause is not visually evident, connect the scan tool to the Data Link Connector (DLC) .
5. **NOTE:** *The Vehicle Communication Module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM .*

   If the scan tool does not communicate with the vehicle:
   - Verify the ignition is ON.
   - The air bag warning indicator prove-out confirms ignition ON (other indicators may NOT prove ignition is ON) confirms ignition ON. If ignition does not turn ON, refer to Section 211-05 to diagnose no power in RUN.
   - Verify the scan tool operation with a known good vehicle.
   - Refer to Section 418-00, Inspection and Verification to establish a scan tool session.
6. **NOTE:** *The ignition must be OFF to carry out the Remote Function Actuator (RFA) module self-test.*

   Carry out the self-test diagnostics for the RFA module and Parking Aid Module (PAM) .
7. If the DTCs retrieved are related to the concern, go to DTC Charts. For all other DTCs, refer to the Diagnostic Trouble Code (DTC) Chart in Section 419-10.
8. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

PAM PID Chart

PID	Description
LRI_DIST	Left rear inner parking aid sensor distance
LRO_DIST	Left rear outer parking aid sensor distance
RRI_DIST	Right rear inner parking aid sensor distance
RRO_DIST	Right rear outer parking aid sensor distance
TRANSGR	Transmission gear position

DTC Charts

NOTE: *Refer to Description and Operation, Intelligent Access (IA) with Push Button Start in Section 419-01B to review the procedures for achieving the various ignition states (ignition in accessory, on, start, off) on vehicles with this feature.*

Parking Aid Module (PAM) DTC Chart

DTC	Description	Action
B1B44:12	Right Rear Outer Sensor: Circuit Short To Battery	GO to Pinpoint Test C.
B1B44:14	Right Rear Outer Sensor: Circuit Short To Ground Or Open	GO to Pinpoint Test B.
B1B44:96	Right Rear Outer Sensor: Component Internal Failure	GO to Pinpoint Test D.
B1B46:12	Right Rear Inner Sensor: Circuit Short To Battery	GO to Pinpoint Test C.
B1B46:14	Right Rear Inner Sensor: Circuit Short To Ground Or Open	GO to Pinpoint Test B.
B1B46:96	Right Rear Inner Sensor: Component Internal Failure	GO to Pinpoint Test D.
B1B48:12	Left Rear Outer Sensor: Circuit Short To Battery	GO to Pinpoint Test C.
B1B48:14	Left Rear Outer Sensor: Circuit Short To Ground Or Open	GO to Pinpoint Test B.
B1B48:96	Left Rear Outer Sensor: Component Internal Failure	GO to Pinpoint Test D.
B1B50:12	Left Rear Inner Sensor: Circuit Short To Battery	GO to Pinpoint Test C.
B1B50:14	Left Rear Inner Sensor: Circuit Short To Ground Or Open	GO to Pinpoint Test B.
B1B50:96	Left Rear Inner Sensor: Component Internal Failure	GO to Pinpoint Test D.
B1B52:12	Rear Sounder-Park Aid: Circuit Short To Battery	GO to Pinpoint Test F.
B1B52:14	Rear Sounder-Park Aid: Circuit Short To Ground Or Open	GO to Pinpoint Test F.
B1B58:11	Rear Sensors Power Circuit: Circuit Short To Ground	GO to Pinpoint Test E.
P1603:55	EEPROM Malfunction: Not Configured	PROGRAM the Parking Aid Module (PAM) . REFER to Programmable Module Installation (PMI) in Section 418-01.
U2024:41	Control Module Cal-Config Data: General Checksum Failure	CLEAR the DTCs. REPEAT the PAM self-test. If DTC U2024:41 is retrieved again, INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. CLEAR all DTCs. REPEAT the self-test.

Symptom Chart

Symptom Chart

Condition	Possible Causes	Action
• No communication with the Parking Aid Module (PAM)	• Fuse • Wiring, terminals or connectors • PAM	• REFER to Section 418-00.
• The parking aid is inoperative	• Wiring, terminals or connectors • Parking aid sensor alignment	• GO to Pinpoint Test A.

	• PAM • Rear bumper cover	
• Continuous or intermittent tone when no obstacles or fault codes are present (certain obstacles may not be detected or recognized due to their shape, size or material)	• Dirty or iced over parking aid sensor(s)	• CLEAN the rear bumper and sensors with high-pressure water.
	• Parking aid sensor bezel(s) or parking aid sensor(s) locked into the rear bumper incorrectly • Improperly mounted sensor and/or grommet • Parking aid sensors are not aligned correctly	• REMOVE and correctly INSTALL the parking aid sensor(s) and or bezel(s) as necessary. REFER to Parking Aid Sensor in this section.
	• Parking aid sensors are not aligned correctly	• CARRY OUT the azimuth system check. REFER to Azimuth System Check in this section.
• The audio volume does not reduce when the parking aid tone sounds	• Communication network concern • PAM • Instrument Panel Cluster (IPC) • Audio Control Module (ACM)	• RETRIEVE and REPAIR all related IPC and ACM DTCs. For IPC DTCs, REFER to Section 413-01. For ACM DTCs, REFER to Section 415-00.
• The parking aid menu is not available in the message center and cannot be deactivated	• A MyKey® restricted key is in use	• The parking aid disable feature is not available when a MyKey® restricted key is in use. This is normal operation.

Pinpoint Tests

Pinpoint Test A: The Parking Aid Is Inoperative

Normal Operation

The parking aid system is enabled when the ignition switch is in the RUN position and the reverse gear is selected. The Parking Aid Module (PAM) receives reverse gear input from the PCM through the High Speed Controller Area Network (HS-CAN) . A reference voltage and signal return is supplied to the parking aid sensors from the PAM . The PAM receives an input signal from each individual parking aid sensor. The system can be disabled through the message center in the Instrument Panel Cluster (IPC) .

NOTE: *If a MyKey® restricted key is in the ignition cylinder, the parking aid menu is not available in the message center and cannot be deactivated.*

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking aid sensors alignment
- PAM
- Rear bumper cover

PINPOINT TEST A : THE PARKING AID IS INOPERATIVE

A1 CHECK THE DTCS FROM THE PAM SELF-TEST

- Check the PAM DTCs from the self-test.

Are any PAM DTCs recorded?

Yes	REFER to DTC Charts in this section.
No	GO to A2.

A2 CHECK THE MESSAGE CENTER FOR CORRECT OPERATION

- While observing the message center, disable and enable the parking aid system.

Does the message center display PARK AID OFF when the parking aid system is disabled, and display PARK AID ON when the parking aid system is enabled?

Yes	GO to A3.
No	REFER to Section 413-01.

A3 CHECK FOR CORRECT REVERSE GEAR INPUT

- Apply the parking brake.
- Ignition ON.
- Select REVERSE.
- Enter the following diagnostic mode on the scan tool: PAM DataLogger.
- Monitor the PAM transmission range PID (TRANSGR).

Does the PID indicate YES (transmission in reverse)?

Yes	GO to A4.
No	REFER to Section 307-01.

A4 CHECK FOR CORRECT PAM OPERATION

- Ignition OFF.
- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins
- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. TEST the system for normal operation.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test B: DTC B1B44:14, B1B46:14, B1B48:14 Or B1B50:14

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation

The Parking Aid Module (PAM) supplies a reference voltage and signal return to the parking aid sensors. A fault condition occurs when the PAM detects an open in the parking aid sensor circuits or the parking aid sensor input signal is open or shorted to ground.

DTC Description	Fault Trigger Conditions
• B1B44:14 — Right Rear Outer Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the right rear outer parking aid sensor circuits are open or the sensor signal line is shorted to ground.
• B1B46:14 — Right Rear Inner Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the right rear inner parking aid sensor circuits are open or the sensor signal line is shorted to ground.
• B1B48:14 — Left Rear Outer Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the left rear outer parking aid sensor circuits are open or the sensor signal line is shorted to ground.
• B1B50:14 — Left Rear Inner Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the left rear inner parking aid sensor circuits are open or the sensor signal line is shorted to ground.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking aid sensor(s)
- Parking aid sensor harness
- PAM

PINPOINT TEST B : DTC B1B44:14, B1B46:14, B1B48:14 OR B1B50:14

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

B1 RETRIEVE THE DTCS FROM THE PAM SELF-TEST

- Check the PAM DTCs from the self-test.

Are multiple DTCs recorded?

Yes	GO to B2.
No	For DTC B1B44:14, B1B46:14, B1B48:14 or B1B50:14, GO to B3. For all other DTCs, REFER to DTC Charts in this section.

B2 CHECK THE BUMPER WIRING HARNESS

- Inspect the bumper wiring harness for opens, shorts, grounds, or corrosion.

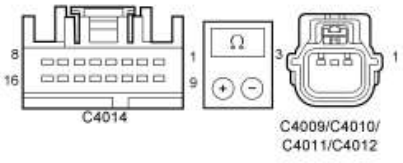
Is the bumper wiring harness OK?

Yes	GO to B3.
No	REPAIR or INSTALL a new bumper wiring harness. CLEAR the DTCs. TEST the system for normal operation.

B3 CHECK THE SENSOR CIRCUITRY FOR OPENS

- Ignition OFF.
- Disconnect: Suspect Parking Aid Sensor C4009, C4010, C4011 or C4012 .
- Disconnect: PAM C4014 .
- Measure the resistance between the PAM C4014, harness side and the suspect parking aid sensor, harness side as follows:

DTC	Rear Sensor	PAM Connector- Pin	Sensor Connector- Pin	Circuit
B1B44:14	RH outer	C4014 Pin 9	C4011 Pin 1	LMP07 (BU/WH)
		C4014 Pin 16	C4011 Pin 2	VMP17 (YE/OG)
		C4014 Pin 12	C4011 Pin 3	RMP07 (GN/WH)
B1B46:14	RH inner	C4014 Pin 9	C4012 Pin 1	LMP07 (BU/WH)
		C4014 Pin 13	C4012 Pin 2	VMP16 (YE/GY)
		C4014 Pin 12	C4012 Pin 3	RMP07 (GN/WH)
B1B48:14	LH outer	C4014 Pin 9	C4009 Pin 1	LMP07 (BU/WH)
		C4014 Pin 15	C4009 Pin 2	VMP15 (YE/GN)
		C4014 Pin 12	C4009 Pin 3	RMP07 (GN/WH)
B1B50:14	LH inner	C4014 Pin 9	C4010 Pin 1	LMP07 (BU/WH)
		C4014 Pin 14	C4010 Pin 2	VMP14 (WH/OG)
		C4014 Pin 12	C4010 Pin 3	RMP07 (GN/WH)



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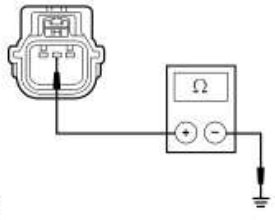
Are the resistances less than 5 ohms?

Yes	GO to B4.
No	REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.

B4 CHECK THE SENSOR CIRCUITRY FOR SHORTS TO GROUND

- Measure the resistance between the suspect parking aid sensor, harness side and ground as follows:

DTC	Rear Sensor	Connector-Pin	Circuit
B1B44:14	RH outer	C4011 Pin 2	VMP17 (YE/OG)
B1B46:14	RH inner	C4012 Pin 2	VMP16 (YE/GY)
B1B48:14	LH outer	C4009 Pin 2	VMP15 (YE/GN)
B1B50:14	LH inner	C4010 Pin 2	VMP14 (WH/OG)



Is the resistance greater than 10,000 ohms?

Yes	If all of the parking aid sensors recorded DTCs, GO to B5. If one or more (but not all) parking aid sensor(s) recorded DTCs, INSTALL a new sensor(s) for the one(s) in question. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.
No	REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.

B5 CHECK FOR CORRECT PAM OPERATION

- Connect: All Disconnected Connectors.
- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins
- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. TEST the system for normal operation.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test C: DTCs B1B44:12, B1B46:12, B1B48:12 and B1B50:12

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation

The Parking Aid Module (PAM) supplies a reference voltage and signal return to the parking aid sensors. A fault condition occurs when the PAM detects a short to voltage on the parking aid sensor signal circuit.

DTC Description	Fault Trigger Conditions
• B1B44:12 — Right Rear Outer Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the right rear outer parking aid sensor signal line is shorted to battery voltage.
• B1B46:12 — Right Rear Inner Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the right rear inner parking aid sensor signal line is shorted to battery voltage.
• B1B48:12 — Left Rear Outer Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the left rear outer parking aid sensor signal line is shorted to battery voltage.
• B1B50:12 — Left Rear Inner Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the left rear inner parking aid sensor signal line is shorted to battery voltage.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking aid sensor(s)
- Parking aid bumper harness

- PAM

PINPOINT TEST C : DTCS B1B44:12, B1B46:12, B1B48:12 AND B1B50:12

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

C1 RETRIEVE THE DTCS FROM THE PAM SELF-TEST

- Check the PAM DTCs from the self-test.

Are multiple DTCs recorded?

Yes	GO to C2.
No	For DTCs B1B44:12, B1B46:12, B1B48:12 and B1B50:12, GO to C3. For all other DTCs, REFER to DTC Charts in this section.

C2 CHECK THE BUMPER WIRING HARNESS

- Inspect the bumper wiring harness for opens, shorts, grounds, or corrosion.

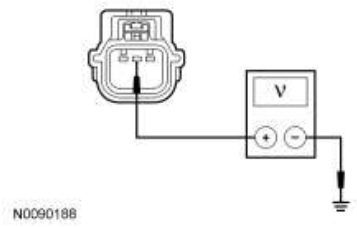
Is the bumper wiring harness OK?

Yes	GO to C3.
No	REPAIR or INSTALL a new bumper wiring harness. CLEAR the DTCs. REPEAT the self-test.

C3 CHECK THE SENSOR CIRCUITRY FOR SHORTS TO VOLTAGE

- Ignition OFF.
- Disconnect: Suspect Parking Aid Sensor C4009, C4010, C4011 or C4012 .
- Disconnect: PAM C4014 .
- Ignition ON.
- Measure the voltage between the suspect parking aid sensor, harness side and ground as follows:

DTC	Rear Sensor	Connector- Pin	Circuit
B1B44:12	RH outer	C4011 Pin 2	VMP17 (YE/OG)
B1B46:12	RH inner	C4012 Pin 2	VMP16 (YE/GY)
B1B48:12	LH outer	C4009 Pin 2	VMP15 (YE/GN)
B1B50:12	LH inner	C4010 Pin 2	VMP14 (WH/OG)



Is any voltage present?

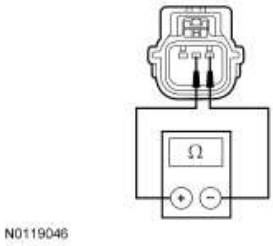
Yes	REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.
No	GO to C4.

C4 CHECK THE PARKING AID SENSOR CIRCUITRY FOR A SHORT TOGETHER

- Measure the resistance between the suspect parking aid sensor pins, harness side as follows:

DTC	Parking Aid Sensor	Connector- Pin/Circuit	Connector- Pin/Circuit
B1B44:12	RH outer	C4011 Pin 2 VMP17 (YE/OG)	C4011 Pin 1 LMP07 (BU/WH)
B1B46:12	RH inner	C4012 Pin 2 VMP16 (YE/GY)	C4012 Pin 1 LMP07 (BU/WH)
B1B48:12	LH outer	C4009 Pin 2 VMP15 (YE/GN)	C4009 Pin 1 LMP07 (BU/WH)

DTC	Parking Aid Sensor	Connector- Pin/Circuit	Connector- Pin/Circuit
B1B50:12	LH inner	C4010 Pin 2 VMP14 (WH/OG)	C4010 Pin 1 LMP07 (BU/WH)



Is the resistance greater than 10,000 ohms?

Yes	If all sensor DTCs are set, GO to C5. If one or more parking aid sensor(s) recorded DTCs, INSTALL a new sensor(s) for the one in question. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.
No	REPAIR the circuits in question. CLEAR the DTCs. TEST the system for normal operation.

C5 CHECK FOR CORRECT PAM OPERATION

- Connect: All Disconnected Connectors.
- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins
- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. TEST the system for normal operation.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test D: DTCs B1B44:96, B1B46:96, B1B48:96 and B1B50:96

Normal Operation

The Parking Aid Module (PAM) calculates the distance to an object using 4 ultrasonic sensors mounted in the rear bumper. The parking aid sensors can detect obstructions in the path behind the vehicle.

The attenuation time for the rear parking aid sensors is the time required for a sensor to detect the distance to an object expressed in milliseconds (ms). A fault condition occurs when the signal or the attenuation time is out of normal range.

DTC Description	Fault Trigger Conditions
• B1B44:96 — Right Rear Outer Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the right rear outer parking aid sensor has internally failed or has an incorrect attenuation time.
• B1B46:96 — Right Rear Inner Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the right rear inner parking aid sensor has internally failed or has an incorrect attenuation time.
• B1B48:96 — Left Rear Outer Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the left rear outer parking aid sensor has internally failed or has an incorrect attenuation time.
• B1B50:96 — Left Rear Inner Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the left rear inner parking aid sensor has internally failed or has an incorrect attenuation time.

This pinpoint test is intended to diagnose the following:

- Dirty or obstructed parking aid sensor
- Parking aid sensor
- PAM

PINPOINT TEST D : DTCS B1B44:96, B1B46:96, B1B48:96 AND B1B50:96

D1 CHECK THE DTCS FROM THE PAM SELF-TEST

- Check the PAM DTCs from the self-test.

Are parking aid DTCs other than B1B44:96, B1B46:96, B1B48:96 and B1B50:96 recorded?

Yes	DIAGNOSE the other DTCs first. REFER to DTC Charts in this section.
No	GO to D2.

D2 CHECK THE PARKING AID SENSOR OPERATION

NOTE: *Make sure the area around the vehicle is clear of anything that can activate the parking aid system.*

- Clean the rear bumper and sensors with high-pressure water.
- Carry out the azimuth system check. Refer to Azimuth System Check in this section.
- Carry out the elevation system check. Refer to Elevation System Check in this section.

Does the parking aid system pass both system checks?

Yes	The system is operating correctly at this time. The concern may have been caused by a dirty or blocked parking aid sensor. CLEAR the DTCs. TEST the system for normal operation.
No	GO to D3.

D3 CHECK THE PARKING AID SENSOR DISTANCE PIDS

- Make sure the suspect parking aid sensor(s) is flush-mounted in the bezel.
- Ignition ON.
- Enter the following diagnostic mode on the scan tool: PAM DataLogger.
- With the brake pedal applied, shift the transmission into reverse and monitor the parking aid sensor distance PID (LRI_DIST, LRO_DIST, RRI_DIST, RRO_DIST). The PID reads 255 cm (100 in or 8.4 ft) on a correctly functioning sensor.

Does the PID read 255 cm (100 in or 8.4 ft)?

Yes	GO to D5.
No	GO to D4.

D4 CHECK THE PARKING AID SENSORS

- Install a new sensor for the suspect parking aid sensor.
- Ignition ON.
- Clear the DTCs. Repeat the self-test. Operate the system and verify the concern is still present.

Is the concern still present?

Yes	GO to D5.
No	The cause of the concern was an inoperative parking aid sensor. The system is now operating correctly.

D5 CHECK FOR CORRECT PAM OPERATION

- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins
- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. TEST the system for normal operation.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test E: DTC B1B58:11

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation

The Parking Aid Module (PAM) supplies a reference voltage and signal return to the parking aid sensors. A fault condition occurs when the PAM detects a short to ground or signal return circuit on the parking aid sensor voltage supply circuit.

- DTC B1B58:11 (Rear Sensors Power Circuit: Circuit Short to Ground) — sets when the sensor voltage supply circuit is shorted to ground or to the signal return circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Parking aid sensor(s)
- Parking aid bumper harness
- PAM

PINPOINT TEST E : DTC B1B58:11

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

E1 CHECK THE BUMPER WIRING HARNESS

- Inspect the bumper wiring harness for opens, shorts, grounds, or corrosion.

Is the bumper wiring harness OK?

Yes	GO to E2.
No	REPAIR or INSTALL a new bumper wiring harness. CLEAR the DTCs. TEST the system for normal operation.

E2 CHECK THE LH OUTER PARKING AID SENSOR FOR AN INTERNAL SHORT

- Ignition OFF.
- Disconnect: Parking Aid Sensor C4009 .
- Ignition ON.
- **NOTE:** *It is normal for the sensor open signal DTC B1B48:14 to set when carrying out this step. It can be ignored.*

  Clear the DTCs. Repeat the on-demand self-test.

Is DTC B1B58:11 still present?

Yes	GO to E3.
No	INSTALL a new LH outer parking aid sensor. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.

E3 CHECK THE RH OUTER PARKING AID SENSOR FOR AN INTERNAL SHORT

- Ignition OFF.
- Disconnect: Parking Aid Sensor C4011 .
- Ignition ON.
- **NOTE:** *It is normal for the sensor open signal DTC B1B44:14 to set when carrying out this step. It can be ignored.*

  Clear the DTCs. Repeat the on-demand self-test.

Is DTC B1B58:11 still present?

Yes	GO to E4.
No	INSTALL a new RH outer parking aid sensor. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.

E4 CHECK THE LH INNER PARKING AID SENSOR FOR AN INTERNAL SHORT

- Ignition OFF.
- Disconnect: Parking Aid Sensor C4010 .
- Ignition ON.
- **NOTE:** *It is normal for the sensor open signal DTC B1B50:14 to set when carrying out this step. It can be ignored.*

  Clear the DTCs. Repeat the on-demand self-test.

Is DTC B1B58:11 still present?

Yes	GO to E5.
No	INSTALL a new LH inner parking aid sensor. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.

E5 CHECK THE RH INNER PARKING AID SENSOR FOR AN INTERNAL SHORT

- Ignition OFF.
- Disconnect: Parking Aid Sensor C4012 .
- Ignition ON.
- **NOTE:** *It is normal for the sensor open signal DTC B1B46:14 to set when carrying out this step. It can be ignored.*

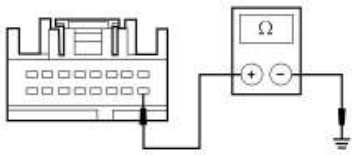
  Clear the DTCs. Repeat the on-demand self-test.

Is DTC B1B58:11 still present?

Yes	GO to E6.
No	INSTALL a new RH inner parking aid sensor. REFER to Parking Aid Sensor in this section. CLEAR the DTCs. TEST the system for normal operation.

E6 CHECK THE PARKING AID SENSOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect: PAM C4014 .
- Measure the resistance between the PAM C4014 Pin 9, circuit LMP07 (BU/WH), harness side and ground.



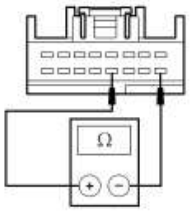
N0057381

Is the resistance greater than 10,000 ohms?

Yes	GO to E7.
No	REPAIR the circuit. CLEAR the DTCs. TEST the system for normal operation.

E7 CHECK THE PARKING AID SENSOR VOLTAGE SUPPLY CIRCUIT AND GROUND CIRCUIT FOR A SHORT TOGETHER

- Measure the resistance between the PAM C4014 Pin 9, circuit LMP07 (BU/WH), harness side and the PAM C4014 Pin 12, circuit RMP07 (GN/WH).



N0058809

Is the resistance greater than 10,000 ohms?

Yes	GO to E8.
No	REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.

E8 CHECK FOR CORRECT PAM OPERATION

- Connect: All Disconnected Connectors.
- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins

- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. TEST the system for normal operation.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

Pinpoint Test F: DTCs B1B52:12 and B1B52:14

Refer to Wiring Diagrams Cell 131 , Parking Aid for schematic and connector information.

Normal Operation

When the parking aid sensors detect obstructions in the path behind the vehicle, a variable rate warning tone is generated from the parking aid speaker. The parking aid speaker increases the warning tone rate as the vehicle gets closer to an obstacle. A fault condition occurs when the Parking Aid Module (PAM) detects an open, short to ground or short to voltage on the parking aid speaker circuits.

- DTC B1B52:12 (Rear Sounder-Park Aid: Circuit Short To Battery) — sets when the sounder circuit is shorted to voltage.
- DTC B1B52:14 (Rear Sounder-Park Aid: Circuit Short To Ground Or Open) — sets when the sounder circuit is open or shorted to ground.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- PAM
- Parking aid speaker

PINPOINT TEST F : DTCS B1B52:12 AND B1B52:14

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

F1 CHECK THE RECORDED DTCS FROM THE PAM SELF-TEST

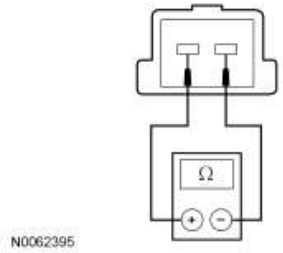
- Ignition ON.
- Check the recorded PAM DTCs from the self-test.

Are parking aid DTCs other than B1B52:12 or B1B52:14 present?

Yes	DIAGNOSE other DTCs first. REFER to DTC Charts in this section.
No	GO to F2.

F2 MEASURE THE PARKING AID SPEAKER RESISTANCE

- Disconnect: Parking Aid Speaker C2024 .
- Measure the resistance between the parking aid speaker pin 2, component side and the parking aid speaker pin 1, component side.

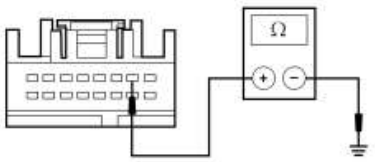


Is the resistance between 40 and 60 ohms?

Yes	For DTC B1B52:14, GO to F3. For DTC B1B52:12, GO to F7.
No	INSTALL a new parking aid speaker. REFER to Parking Aid Speaker in this section. CLEAR the DTCs. TEST the system for normal operation.

F3 CHECK THE PARKING AID SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

- Connect: Parking Aid Speaker C2024 .
- Disconnect: PAM C4014 .
- Measure the resistance between the PAM C4014 Pin 2, circuit VMP03 (VT/GN), harness side and ground.



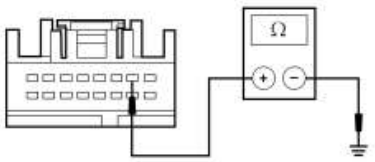
A0087706

Is the resistance greater than 10,000 ohms?

Yes	GO to F5.
No	GO to F4.

F4 CHECK THE PARKING AID SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND WITH THE PARKING AID SPEAKER DISCONNECTED

- Disconnect: Parking Aid Speaker C2024 .
- Measure the resistance between the PAM C4014 Pin 2, circuit VMP03 (VT/GN), harness side and ground.



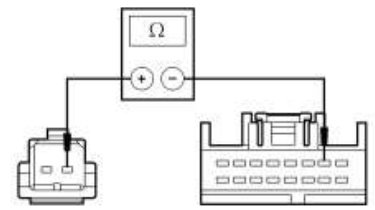
A0087706

Is the resistance greater than 10,000 ohms?

Yes	REPAIR circuit RMP09 (BU/GN). CLEAR the DTCs. TEST the system for normal operation.
No	REPAIR circuit VMP03 (VT/GN). CLEAR the DTCs. TEST the system for normal operation.

F5 CHECK THE PARKING AID SPEAKER (+) CIRCUIT FOR AN OPEN

- Disconnect: Parking Aid Speaker C2024 .
- Measure the resistance between the parking aid speaker C2024 Pin 2, circuit VMP03 (VT/GN), harness side and the PAM C4014 Pin 2, circuit VMP03 (VT/GN), harness side.



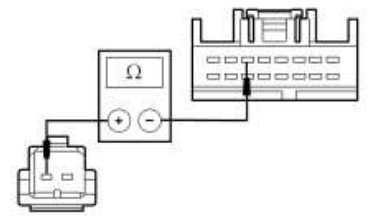
A0087707

Is the resistance less than 5 ohms?

Yes	GO to F6.
No	REPAIR the circuit. CLEAR the DTCs. TEST the system for normal operation.

F6 CHECK THE PARKING AID SPEAKER (-) CIRCUIT FOR AN OPEN

- Measure the resistance between the parking aid speaker C2024 Pin 1, circuit RMP09 (BU/GN), harness side and the PAM C4014 Pin 6, circuit RMP09 (BU/GN), harness side.



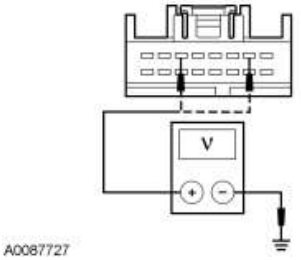
A0087708

Is the resistance less than 5 ohms?

Yes	GO to F8.
No	REPAIR the circuit. CLEAR the DTCs. TEST the system for normal operation.

F7 CHECK THE PARKING AID SPEAKER CIRCUITRY FOR SHORTS TO VOLTAGE

- Ignition ON.
- Measure the voltage between the PAM C4014 Pin 2, circuit VMP03 (VT/GN), harness side and ground; and between the PAM C4014 Pin 6, circuit RMP09 (BU/GN), harness side and ground.



Is any voltage present?

Yes	REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.
No	GO to F8.

F8 CHECK FOR CORRECT PAM OPERATION

- Connect: All Disconnected Connectors.
- Disconnect the PAM connector.
- Check for:
  - corrosion
  - damaged pins
  - pushed-out pins
- Connect the PAM connector and make sure it seats correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new PAM . REFER to Parking Aid Module (PAM) in this section. CLEAR the DTCs. 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.