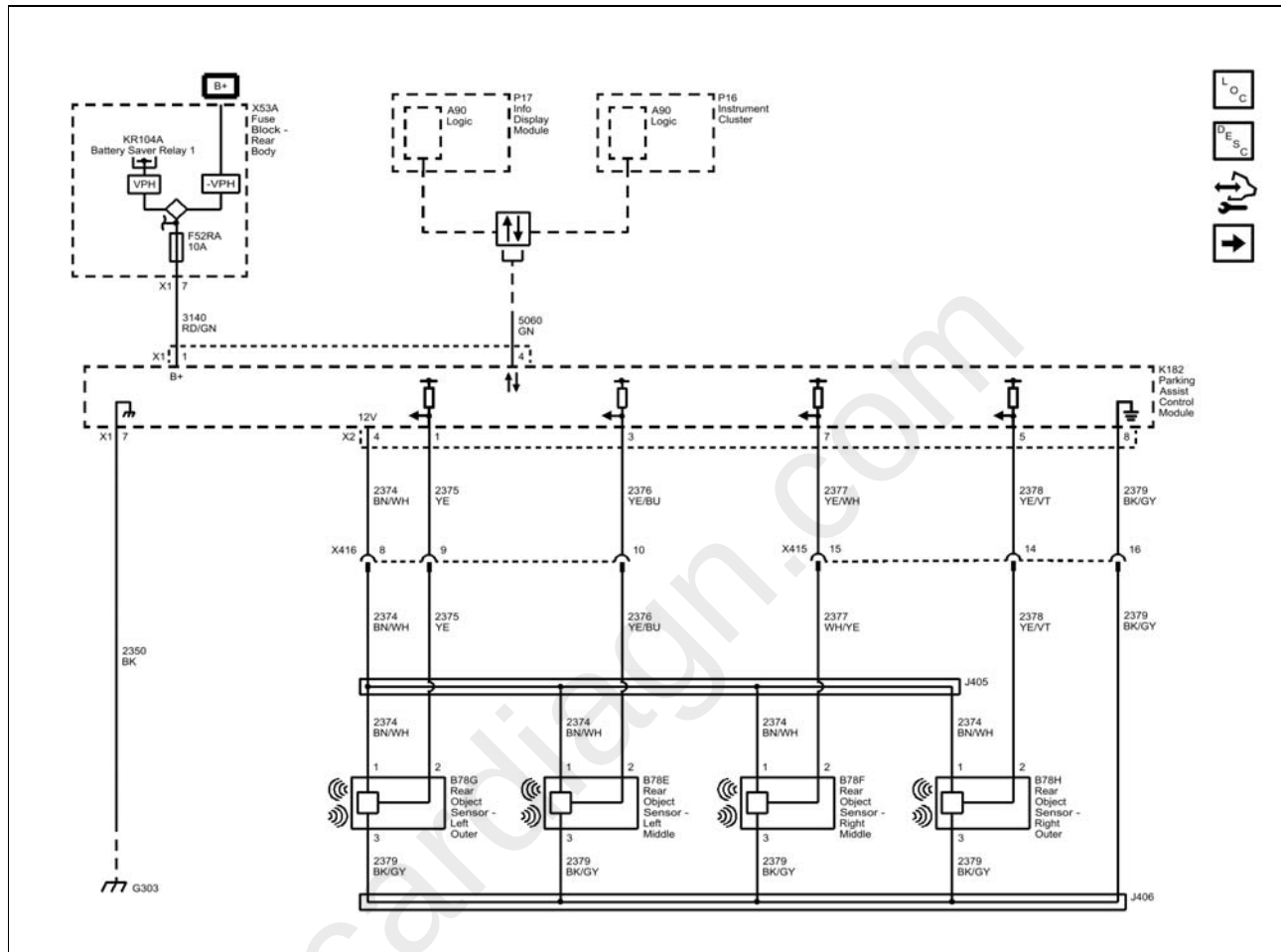


Service Manual: OBJECT DETECTION AND PEDESTRIAN
PROTECTION SYSTEM

**SCHEMATIC WIRING DIAGRAMS > OBJECT DETECTION WIRING SCHEMATICS >
PARK ASSIST - POWER, GROUND, SERIAL DATA AND REAR SENSORS**

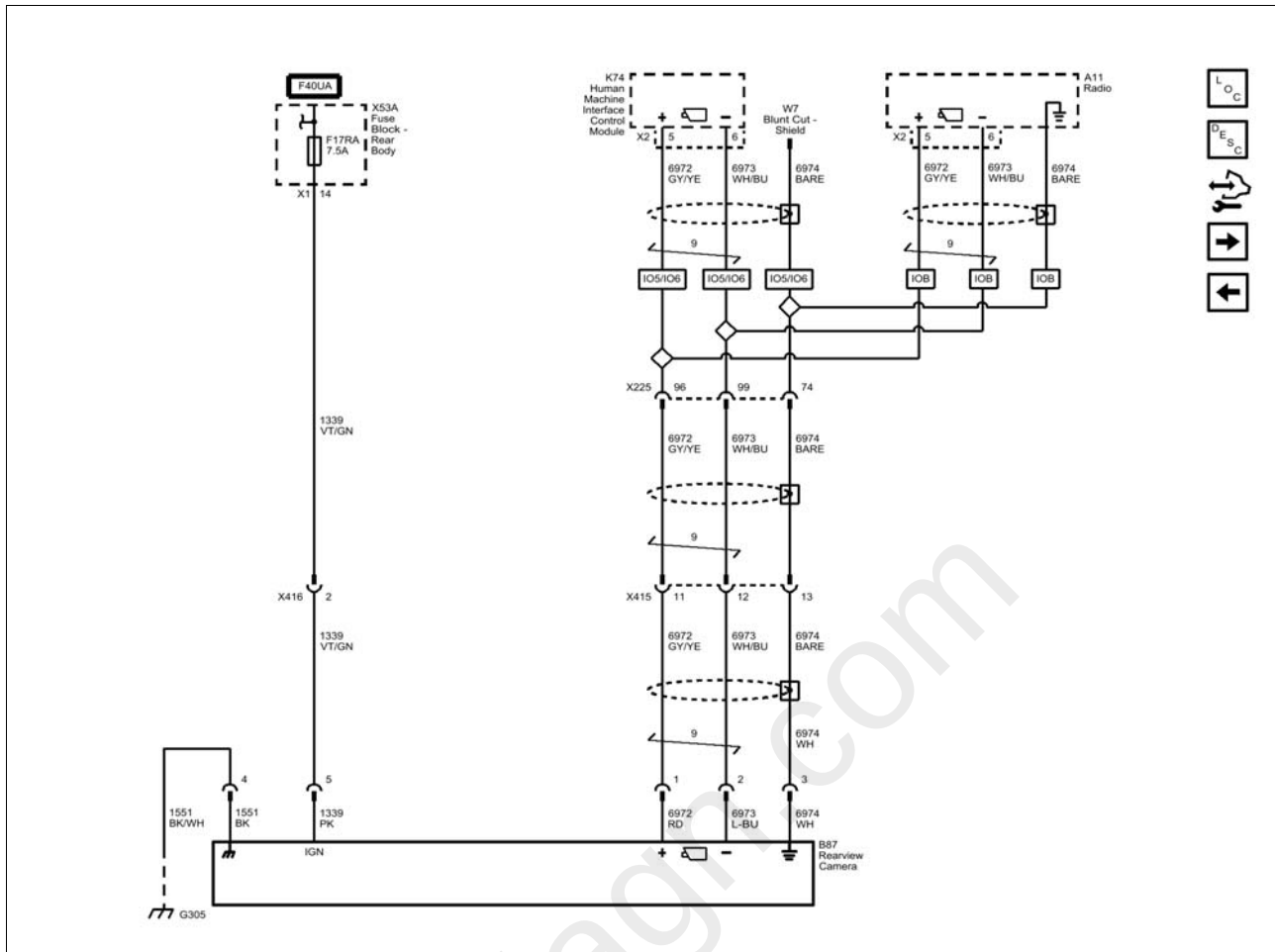
Fig 1: Park Assist - Power, Ground, Serial Data and Rear Sensors



Courtesy of GENERAL MOTORS COMPANY

**SCHEMATIC WIRING DIAGRAMS > OBJECT DETECTION WIRING SCHEMATICS >
REARVIEW CAMERA (UVC)**

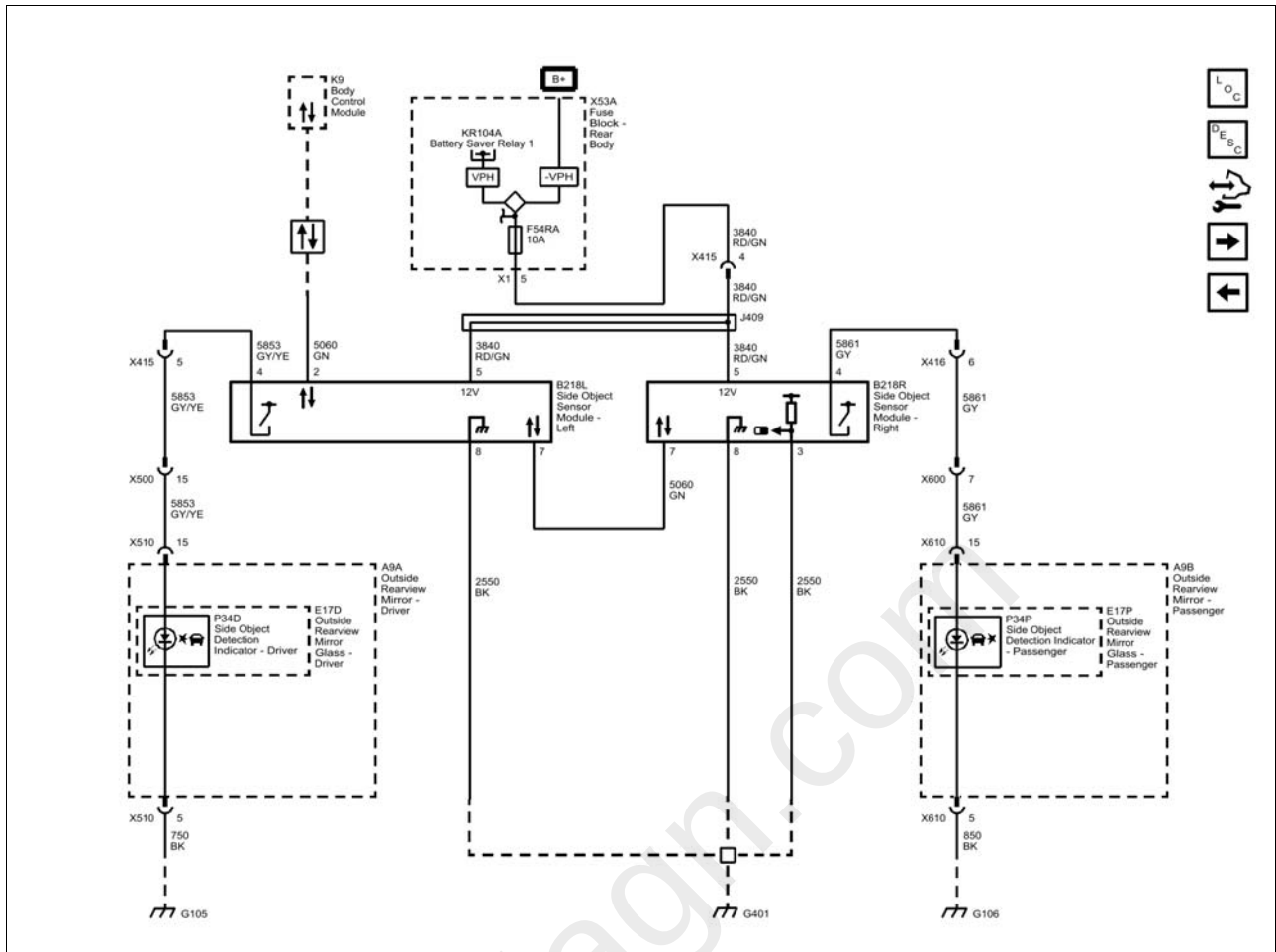
Fig 1: Rearview Camera (UVC)



Courtesy of GENERAL MOTORS COMPANY

SCHEMATIC WIRING DIAGRAMS > OBJECT DETECTION WIRING SCHEMATICS > SIDE OBJECT DETECTION (UKC)

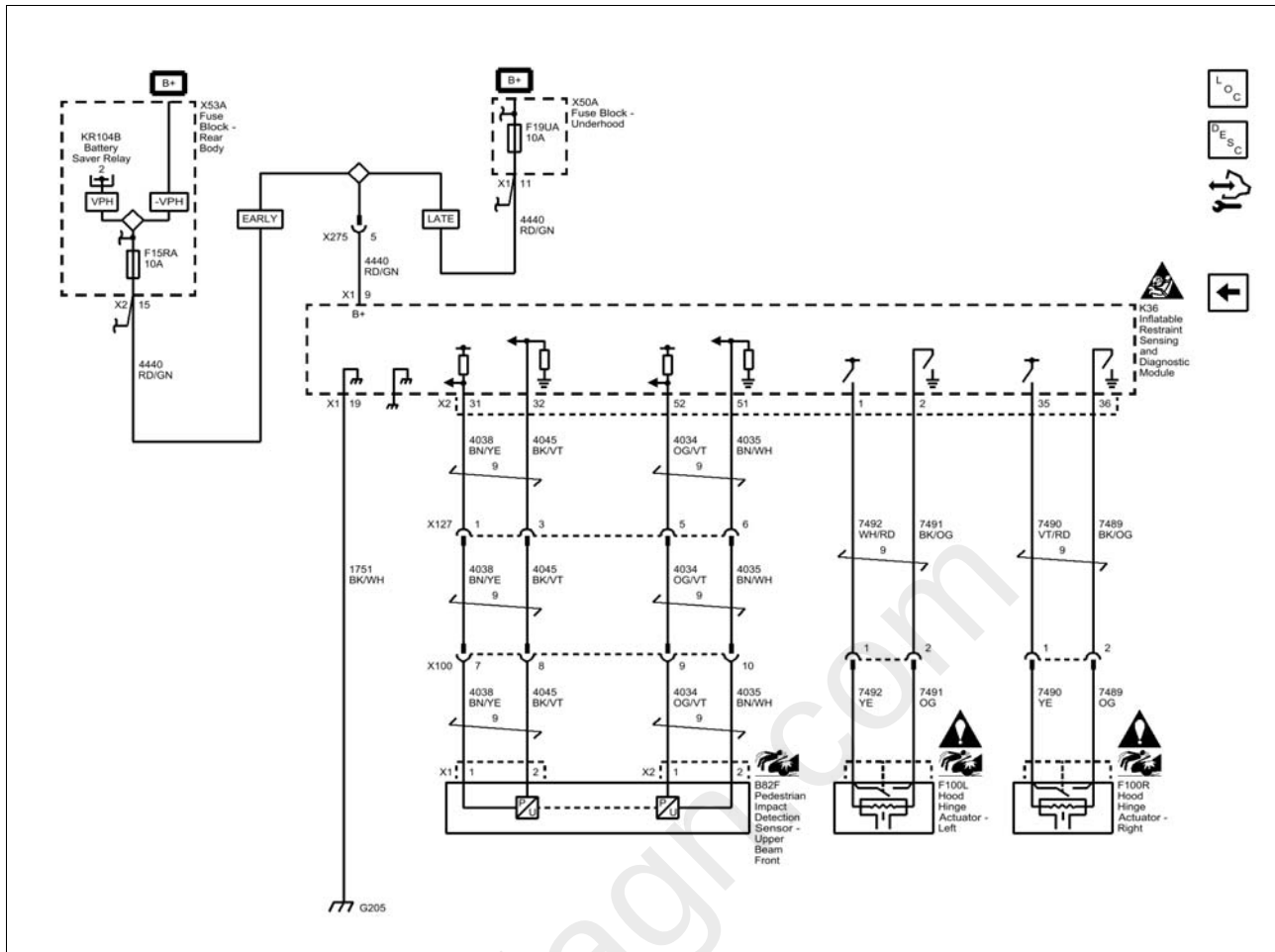
Fig 1: Side Object Detection (UKC)



Courtesy of GENERAL MOTORS COMPANY

SCHEMATIC WIRING DIAGRAMS > OBJECT DETECTION WIRING SCHEMATICS > PEDESTRIAN IMPACT DETECTION SYSTEM (B3T)

Fig 1: Pedestrian Impact Detection System (B3T)



Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > DTC DESCRIPTOR

B0099 00

Deployment Commanded Circuit

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The pedestrian impact detection system senses and discriminates vehicle impacts and deploys the pedestrian hood hinge actuators in a timely manner to help reduce pedestrian head injuries. The Pedestrian Impact Detection Sensors provides force information to the pedestrian impact detection module. The pedestrian impact detection module uses force information from the sensor to determine those events when the deployment of the hood hinge actuator is expected. The pedestrian hood actuators deploy only when a valid signal whose energy is capable of triggering deployment of the hood is present. During a frontal pedestrian impact of sufficient force, the pedestrian impact detection module will allow current to flow through the deployment loop in order to deploy the hood hinge actuator. The pedestrian impact detection module provides a minimum of 1.2 amps and a maximum of 1.95 amps of current for a minimum of 2 ms when an actuator deployment is commanded. The pedestrian impact detection module performs continuous diagnostic tests on the deployment loops to check for proper circuit continuity. The pedestrian impact detection module sets this DTC in the current ignition cycle when a hood hinge actuator deployment has been commanded. After a deployment, the hood hinge actuators and the pedestrian impact detection module need to be replaced.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition voltage is between 9-16 volts.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > CONDITIONS FOR SETTING THE DTC

- The pedestrian impact detection module detects a frontal impact to warrant deployment of the hood hinge actuators.
- The pedestrian impact detection module provides a minimum of 1.2 amps and a maximum of 1.95 amps of current for a minimum of 2 ms to command deployment of the hood hinge actuators

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

- The pedestrian impact detection module commands the DIC to display Reset Hood See Owners Manual for the following two ignition cycles.
- The pedestrian impact detection module commands the DIC to display Service Pedestrian Protection System at the third ignition cycle after the hood hinge actuators have been deployed until service is performed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT

COMMANDED CIRCUIT > CONDITIONS FOR CLEARING THE DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > REFERENCE INFORMATION

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- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > CIRCUIT/SYSTEM TESTING

Ignition ON, verify DTC B0099 is not set.

- If DTC is set, replace the pedestrian impact detection module and the active hood hinge actuators.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0099: DEPLOYMENT COMMANDED CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Active Hood Hinge Actuator Replacement

- Control Module References for pedestrian impact detection module replacement, setup, and programming

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DTC DESCRIPTORS

B00A1 01

Hood Latch Actuator Deployment Loop Short to Battery

B009A 01

Left Hood Hinge Deployment Loop Short to Battery

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Hood Latch Actuator- Low Control Circuit	B00A1 02, B00A1 0E	B00A1 04	B00A1 0D	B00A1 01	-
Hood Latch Actuator- High Control Circuit	B00A1 02, B00A1 0E	B00A1 04	B00A1 0D	B00A1 01	-
Left Hood Hinge Actuator- Low Control Circuit	B009A 02, B009A 0E	B009A 04	B009A 0D	B009A 01	-
Left Hood Hinge Actuator- High Control Circuit	B009A 02, B009A 0E	B009A 04	B009A 0D	B009A 01	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM DESCRIPTION

The pedestrian hood actuators deploy only when a valid signal whose energy is capable of triggering deployment of the hood is present. The pedestrian hood actuators only deploys in those events where the activation of the hood is expected. The hood actuator is not expected to deploy in low severity event where the risk of injury is low or in a high severity event like a car to car crash. During a frontal pedestrian impact of sufficient force the pedestrian impact detection module will allow current to flow through the deployment loop in order to deploy the hood actuators. The pedestrian impact detection module performs continuous diagnostic tests on the deployment loops to check for proper circuit continuity, shorts to ground and shorts to voltage. There are 2 shorting bars used within the hood hinge actuator connector which will short together both high and low control circuits, when the hood hinge connector is disconnected. This helps to prevent unwanted deployment of the actuator during servicing.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR RUNNING THE DTC

Ignition voltage is between 9-16 volts.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR SETTING THE DTC

B00A1 01 or B009A 01

The pedestrian impact detection module deployment loop resistance leakage is less than 3.5 k ohms for 2.5 seconds.

B00A1 02 or B009A 02

The pedestrian impact detection module deployment loop resistance leakage is less than 3.5 k ohms for 2.5 seconds.

B00A1 04 or B009A 04

The pedestrian impact detection module deployment loop resistance is greater than 7.2 ohms for 2.5 seconds.

B00A1 0D or B009A 0D

The pedestrian impact detection module deployment loop resistance is greater than 3.1 ohms for 2.5 seconds.

B00A1 0E or B009A 0E

The pedestrian impact detection module deployment loop resistance is less than 1.6 ohms for 2.5 seconds.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > ACTION TAKEN WHEN THE DTC SETS

- The pedestrian impact detection module commands the DIC to display Service Pedestrian Protection System.
- The pedestrian impact detection module stores DTC in memory.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR CLEARING THE DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC AID



NOTE:

The following diagnostic aids apply for both current and history DTCs.

An incorrectly installed connector position assurance (CPA) or incorrectly seated connector can cause a shorting bar to short both control circuits together. Check the connectors and CPAs if a DTC with symptom byte 02 or 0E is set, to ensure the shorting bars are not causing the circuits to be shorted together. Shorting bars are used in the locations listed below:

- Left Hood Hinge Actuators
- Hood Latch Actuator (if equipped)
- Inline harness connectors
- Pedestrian Impact Detection Control Module connector

Terminal fretting or incorrectly seated connectors can cause an open/high resistance condition. Check the circuit terminals for fretting or incorrectly seated connector if a DTC with symptom byte 04 or 0D is set.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > REFERENCE INFORMATION

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- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM VERIFICATION



NOTE:

Refer to SIR Service Precautions .

Inspect all terminals for damage or corrosion when disconnecting connectors. Damage or corrosion in the following requires repair or replacement of the affected component/connector.

- *F100L Hood Hinge Actuator - Left*
- *F125 Hood Latch Actuator*
- *Pedestrian Impact Detection Sensor - Right Front*
- *Pedestrian Impact Detection Sensor - Left Front*
- *Wiring harness connectors*

- K36 Inflatable Restraint Sensing and Diagnostic Module wiring harness connector

The connector and connector position assurance (CPA) may seat independent of each other. Both the connector and CPA should seat with an audible and/or tactile click. The CPA isolates the shorting-bars within the connector allowing the deployment circuit to operate properly.

 NOTE:

If the condition is intermittent or cannot be duplicated, disconnect the connectors and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087). This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Verify the appropriate scan tool Hood Hinge Deployment Loop Resistance parameters stay consistently between 2.1 and 4.0 Ω without any spikes or dropouts while moving the harness near each connector listed below:

1. F100L Hood Hinge Actuator - Left
2. F125 Hood Latch Actuator
3. Any inline harness connector
4. K36 Inflatable Restraint Sensing and Diagnostic Module

1. **If less than 2.1 or greater than 4.0 Ω**

Refer to Circuit/System Testing.

1. **If there are spikes or dropouts, perform the following**

1. Inspect each connector terminal and harness for damage or corrosion and repair as necessary
2. Apply dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to each connector terminal
3. Insure each connector and CPA is correctly seated.

1. **If within 2.1 and 4.0 Ω without any spikes or dropouts**

2. All OK

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector listed below at the appropriate actuator:

1. F100L Hood Hinge Actuator - Left connector
2. F125 Hood Latch Actuator
2. Test for greater than 25 Ω between the control circuit terminal 1 and the control circuit terminal 2.

1. **If 25 Ω or less**

1. Disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.



NOTE:

Some connectors may be equipped with shorting bars as a safety component to prevent accidental deployment. When testing on a connector with shorting bars, the shorting bars must be disabled to ensure accurate test results. Insert an appropriate pick from EL-38125-580 and depress the shorting bars above the appropriate terminals. This will lift the shorting bar from the terminal and allow accurate test results. Take care not to damage the connector, shorting bar, or terminal when depressing the shorting bar.

2. Test for infinite resistance between the two control circuits.
 1. If less than infinite resistance, repair the short between the two circuits.
 2. If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. **If greater than 25 Ω**

3. Ignition ON.
4. Test for less than 11 V between the following control circuits and ground:

1. Control circuit terminal 1
2. Control circuit terminal 2

1. **If 11 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module, ignition ON.
2. Test for less than 1 V between the appropriate control circuit and ground.
 1. If 1 V or greater, repair the short to voltage on the circuit.
 2. If less than 1 V, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. **If less than 11 V**

5. Ignition OFF.

6. Test for greater than 25 Ω resistance between each control circuit terminal listed below and ground:

1. Control circuit terminal 1
2. Control circuit terminal 2

1. If 25 Ω or less

1. Disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.



NOTE:

Some connectors may be equipped with shorting bars as a safety component to prevent accidental deployment. When testing on a connector with shorting bars, the shorting bars must be disabled to ensure accurate test results. Insert an appropriate pick from EL-38125-580 and depress the shorting bars above the appropriate terminals. This will lift the shorting bar from the terminal and allow accurate test results. Take care not to damage the connector, shorting bar, or terminal when depressing the shorting bar.

2. Test for infinite resistance between the appropriate control circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.
2. If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If greater than 25 Ω

7. Install a 3 A fused jumper wire between the control circuit terminals 1 and 2. Ignition ON.

8. Verify the appropriate scan tool Hood Hinge Deployment Loop Resistance parameter is less than 2 Ω .

1. If 2 Ω or greater

1. Ignition OFF. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.

2. Test for less than 2 Ω in each control circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.
2. If less than 2 Ω , replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If less than 2 Ω

9. Ignition OFF, connect the harness connector at the appropriate Hood Hinge Actuator, press in the CPA (if equipped) until an audible and/or tactile click is heard.

10. Ignition ON, clear DTCs. Operate the vehicle within the Conditions for Running the DTC.

11. Verify DTC B00A1 or B009A is not set.

1. If DTC B00A1 or B009A is set

Replace the appropriate actuator.

1. If DTC B00A1 or B009A is not set

12. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009A OR B00A1: HOOD LATCH ACTUATOR DEPLOYMENT LOOP SHORT TO BATTERY, LEFT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Active Hood Hinge Actuator Replacement
- Control Module References for Pedestrian Impact Detection Control Module replacement, setup, and programming

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DTC DESCRIPTORS

B009B 01

Right Hood Hinge Deployment Loop Short to Battery

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
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Right Hood Hinge Actuator - Low Control Circuit	B009B 02, B009B 0E	B009B 04	B009B 0D	B009B 01	-
Right Hood Hinge Actuator - High Control Circuit	B009B 02, B009B 0E	B009B 04	B009B 0D	B009B 01	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM DESCRIPTION

The pedestrian hood actuators deploy only when a valid signal whose energy is capable of triggering deployment of the hood is present. The pedestrian hood actuators only deploys in those events where the activation of the hood is expected. The hood actuator is not expected to deploy in low severity event where the risk of injury is low or in a high severity event like a car to car crash. During a frontal pedestrian impact of sufficient force the pedestrian impact detection module will allow current to flow through the deployment loop in order to deploy the hood actuators. The pedestrian impact detection module performs continuous diagnostic tests on the deployment loops to check for proper circuit continuity, shorts to ground and shorts to voltage. There are 2 shorting bars used within the hood hinge actuator connector which will short together both high and low control circuits, when the hood hinge connector is disconnected. This helps to prevent unwanted deployment of the actuator during servicing.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR RUNNING THE DTC

Ignition voltage is between 9-16 volts.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR SETTING THE DTC

B009B 01

The pedestrian impact detection module deployment loop resistance leakage is less than 3.5 k ohms for 2.5 seconds.

B009B 02

The pedestrian impact detection module deployment loop resistance leakage is less than 3.5 k ohms for 2.5 seconds.

B009B 04

The pedestrian impact detection module deployment loop resistance is greater than 7.2 ohms for 2.5 seconds.

B009B 0D

The pedestrian impact detection module deployment loop resistance is greater than 3.1 ohms for 2.5

seconds.

B009B 0E

The pedestrian impact detection module deployment loop resistance is less than 1.6 ohms for 2.5 seconds.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > ACTION TAKEN WHEN THE DTC SETS

- The pedestrian impact detection module commands the DIC to display Service Pedestrian Protection System.
- The pedestrian impact detection module stores DTC in memory.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CONDITIONS FOR CLEARING THE DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > DIAGNOSTIC AID



NOTE:

The following diagnostic aids apply for both current and history DTCs.

An incorrectly installed connector position assurance (CPA) or incorrectly seated connector can cause a shorting bar to short both control circuits together. Check the connectors and CPAs if a DTC with symptom byte 02 or 0E is set, to ensure the shorting bars are not causing the circuits to be shorted together. Shorting bars are used in the locations listed below:

- Right Hood Hinge Actuators
- Inline harness connectors
- Pedestrian Impact Detection Control Module connector

Terminal fretting or incorrectly seated connectors can cause an open/high resistance condition. Check the circuit terminals for fretting or incorrectly seated connector if a DTC with symptom byte 04 or 0D is set.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM VERIFICATION



NOTE:

Refer to SIR Service Precautions .

Inspect all terminals for damage or corrosion when disconnecting connectors. Damage or corrosion in the following requires repair or replacement of the affected component/connector.

- *F100R Hood Hinge Actuator - Right*
- *Pedestrian Impact Detection Sensor - Right Front*
- *Pedestrian Impact Detection Sensor - Left Front*
- *Wiring harness connectors*
- *K36 Inflatable Restraint Sensing and Diagnostic Module wiring harness connector*

The connector and connector position assurance (CPA) may seat independent of each other. Both the connector and CPA should seat with an audible and/or tactile click. The CPA isolates the shorting-bars within the connector allowing the deployment circuit to operate

properly.



NOTE:

If the condition is intermittent or cannot be duplicated, disconnect the connectors and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087). This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Verify "Deployment Loop 20 Type" Resistance parameter stays consistently between 2.1 and 4.0 Ω without any spikes or dropouts while moving the harness near each connector listed below:

1. F100R Hood Hinge Actuator - Right
2. Any inline harness connector
3. K36 Inflatable Restraint Sensing and Diagnostic Module



NOTE:

Deployment Loop 20 Type may have a value of "Not Equipped" and still have a value in the Resistance field. This loop is the Right Hood Hinge Deployment loop.

2. **1. If less than 2.1 or greater than 4.0 Ω**

Refer to Circuit/System Testing.

- 1. If there are spikes or dropouts, perform the following**

1. Inspect each connector terminal and harness for damage or corrosion and repair as necessary
2. Apply dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to each connector terminal
3. Insure each connector and CPA is correctly seated.

- 1. If within 2.1 and 4.0 Ω without any spikes or dropouts**

3. All OK

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector listed below at the F100R Hood Hinge Actuator - Right.

2. Test for greater than 25 Ω between the control circuit terminal 1 and the control circuit terminal 2.

1. **If 25 Ω or less**

1. Disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.



NOTE:

Some connectors may be equipped with shorting bars as a safety component to prevent accidental deployment. When testing on a connector with shorting bars, the shorting bars must be disabled to ensure accurate test results. Insert an appropriate pick from EL-38125-580 and depress the shorting bars above the appropriate terminals. This will lift the shorting bar from the terminal and allow accurate test results. Take care not to damage the connector, shorting bar, or terminal when depressing the shorting bar.

2. Test for infinite resistance between the two control circuits.

1. If less than infinite resistance, repair the short between the two circuits.
2. If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. **If greater than 25 Ω**

3. Ignition ON.

4. Test for less than 11 V between the following control circuits and ground:

1. Control circuit terminal 1
2. Control circuit terminal 2

1. **If 11 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module, ignition ON.

2. Test for less than 1 V between the appropriate control circuit and ground.

1. If 1 V or greater, repair the short to voltage on the circuit.
2. If less than 1 V, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. **If less than 11 V**

5. Ignition OFF.

6. Test for greater than 25 Ω resistance between each control circuit terminal listed below and ground:

1. Control circuit terminal 1

2. Control circuit terminal 2

1. If 25 Ω or less

1. Disconnect the X1 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.



NOTE:

Some connectors may be equipped with shorting bars as a safety component to prevent accidental deployment. When testing on a connector with shorting bars, the shorting bars must be disabled to ensure accurate test results. Insert an appropriate pick from EL-38125-580 and depress the shorting bars above the appropriate terminals. This will lift the shorting bar from the terminal and allow accurate test results. Take care not to damage the connector, shorting bar, or terminal when depressing the shorting bar.

2. Test for infinite resistance between the appropriate control circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.
2. If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If greater than 25 Ω

7. Install a 3 A fused jumper wire between the control circuit terminals 1 and 2. Ignition ON.
8. Verify the "Deployment Loop 20 Type" Resistance parameter is less than 2 Ω .



NOTE:

Deployment Loop 20 Type may have a value of "Not Equipped" and still have a value in the Resistance field. This loop is the Right Hood Hinge Deployment loop.

9. 1. If 2 Ω or greater

1. Ignition OFF. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.

2. Test for less than 2 Ω in each control circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.
2. If less than 2 Ω , replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If less than 2 Ω

10. Ignition OFF, connect the harness connector at the F100R Hood Hinge Actuator - Right, press in the CPA (if equipped) until an audible and/or tactile click is heard.

11. Ignition ON, clear DTCs. Operate the vehicle within the Conditions for Running the DTC.

12. Verify DTC B009B is not set.

1. If DTC B009B is set

Replace the F100R Hood Hinge Actuator - Right.

1. If DTC B009B is not set

13. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009B: RIGHT HOOD HINGE DEPLOYMENT LOOP SHORT TO BATTERY > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Active Hood Hinge Actuator Replacement
- Control Module References for Pedestrian Impact Detection Control Module replacement, setup, and programming

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > DTC DESCRIPTORS

B009C 01

Pedestrian Impact Detection Sensor - Upper Beam Front Left Short to Battery

B009C 02

Pedestrian Impact Detection Sensor - Upper Beam Front Left Short to Ground

B009C 08

Pedestrian Impact Detection Sensor - Upper Beam Front Left Signal Invalid

B009C 39

Pedestrian Impact Detection Sensor - Upper Beam Front Left Internal Electronic Failure

B009C 3A

Pedestrian Impact Detection Sensor - Upper Beam Front Left Incorrect Component Installed

B009C 3B

Pedestrian Impact Detection Sensor - Upper Beam Front Left Internal Self Test Failed

B00A0 01

Pedestrian Impact Detection Sensor - Upper Beam Front Right Short to Battery

B00A0 02

Pedestrian Impact Detection Sensor - Upper Beam Front Right Short to Ground

B00A0 08

Pedestrian Impact Detection Sensor - Upper Beam Front Right Signal Invalid

B00A0 39

Pedestrian Impact Detection Sensor - Upper Beam Front Right Internal Electronic Failure

B00A0 3A

Pedestrian Impact Detection Sensor - Upper Beam Front Right Incorrect Component Installed

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0:
PEDESTRIAN IMPACT DETECTION SENSOR > DIAGNOSTIC FAULT INFORMATION**

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Pedestrian Impact Detection Sensor - Upper Beam Front Left Sensor High Signal Circuit	B009C 02	B009C 08	B009C 08	B009C 01	B009C 39, B009C 3A, B009C 3B
Pedestrian Impact Detection Sensor - Upper Beam Front Left Sensor Low Reference Circuit	B009C 02	B009C 08	B009C 08	B009C 01	B009C 39, B009C 3A, B009C 3B
Pedestrian Impact Detection Sensor - Upper Beam Front Right Sensor High Signal Circuit	B00A0 02	B00A0 08	B00A0 08	B00A0 01	B00A0 39, B00A0 3A
Pedestrian Impact Detection Sensor - Upper Beam Front Right Sensor Low Reference Circuit	B00A0 02	B00A0 08	B00A0 08	B00A0 01	B00A0 39, B00A0 3A

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > CIRCUIT/SYSTEM DESCRIPTION

The pedestrian impact detection system senses and discriminates vehicle impacts and deploys the pedestrian hood hinge actuators in a timely manner to help reduce pedestrian head injuries. The Pedestrian Impact Detection Sensor provides discrete force information to the Pedestrian Impact Detection Control Module. The Pedestrian Impact Detection Control Module uses force information from the Pedestrian Impact Detection Sensors to determine those events when the deployment of the hood hinge actuator is expected. The pedestrian impact detection module provides a two wire current loop interface to the Pedestrian Impact Detection Sensors. This loop also powers the sensor. The Pedestrian Impact Detection Control Module monitors the Pedestrian Impact Detection Sensors for any system malfunction and when a malfunction is detected, a DTC will be stored in non volatile memory.

B82F Pedestrian Impact Detection Sensor - Upper Beam Front consists of two sensors connected together by a tube. If either sensor needs to be replaced they must be replaced as a complete assembly. Also verify there are no cracks or other damage to the front fascia or front bumper fascia energy absorber.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > CONDITIONS FOR RUNNING THE DTC

Ignition voltage is between 9-16 volts.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > CONDITIONS FOR SETTING THE DTC

B009C 01

The sensor has been shorted to battery.

B009C 02

The sensor has been shorted to ground.

B009C 08

The sensor high and/or low circuit is open or no new data received. An open circuit indicates as no new data received.

B009C 39

The sensor sent an error message or invalid data to the Pedestrian Impact Detection Control Module.

B009C 3A

Invalid sensor ID data received by the Pedestrian Impact Detection Control Module.

B009C 3B

Sensor internal self-test failed.

B00A0 01

The sensor has been shorted to battery.

B00A0 02

The sensor has been shorted to ground.

B00A0 08

The sensor high and/or low circuit is open or no new data received. An open circuit indicates as no new data received.

B00A0 39

The sensor sent an error message or invalid data to the Pedestrian Impact Detection Control Module.

B00A0 3A

Invalid sensor ID data received by the Pedestrian Impact Detection Control Module.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0:
PEDESTRIAN IMPACT DETECTION SENSOR > ACTION TAKEN WHEN THE DTC SETS**

- The Pedestrian Impact Detection Control Module commands the DIC to display Service Pedestrian Protection System.
- The Pedestrian Impact Detection Control Module stores DTC in memory.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0:
PEDESTRIAN IMPACT DETECTION SENSOR > CONDITIONS FOR CLEARING THE
DTC**

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0:
PEDESTRIAN IMPACT DETECTION SENSOR > REFERENCE INFORMATION**

Schematic Reference

Object Detection Schematics

Connector End View Reference

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Description and Operation

Pedestrian Impact Detection Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > CIRCUIT/SYSTEM VERIFICATION



NOTE:

- *SIR Service Precautions*
- *Inspect all terminals for damage or corrosion when disconnecting connectors. Damage or corrosion in the following requires repair or replacement of the affected component/connector.*
 - *Pedestrian Impact Detection Sensors*
 - *Pedestrian Impact Detection Control Module*
 - *Pedestrian Impact Detection Control Module wiring harness connector*

1. Ignition ON.

2. Verify that DTC B009C symptom byte 08, 39 or 3B or DTC B00A0 08 or 39 is not set as current.

1. If DTC B009C symptom byte 08, 39 or 3B or DTC B00A0 08 or 39 is set as current

Replace the B82F Pedestrian Impact Detection Sensor - Upper Beam Front.

1. If DTC B009C or B009C symptom byte 08, 39 or 3B or DTC B00A0 08 or 39 is not set as current

3. Verify that DTC B009C or B00A0 symptom byte 3A is not set as current.

1. If DTC B009C or B00A0 symptom byte 3A is set as current

Replace the B82F Pedestrian Impact Detection Sensor - Upper Beam Front.

1. If DTC B009C or B00A0 symptom byte 3A is not set as current

4. Verify that DTC B009C or B00A0 symptom byte 01 or 02 is not set as current.

1. If DTC B009C or B00A0 symptom byte 01 or 02 is set as current

Refer to Circuit/System Testing.

1. If DTC B009C or B00A0 symptom byte 01 or 02 is not set as current

5. All OK.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0:
PEDESTRIAN IMPACT DETECTION SENSOR > CIRCUIT/SYSTEM TESTING**

1. Ignition OFF. Disconnect the harness connector at the appropriate Pedestrian Impact Detection Sensor. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 Ω between the low reference circuit terminal 2 and ground.

1. If 10 Ω or greater

1. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.

2. Test for less than 2 Ω in the low reference circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If less than 10 Ω

3. Ignition ON.

4. Test for less than 1 V between the signal circuit terminal 1 and ground.

1. If 1 V or greater

1. Ignition OFF. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module. Ignition ON.

2. Test for less than 1 V between the signal circuit terminal 1 and ground.

1. If 1 V or greater, repair the short to voltage on the circuit.

2. If less than 1 V, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If less than 1 V

5. Ignition OFF.

6. Test for greater than 50k Ω between the signal circuit terminal 1 and ground.

1. If 50k Ω or less

1. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.
2. Test for infinite resistance between the signal circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If greater than 50k Ω

7. Disconnect the X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module.
8. Test for less than 2 Ω between the Pedestrian Impact Detection Sensor signal circuit terminal 1 and the appropriate K36 Inflatable Restraint Sensing and Diagnostic Module signal circuit terminal listed below:

1. Right front impact sensor terminal 22 X2
2. Left front impact sensor terminal 23 X2

1. If 2 Ω or greater

Repair the short to voltage or an open/high resistance in the circuit.

1. If less than 2 Ω

9. Ignition OFF, reconnect all harness connectors.
10. Ignition ON, clear DTCs. Operate the vehicle within the Conditions for Running the DTC.
11. Verify DTC B009C or B00A0 does not set.

1. If the DTC sets

1. Replace the B82F Pedestrian Impact Detection Sensor - Upper Beam Front.
2. Verify the DTC does not set.
 1. If the DTC sets, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.
 1. If the DTC does not set.
3. All OK.

1. If the DTC does not set

12. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B009C OR B00A0: PEDESTRIAN IMPACT DETECTION SENSOR > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Pedestrian Impact Detection Sensor Replacement - Front Upper Beam
- Control Module References for pedestrian impact detection module replacement, setup, and programming.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > DTC DESCRIPTOR

DTC B094B 00

Left Side Object Detection Control Module - Malfunction

DTC B094B 08

Left Side Object Detection Control Module - Performance - Signal Invalid

DTC B094B 45

Left Side Object Detection Control Module - Variant Not Programmed

DTC B094B 54

Left Side Object Detection Control Module - High Temperature

DTC B094B 58

Left Side Object Detection Control Module - Performance

DTC B094C 00

Right Side Object Detection Control Module - Malfunction

DTC B094C 08

Right Side Object Detection Control Module - Performance - Signal Invalid

DTC B094C 45

Right Side Object Detection Control Module - Variant Not Programmed

DTC B094C 54

Right Side Object Detection Control Module - High Temperature

Right Side Object Detection Control Module - Performance

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > CIRCUIT/SYSTEM DESCRIPTION

The B218L Side Object Sensor Module - Left or B218R Side Object Sensor Module - Right can set this code if the module determines there is a fault due to the reason listed in the symptom byte.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > CONDITIONS FOR SETTING THE DTC

The control module has detected a malfunction.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > ACTION TAKEN WHEN THE DTC SETS

- The Side Blind Zone and Rear Cross Traffic Alert Systems will not function.
- The DIC will display "Service Side Detection System".

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > CONDITIONS FOR CLEARING THE DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the control module ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > DIAGNOSTIC AIDS

If DTC B094B 58 or B094C 58 is set, check for anything that can interfere with the radar signal. Verify area in front of radar is clean of mud, ice, snow, etc. Also verify the fascia panels in front of the radar

are damage-free and not obstructed by any add-on accessories such as emblems, etc.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

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Side Blind Zone Alert Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.

2. Verify that B094B 45 or B094C 45 is not set.

1. If DTC is set

1. Program the appropriate B218 Side Object Sensor Module.

2. Verify the DTC does not set.

1. If the DTC sets, replace the appropriate B218 Side Object Sensor Module.

1. If the DTC does not set

3. All OK.

1. If DTC is not set

3. Verify that B094B 00, B094C 00, B094B 08, B094C 08, B094B 54 or B094C 54 is not set.

1. If DTC is set

Replace the appropriate B218 Side Object Sensor Module.

1. If the DTC is not set

4. Verify that B094B 58 or B094C 58 is not set.

1. If DTC is set

Verify the area in front of the sensor is clean, unobstructed, and damage-free.

2. If not clean, unobstructed, and damage-free, clean or repair as necessary.

3. If clean, unobstructed, and damage-free, replace the appropriate B218 Side Object Sensor Module.

1. If DTC is not set

5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094B OR B094C: OBJECT DETECTION CONTROL MODULE > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for side object sensor module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > DTC DESCRIPTORS

DTC B094D

Left Side Object Detection Indicator Circuit

DTC B094E

Right Side Object Detection Indicator Circuit

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Side Object Detection Indicator Control Circuit	B094D 02	B094D 04	B094D 01	-
Right Side Object Detection Indicator Control Circuit	B094E 02	B094E 04	B094E 01	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The side blind zone alert system sensors are located behind the rear fascia and detect and report objects on either side of the vehicle, within a specified blind zone. The system alerts with a visual indicator placed on each side rear view mirror, to the presence of objects that may not be visible in the inside rearview mirror and outside rearview mirrors. When the system detects a vehicle in the side blind zone while driving forward, independent if passing a vehicle or being passed, an amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing and a chime sounds to give an extra warning not to change lanes. The side object sensor module provides the voltage to the outside rearview mirror to illuminate the side blind zone alert symbol on the mirror.

Side blind zone alert is active from speeds of 10 km/h (6.2 MPH) up to 140 km/h (87 MPH). Driving faster deactivates the system, indicated by low lighting warning symbols in the mirrors. Driving under this speed again will turn off the warning symbols. If then a vehicle is detected in blind zone, the warning symbols will illuminate normally on the appropriate side. When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CONDITIONS FOR RUNNING THE DTC

- Engine running.
- The Side blind zone alert is active from speeds of 10 km/h (6.2 MPH) up to 140 km/h (87 MPH).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CONDITIONS FOR SETTING THE DTC

B094D 02

The module has detected a short to ground in the left side object detection indicator circuit.

B094D 01

The module has detected a short to voltage in the left side object detection indicator circuit.

B094E 02

The module has detected a short to ground in the right side object detection indicator circuit.

B094E 01

The module has detected a short to voltage in the right side object detection indicator circuit.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

The side blind zone alert system is inoperative and Service Side Detection System is displayed on the Driver Information Center.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CONDITIONS FOR CLEARING THE DTC

The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

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Side Blind Zone Alert Description and Operation

Electrical Information Reference

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- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition OFF, ignition ON.
2. Verify the side blind zone alert system indicators located in the outside rearview mirrors briefly turn ON and then OFF during the system self test when ignition is turned ON.

1. If the side blind zone alert system indicators do not briefly turn ON and OFF

Refer to Circuit/System Testing

1. If both side blind zone alert indicators briefly turn ON and OFF

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > CIRCUIT/SYSTEM TESTING

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector for the appropriate A9 Outside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.

1. X510 - Driver Door Harness to Outside Rearview Mirror

2. X610 - Passenger Door Harness to Outside Rearview Mirror

2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Ignition ON, connect a test lamp between the control circuit terminal 18 and the ground circuit terminal 5.
4. Verify the test lamp turns ON and OFF when commanding the Object Detection Alert Indicators On and Off with a scan tool.

1. If the test lamp is always OFF

1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object

Sensor Module.

2. Test for infinite resistance between the control circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the B218 Side Object Sensor Module.

1. If the test lamp is always ON

1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.
2. Test for less than 1 V between the control circuit and ground.
 1. If 1 V or greater, repair the short to voltage on the circuit.
 2. If less than 1 V, replace the B218 Side Object Sensor Module.

1. If the test lamp turns ON and OFF

5. Test or replace the A9 Outside Rearview Mirror Glass.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B094D OR B094E: OBJECT DETECTION INDICATOR CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Outside Rearview Mirror Glass Replacement
- Control Module References for side object sensor module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > DTC DESCRIPTORS

DTC B0958

Parking Assist Rear Sensor Left Corner Circuit

DTC B0959

Parking Assist Rear Sensor Left Middle Circuit

DTC B0960

Parking Assist Rear Sensor Right Middle Circuit

DTC B0961

Parking Assist Rear Sensor Right Corner Circuit

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12 V Reference	B1405 02	B0954 04, B0955 04, B0956 04, B0957 04, B0958 04, B0959 04, B0960 04, B0961 04, B1405 03	B0954 01, B0955 01, B0956 01, B0957 01, B0958 01, B0959 01, B0960 01, B0961 01, B1405 07	-
Left Rear Object Sensor Signal	B0958 02	B0958 04	B0958 01	B0958 08, B0958 18, B0958 22
Left Middle Rear Object Sensor Signal	B0959 02	B0959 04	B0959 01	B0959 08, B0959 18, B0959 22
Right Middle Rear Object Sensor Signal	B0960 06	B0960 06	B0960 01	B0960 08, B0960 18, B0960 22
Right Rear Object Sensor Signal	B0961 06	B0961 06	B0961 01	B0961 08, B0961 18, B0961 22
Low Reference	-	B0954 01, B0955 01, B0956 01, B0957 01, B0958 01, B0959 01, B0960 01, B0961 01	-	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CIRCUIT/SYSTEM DESCRIPTION

The object sensors are 3-wire sensors that are used to determine the distance between the vehicle and an object of interest. The Parking Assist Control Module supplies 12 V to the object sensors via the 12 V reference circuit and provides ground via the low reference circuit. The Parking Assist Control Module triggers the sensors in a sequential loop. After each sensor transmits, the Parking Assist Control Module uses the sensor echo received through the signal circuit to calculate the distance and position of an object.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CONDITIONS FOR RUNNING THE DTC

- Ignition ON.
- The parking assist is activated. The activation takes place through putting the vehicle in reverse.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CONDITIONS FOR SETTING THE DTC

B0958 01, B0959 01, B0960 01, or B0961 01

The Parking Assist Control Module has detected the voltage at the sensor circuit is greater than 11.5 V or the object sensor is not grounded.

B0958 02, B0959 02, B0960 02, or B0961 02

The Parking Assist Control Module has detected sensor circuit is shorted to ground.

B0958 04, B0959 04, B0960 04, or B0961 04

The Parking Assist Control Module has detected the voltage at the sensor circuit is less than 0.5 V.

B0958 08, B0959 08, B0960 08, or B0961 08

The Parking Assist Control Module has received an invalid signal.

B0958 18, B0959 18, B0960 18, or B0961 18

The Parking Assist Control Module has received an invalid signal.

B0958 22, B0959 22, B0960 22 or B0961 22

The object sensor determines no change in the position of an object while the vehicle is in motion.

B0958 3A, B0959 3A, B0960 3A, or B0961 3A

The Parking Assist Control Module determines the wrong sensor type is installed.

B0958 3B, B0955 3B, B0956 3B, or B0957 3B

The Parking Assist Control Module determines the sensor failed a self test.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > ACTION TAKEN WHEN THE DTC SETS

- The parking assist is disabled.
- The driver information center displays "Park Assist Temporarily Unavailable" or "Service Park Assist".

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CONDITIONS FOR CLEARING THE DTC

The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

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Parking Assist Description and Operation

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC B1405 is not set.
 1. **If the DTC is set**

Refer to DTC B1405
 1. **If the DTC is not set**
3. Verify that DTC B0958 3A, DTC B0958 3B, B0959 3A, B0959 3B, B0960 3A, B0960 3B, B0961 3A or B0961 3B is not set.
 1. **If the DTC is set**

Replace the B78 Front Object Sensor.
 1. **If the DTC is not set**
4. Verify that DTC B0958, B0959, B0960, or B0961 is not set.
 1. **If the DTC is set**
 1. Check the B78 Rear Object Sensor for contamination with snow, mud, dirt, slush, or ice.
 1. If contaminated, clean sensor.
 1. If there is no contamination
 2. Refer to Circuit/System Testing.
 1. **If the DTC is not set**
5. Ignition ON, transmission in R.
6. Verify the scan tool Parking Assist System Status parameter displays Enabled.
 1. **If the Parking Assist System displays Disabled**

Refer to Circuit/System Testing.
 1. **If the Parking Assist System displays Enabled**
7. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, scan tool disconnected, disconnect the harness at the appropriate B78 Rear Object Sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 3 and ground.
 1. **If 10 Ω or greater**

1. Ignition OFF, disconnect the harness connector X2 at the K182 Parking Assist Control Module.
2. Test for less than 2 Ω in the low reference circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω replace the K182 Parking Assist Control Module.

1. If less than 10 Ω

3. Ignition ON.
4. Test for at least 9.7 V between the 12 V reference circuit terminal 1 and ground.

1. If less than 9.7 V

1. Ignition OFF, disconnect the X2 harness connector at the K182 Parking Assist Control Module.
2. Test for infinite resistance between the 12 V reference circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the 12 V reference circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the K182 Parking Assist Control Module.

1. If 9.7 V or greater

5. Test for 10.3 - 12.0 V between the signal circuit terminal 2 and ground.

1. If less than 10.3 V

1. Ignition OFF, disconnect the X2 harness connector at the K182 Parking Assist Control Module.
2. Test for infinite resistance between the signal circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the K182 Parking Assist Control Module.

1. If greater than 12.0 V

1. Ignition OFF, disconnect the X2 harness connector at the K182 Parking Assist Control Module, ignition ON.
2. Test for less than 1 V between the signal circuit and ground.

1. If 1 V or greater, repair the short to voltage on the circuit.
2. If less than 1 V, replace the K182 Parking Assist Control Module.

1. If between 10.3-12.0 V

6. Test or replace the appropriate B78 Rear Object Sensor.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Rear Parking Assist Alarm Sensor Replacement
- Control Module References for control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > DTC DESCRIPTOR

DTC B1015 00

Vehicle Identification Number Information Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

When the ignition is turned ON, the control module receives the vehicle identification number (VIN) from the body control module. The modules will compare the VIN received to the VIN stored in memory.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > CONDITIONS FOR

RUNNING THE DTC

Ignition voltage is between 9-16 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > CONDITIONS FOR SETTING THE DTC

The stored VIN does not match the received VIN.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The parking assist system OR lane departure warning system OR forward collision alert system, and/or active safety system is disabled.
- The driver information center displays SERVICE PARK ASSIST or SERVICE LANE DEPARTURE SYSTEM or SERVICE DRIVER ASSIST.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

The stored VIN matches the VIN stored in the body control module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

- Parking Assist Description and Operation
- Side Blind Zone Alert Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify DTC B1015 is not.
 1. **If DTC B1015 is set**
 1. Program the control module the DTC originally set in.
 2. Verify the DTC does not set.
 1. If the DTC is sets, replace the control module the DTC set in.
 1. If the DTC does not set
 3. All OK
 1. **If DTC B1015 is not set**
3. All OK

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair

Control Module References for the control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > DTC DESCRIPTOR

DTC B101D

Electronic Control Unit Hardware

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > CIRCUIT/SYSTEM DESCRIPTION

The side blind zone alert system uses two modules: The side object sensor module - left and the side object sensor module - right. The side object sensor module - left is the master and communicates with other control modules in the vehicle via the vehicle-wide serial data bus. The side object sensor module - left communicates with the side object sensor module - right on a private serial data bus. Internal fault detection is performed within the side object sensor module - left. No external circuit diagnosis is involved.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > CONDITIONS FOR SETTING THE DTC

- The side object sensor module - left is awake.
- The side object sensor module - left has detected an internal malfunction.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > ACTION TAKEN WHEN THE DTC SETS

- The side blind zone alert system is disabled.
- The driver information center may display a system service message.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > CONDITIONS FOR CLEARING THE DTC

- A current DTC clears when the malfunction is no longer present.
- A history DTC clears when the device ignition cycle counter reaches the reset threshold of 50, without a repeat of the malfunction.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > DIAGNOSTIC AIDS

- This DTC may be stored as a history DTC without affecting the operation of the side object sensor module - left.
- Do not replace the side object sensor module - left based only on DTC B101D being set in history.
- If DTC B101D is set as current, replace the side object sensor module - left.
- Because the side object sensor module - left is the master, if it is replaced there still may be a concern with the side object sensor module - right as the module may have been unable to report it. Once the side object sensor module - left is replaced, check for DTCs and verify operation of the system to assure proper functionality.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > REFERENCE INFORMATION

Schematic Reference

- Data Communication Schematics
- Control Module References

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Data Link Communications Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify the DTC B101D is not set.

1. If the DTC is set

1. Replace the B218L Side Object Sensor Module - Left.
2. Verify no new DTCs set and the side blind zone alert operates properly.
 1. If any DTCs are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle , or if the system does not operate properly, refer to Symptoms - Object Detection .
 1. If there are no new DTCs and the side object system operates properly
3. All OK.

1. If the DTC is not set

3. All OK

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B101D (SIDE OBJECT DETECTION, UKC): ELECTRONIC CONTROL UNIT HARDWARE > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming, and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > DTC DESCRIPTORS

B127B 2B

Rearview Camera Input Signal Circuit Missing Reference

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	B127B 2B	-	-
Camera Module signal +	1	1	1	-
Camera Module signal -	2	B127B 2B	1	-
Ground	-	B127B 2B	-	-
Shield	2	B127B 2B	2	-
1. Rear Vision Camera Malfunction 2. Poor Quality Image				

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CIRCUIT/SYSTEM DESCRIPTION

The rearview camera is always supplied power when the vehicle is ON. Video signals are constantly to the Human Machine Interface Control Module. If the Human Machine Interface Control Module does not see a signal from the camera it will set B127B 2B and display "Service Rear Vision System".

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CONDITIONS FOR RUNNING THE DTC

The vehicle must be in reverse with the engine running.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CONDITIONS FOR SETTING THE DTC

B127B 2B

Signal from the rearview camera not received by the Human Machine Interface Control Module for 2.5s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > ACTION TAKEN WHEN THE DTC SETS

- The Human Machine Interface Control Module commands the driver information center to display "Service Rear Vision System".
- The Human Machine Interface Control Module stores the DTC in memory.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CONDITIONS FOR CLEARING THE DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Vision Camera Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.

2. Verify that DTC B2545 is not set.

1. If the DTC is set

Refer to DTC B2545 .

1. If the DTC is not set

3. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.

1. If debris are found on the lens

Clean the lens. If the lens, bezel, or bezel seal are damaged, replace as necessary.

1. If no debris on the lens

4. Ignition ON, transmission in R.

5. Verify the backup lamps are illuminated.

1. If the backup lamps are not illuminated

Refer to Backup Lamps Malfunction (Automatic Transmission)Backup Lamps Malfunction (Manual Transmission) .

1. If the backup lamps are illuminated

6. Engine running, transmission in R.

7. Verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear image is not displayed

Refer to Circuit/System Testing.

1. If a clear image is displayed

8. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > CIRCUIT/SYSTEM TESTING



NOTE:

- *Circuit/System Verification must be performed before Circuit/System Testing.*

- *Under normal operating conditions the Human Machine Interface Control Module will become very hot. The module should be allowed to cool down prior to removal for any service procedure.*

With IO5 or IO6

1. Ignition OFF, disconnect the harness connector at the B87 Rearview Camera.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

1. If 10 Ω or greater

1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition OFF.
2. Test for less than 2 Ω in the ignition circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.
2. Test for infinite resistance between the ignition circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the B87 Rearview Camera.

1. If the test lamp illuminates

5. Ignition OFF, disconnect the X2 harness connector at the K74 Human Machine Interface Control Module, ignition ON.
6. Test for less than 1 V between the signal circuit terminal listed below and ground:
 1. B87 Rearview Camera signal (+) circuit terminal 5
 2. B87 Rearview Camera signal (-) circuit terminal 6

1. If 1 V or greater

Repair the short to voltage on the circuit.

1. If less than 1 V

7. Test for infinite resistance between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 5
2. B87 Rearview Camera signal (-) circuit terminal 6

1. If less than infinite resistance

Repair the short to ground on the circuit.

1. If infinite resistance

8. Test for less than 2 Ω in the signal (+) circuit end to end.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

9. Test for less than 2 Ω in the signal (-) circuit end to end.

1. If 2 Ω or greater

Test the signal circuit for an open/high resistance.

1. If less than 2 Ω

10. Replace the B87 Rearview Camera.

11. Engine running, transmission in R, verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear rear vision image is not displayed

Replace the K74 Human Machine Interface Control Module.

1. If a clear rear vision image is displayed

12. All OK.

With IOB

1. Ignition OFF, disconnect the harness connector at the B87 Rearview Camera.

2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If $2\ \Omega$ or greater, repair the open/high resistance in the circuit.
2. If less than $2\ \Omega$, repair the open/high resistance in the ground connection.

1. If less than $10\ \Omega$

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition OFF.

2. Test for less than $2\ \Omega$ in the ignition circuit end to end.

1. If $2\ \Omega$ or greater, repair the open/high resistance in the circuit.

2. If less than $2\ \Omega$, verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.

2. Test for infinite resistance between the ignition circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.

2. If infinite resistance, replace the B87 Rearview Camera.

1. If the test lamp illuminates

5. Ignition OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON.

6. Test for less than 1 V between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 15

2. B87 Rearview Camera signal (-) circuit terminal 14

1. If 1 V or greater

Repair the short to voltage on the circuit.

1. If less than 1 V

7. Test for infinite resistance between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 15

2. B87 Rearview Camera signal (-) circuit terminal 14

1. If less than infinite resistance

Repair the short to ground on the circuit.

1. If infinite resistance

8. Test for less than 2 Ω in the signal (+) circuit end to end.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

9. Test for less than 2 Ω in the signal (-) circuit end to end.

1. If 2 Ω or greater

Test the signal circuit for an open/high resistance.

1. If less than 2 Ω

10. Replace the B87 Rearview Camera.

11. Engine running, transmission in R, verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear rear vision image is not displayed

Replace the A11 Radio.

1. If a clear rear vision image is displayed

12. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT MISSING REFERENCE > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Rearview Driver Information Camera Replacement
- Control Module References for Control Module replacement, programming, and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > DTC DESCRIPTORS

DTC B1405

Control Module Voltage Reference Output 2 Circuit

For symptom byte information, refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
8 V Reference	B1405 02	B0958 04, B0959 04, B0960 04, B0961 04	-	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The object sensors are 3-wire ultrasonic sensors that are used to determine the distance between the vehicle and an object. The Parking Assist Control Module supplies 8 V to the object sensors via the 8 V reference circuit and provides ground via the low reference circuit. The Parking Assist Control Module triggers the sensors in a sequential loop. After each sensor transmits, the Parking Assist Control Module uses the sensor echo received through the signal circuit to calculate the distance and position of an object.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition ON

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CONDITIONS FOR SETTING THE DTC

B1405 02

The Parking Assist Control Module has detected the 8 V reference circuit is shorted to ground.

B1405 03

The Parking Assist Control Module has detected the 8 V reference circuit is less than 7.2 V.

B1405 07

The Parking Assist Control Module has detected the 8 V reference circuit is greater than 9.2 V.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

- Parking assist is disabled.
- The driver information center may display a system service message.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CONDITIONS FOR CLEARING THE DTC

The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Parking Assist Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.

2. Verify the scan tool Parking Assist Sensors Reference Voltage parameter is between 7-10 V.

1. If less than 7 V or greater than 10 V

Refer to Circuit/System Testing.

1. If between 7-10 V

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the X2 harness connector at the K182 Parking Assist Control Module.

2. Test for infinite resistance between the 8 V reference circuit terminal 4 and ground.

1. If less than infinite resistance

1. Ignition OFF, disconnect the harness connector at each of the B78 Rear Object Sensors.

2. Test for infinite resistance between the control circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.

2. If less than 2 Ω , replace the appropriate B78 Rear Object Sensor.

1. If infinite resistance

3. Connect the X2 harness connector at the K182 Parking Assist Control Module, ignition ON.

4. Verify the scan tool Parking Assist Sensors Reference Voltage parameter is between 7-10 V.

1. If not between 7-10 V

1. Ignition OFF, disconnect the harness connector at each of the B78 Object Sensors.

2. Verify the scan tool Parking Assist Sensors Reference Voltage parameter is between 7-10 V.

1. If not between 7-10 V

Replace the K182 Parking Assist Control Module.

1. If between 7-10 V

3. Observe the scan tool Parking Assist Sensors Reference Voltage parameter while connecting the harness connector at each B78 Object Sensor, one at a time.

4. Verify the scan tool Parking Assist Sensors Reference Voltage parameter is between 7-10 V after connecting the harness connector at each B78 Object Sensor.

1. If not between 7-10 V

Replace the B78 Object Sensor that was connected immediately before the Parking

Assist Sensors Reference Voltage parameter was between 7-10 V.

1. If between 7-10 V

5. All OK.

1. If between 7-10 V

6. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Rear Parking Assist Alarm Sensor Replacement
- Control Module References for Control Module replacement, programming, and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - OBJECT DETECTION



NOTE:

The following steps must be completed before using the symptom tables:

1. Perform the Diagnostic System Check - Vehicle before using the Symptom Tables in order to verify that all of the following are true:

1. There are no DTCs set.
2. The control modules can communicate via the serial data link.

Note: The rear vision camera does not communicate on the serial data bus.

2. Review the system operation in order to familiarize yourself with the system functions. Refer to:

1. Cross Traffic Alert Description and Operation
2. Parking Assist Description and Operation
3. Pedestrian Impact Detection Description and Operation
4. Rear Vision Camera Description and Operation
5. Side Blind Zone Alert Description and Operation

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - OBJECT DETECTION > VISUAL/PHYSICAL INSPECTION

- Inspect for aftermarket devices which may affect the operation of the system. Refer to Checking Aftermarket Accessories .
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.
- This system can use various sensors that need to be clean in order to function properly. Make sure to check the following sensors for obstructions:
 - parking assist sensors located in the front and rear bumper covers.
 - rear vision camera lens.
 - front camera line of vision.
 - side object sensor module areas at sides of rear bumper fascia.

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - OBJECT DETECTION > INTERMITTENT

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections .

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - OBJECT DETECTION > SYMPTOM LIST

- Rear Cross Traffic Alert System Malfunction
- Rear Vision Camera System Malfunction
- Side Blind Zone Alert System Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > PEDESTRIAN IMPACT DETECTION SYSTEM DISABLING AND ENABLING

There are several reasons for disabling the pedestrian impact detection system (PIDS), such as repairs to the system or servicing a component near or attached to a PIDS component. There are several ways to disable the PIDS depending on what type of service is being performed. The following information covers the proper procedures for disabling/enabling the pedestrian impact detection system (PIDS).

Condition	Action
If the vehicle was involved in an accident with a hinge deployment.	Disconnect the negative battery cable(s). Refer to Repairs and Inspections Required After a Collision

	.
When performing PIDS diagnostics.	Follow the appropriate PIDS service manual diagnostic procedure(s)
When removing or replacing a PIDS component or a component attached to a PIDS component.	Disconnect the negative battery cable(s)
If the vehicle is suspected of having shorted electrical wires.	Disconnect the negative battery cable(s)
When performing electrical diagnosis on components other than the PIDS.	Remove the PIDS fuse(s) when indicated by the diagnostic procedure to disable the system

Pedestrian Impact Detection System (PIDS) Service Precautions



WARNING:

When performing service on or near the pedestrian impact detection system (PIDS) components or the PIDS wiring, the PIDS must be disabled. Failure to observe the correct procedure could cause deployment of the PIDS components. Serious injury can occur. Failure to observe the correct procedure could also result in unnecessary PIDS repairs

The pedestrian impact detection system (PIDS) maintains a reserve energy supply. The PIDS reserve energy supply provides deployment power for the hood hinge actuators if the PIDS loses battery power during a collision. Deployment power is available for as much as 1 minute after disconnecting the vehicle power. Waiting 1 minute before working on the system after disabling the system prevents deployment of the hood hinge actuators from the reserved energy supply.

General Service Instructions

The following are general service instructions which must be followed in order to properly repair the vehicle and return it to its original integrity:

- Do not expose the PIDS modules to temperatures above 65°C (150°F).
- Verify the correct replacement part number. Do not substitute a component from a different vehicle.
- Use only original GM replacement parts available from your authorized GM dealer. Do not use salvaged parts for repairs to the PIDS.

Discard any of the following components if it has been dropped from a height of 100 cm (3 feet) or greater:

- Pedestrian impact detection system module
- Pedestrian impact detection system sensors
- Pedestrian impact detection system hood hinge actuators

Disabling Procedure - Pedestrian Impact Detection System (PIDS) Fuse

1. Place the ignition in the OFF position.
2. Locate and remove the fuse supplying power to the PIDS. Refer to Object Detection

Schematics , or Electrical Center Identification Views . With all PIDS fuses removed and the ignition switch in the ON position, the PIDS warning indicator illuminates. This is normal operation, and does not indicate a PIDS system malfunction.

3. Wait 1 minute before working on the system.

Enabling Procedure - Pedestrian Impact Detection System (PIDS) Fuse

1. Place the ignition in the OFF position.
2. Install the fuse supplying power to the PIDS. Refer to Object Detection Schematics , or Electrical Center Identification Views .
3. Turn the ignition switch to the ON position. The PIDS indicator will flash then turn OFF.
4. Perform the Diagnostic System Check - Vehicle if the PIDS warning indicator does not operate as described. Refer to Diagnostic System Check - Vehicle .

Disabling Procedure - Negative Battery Cable

1. Place the ignition in the OFF position.
2. Disconnect the negative battery cable from the battery. Refer to Battery Negative Cable Disconnection and Connection .
3. Wait 1 minute before working on system.

Enabling Procedure - Negative Battery Cable

1. Place the ignition in the OFF position.
2. Connect the negative battery cable to the battery. Refer to Battery Negative Cable Disconnection and Connection .
3. Turn the ignition switch to the ON position. The PIDS indicator will flash then turn OFF.
4. Perform the Diagnostic System Check - Vehicle if the PIDS warning indicator does not operate as described. Refer to Diagnostic System Check - Vehicle .

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Side Object Sensor - Left Ground	-	U0232	-	-
Side Object Sensor - Left B+	-	U0232	-	-
Side Object Sensor - Left Communication (terminal 7)	1	U0232	1	-
Side Object Sensor - Left Communication (terminal 2)	1	U0233	1	
Side Object Sensor - Right Ground (terminal 8)	-	U0233	1	-
Side Object Sensor - Right Ground (terminal 3)	-	U0233	1	
Side Object Sensor - Right B+	1	U0233	-	-
Side Object Sensor - Right Communication	1	U0233	1	-
1. Rear Cross Traffic Alert Malfunction				

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The same sensors are also used for side blind zone alert. The sensors use radar to determine the presence of objects near the back of the vehicle. When an object is detected in the rear cross traffic zone, the module will send out a signal through serial data communication to turn on the visual icons and also audio chime or haptic notification. Each sensor is supplied B+ and ground. The right sensor receives an additional ground. Both sensors communicate independently on the serial data line. The serial data enters the left sensor in a pass-thru configuration, that connects to the right sensor. The scan tool is able to individually communicate with each sensor.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > DIAGNOSTIC AIDS

- The rear cross traffic alert system uses the same sensors as side blind zone alert so a malfunction may affect either or both systems.
- The conditions for disabling the rear cross traffic alert system are captured by DTCs. The drivers information center will display Service Side Detection System if one of the sensors has failed. A B101E 47 Electronic Control Unit Software VIN Not Programmed DTC in history will not affect sensor operation and the module should not be replaced for this DTC.
- The rear cross traffic system can be disabled if any off the following occur:

- The driver has selected the Off mode through vehicle personalization menus. The selected mode is retained over ignition cycles. A driver information center message stating that the Rear Cross Traffic System Alert Off shall be displayed.
 - There is a loss of serial data communication with a sensor or between modules.
- The side blind zone may be temporarily unavailable due to the following:
 - A blockage condition exists (i.e. mud/snow buildup in front of the sensor). A driver information message "Side Detection System Unavailable" will be displayed. The side blind zone system transitions back to the normal operating state when the blockage is removed. Bumper sticks, fascia damage, labels, and heavy rain storms may also cause this condition. The blockage determination is performed with the vehicle in a drive gear.
 - The rear cross traffic alert system will read the GPS latitude and longitude on the serial data bus and calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.
- Because the sensors are identical, they may be swapped from one side of the vehicle to the other in an attempt to isolate a concern. Sensors should NOT be swapped from one vehicle to another.
- The rear cross traffic alert system is designed to ignore stationary objects; however, the system may occasionally detect pedestrians, shopping carts, or other objects. This is normal system operation and does not require service.
- The rear cross traffic alert system may indicate an object if a trailer is attached to the vehicle, or a bicycle or object is extending out to either side of the vehicle. This is normal operation and does not require service.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Cross Traffic Alert Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify the scan tool can communicate with the left side object sensor.
 1. **If the scan tool can not communicate with the left side object sensor**
Refer to Circuit/System Testing - Left Side Object Sensor Malfunction.
 1. **If the scan tool can communicate with the left side object sensor**
3. Verify the scan tool can communicate with the right side object sensor.
 1. **If the scan tool can not communicate with the right side object sensor**
Refer to Circuit/System Testing - Right Side Object Sensor Malfunction.
 1. **If the scan tool can communicate with the right side object sensor**
4. Verify that the rear cross traffic indicators turn ON and then turn OFF when commanding the Rear Cross Traffic Visual Alert Indicators ON and OFF with a scan tool.
 1. **If alert indicators do not turn ON and OFF**
 1. Verify the system is enabled.
 1. If disabled, refer to diagnostic aids for cause of disable.
 1. If enabled test or replace the display.
 1. **If indicators turn ON and OFF**
5. Verify that the audible alert turns ON and then turn OFF when commanding the Rear Cross Traffic Audible Alert ON and OFF with a scan tool.
 1. **If the audible alert does not turn ON and OFF**
 1. Verify the system is enabled.
 1. If disabled, refer to diagnostic aids for cause of disable.
 1. If enabled refer to audio system malfunction.
 1. **If audible alert turns ON and OFF**
6. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM TESTING

Left Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down. Disconnect the harness connector at the B218L Side Object Sensor Module - Left.
2. Test for less than 10 Ω between ground circuit terminal 8 and ground.
 1. **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , repair the open/high resistance in the ground connection.
 1. **If less than 10 Ω**
3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 1. **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition Off.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 1. **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the B218L Side Object Sensor Module - Left.
 1. **If the test lamp illuminates**
4. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 2 Ω in each of the serial data circuits end to end between the control module harness connector terminal 2 and the DLC terminal 1.
 1. **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 1. **If less than 2 Ω**

6. Replace B218L Side Object Sensor Module - Left.

Right Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down. Disconnect the harness connector at the B218R Side Object Sensor Module - Right.

2. Test for less than 10 Ω between the following ground circuit terminals and ground.

1. Terminal 3

2. Terminal 8

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition OFF.

2. Test for less than 2 Ω in the B+ circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.

2. Test for infinite resistance between the B+ circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.

2. If infinite resistance, replace the B218R Side Object Sensor Module - Right.

1. If the test lamp illuminates

4. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.

5. Test for less than 2 Ω in each of the serial data circuits end to end between the control module harness connector terminal 7 and the DLC terminal 1.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

6. Replace B218R Side Object Sensor Module - Right.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR CROSS TRAFFIC ALERT SYSTEM MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > DTC DESCRIPTORS

B127B 2B

Rearview Camera Input Signal Circuit Missing Reference

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	1	B127B 2B	-	-
Camera Module signal +	1	1	1	-
Camera Module signal -	2	B127B 2B	1	-
Ground	-	B127B 2B	-	-
Shield	2	B127B 2B	2	-
1. Rear Vision Camera Malfunction 2. Poor Quality Image				

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The rearview camera is always supplied power when the vehicle is ON. Video signals are constantly to the Human Machine Interface Control Module. If the Human Machine Interface Control Module does not see a signal from the camera it will set B127B 2B and display "Service Rear Vision System".

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

The vehicle must be in reverse with the engine running.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CONDITIONS FOR SETTING THE DTC

B127B 2B

Signal from the rearview camera not received by the Human Machine Interface Control Module for 2.5s.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The Human Machine Interface Control Module commands the driver information center to display "Service Rear Vision System".
- The Human Machine Interface Control Module stores the DTC in memory.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Vision Camera Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC B2545 is not set.
 1. **If the DTC is set**

Refer to DTC B2545 .
 1. **If the DTC is not set**
3. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
 1. **If debris are found on the lens**

Clean the lens. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 1. **If no debris on the lens**
4. Ignition ON, transmission in R.
5. Verify the backup lamps are illuminated.
 1. **If the backup lamps are not illuminated**

Refer to Backup Lamps Malfunction (Automatic Transmission)Backup Lamps Malfunction (Manual Transmission) .
 1. **If the backup lamps are illuminated**
6. Engine running, transmission in R.

7. Verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear image is not displayed

Refer to Circuit/System Testing.

1. If a clear image is displayed

8. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > CIRCUIT/SYSTEM TESTING



NOTE:

- *Circuit/System Verification must be performed before Circuit/System Testing.*
- *Under normal operating conditions the Human Machine Interface Control Module will become very hot. The module should be allowed to cool down prior to removal for any service procedure.*

With IO5 or IO6

1. Ignition OFF, disconnect the harness connector at the B87 Rearview Camera.

2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition OFF.

2. Test for less than 2 Ω in the ignition circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.
2. Test for infinite resistance between the ignition circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the B87 Rearview Camera.

1. If the test lamp illuminates

5. Ignition OFF, disconnect the X2 harness connector at the K74 Human Machine Interface Control Module, ignition ON.

6. Test for less than 1 V between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 5
2. B87 Rearview Camera signal (-) circuit terminal 6

1. If 1 V or greater

Repair the short to voltage on the circuit.

1. If less than 1 V

7. Test for infinite resistance between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 5
2. B87 Rearview Camera signal (-) circuit terminal 6

1. If less than infinite resistance

Repair the short to ground on the circuit.

1. If infinite resistance

8. Test for less than 2 Ω in the signal (+) circuit end to end.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

9. Test for less than 2 Ω in the signal (-) circuit end to end.

1. If 2 Ω or greater

Test the signal circuit for an open/high resistance.

1. If less than 2 Ω

10. Replace the B87 Rearview Camera.

11. Engine running, transmission in R, verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear rear vision image is not displayed

Replace the K74 Human Machine Interface Control Module.

1. If a clear rear vision image is displayed

12. All OK.

With IOB

1. Ignition OFF, disconnect the harness connector at the B87 Rearview Camera.

2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition OFF.

2. Test for less than 2 Ω in the ignition circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , verify the fuse is OK and there is voltage at the fuse. Refer to Power Mode Mismatch .

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.

2. Test for infinite resistance between the ignition circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.

2. If infinite resistance, replace the B87 Rearview Camera.

1. If the test lamp illuminates

5. Ignition OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON.

6. Test for less than 1 V between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 15

2. B87 Rearview Camera signal (-) circuit terminal 14

1. If 1 V or greater

Repair the short to voltage on the circuit.

1. If less than 1 V

7. Test for infinite resistance between the signal circuit terminal listed below and ground:

1. B87 Rearview Camera signal (+) circuit terminal 15

2. B87 Rearview Camera signal (-) circuit terminal 14

1. If less than infinite resistance

Repair the short to ground on the circuit.

1. If infinite resistance

8. Test for less than 2 Ω in the signal (+) circuit end to end.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

9. Test for less than 2 Ω in the signal (-) circuit end to end.

1. If 2 Ω or greater

Test the signal circuit for an open/high resistance.

1. If less than 2 Ω

10. Replace the B87 Rearview Camera.

11. Engine running, transmission in R, verify a clear rear vision image is displayed on the P17 Info Display Module.

1. If a clear rear vision image is not displayed

Replace the A11 Radio.

1. If a clear rear vision image is displayed

12. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > REAR VISION CAMERA SYSTEM MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Rearview Driver Information Camera Replacement

- Control Module References for Control Module replacement, programming, and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Side Object Sensor - Left Ground	-	U0232	-	-
Side Object Sensor - Left B+	-	U0232	-	-
Side Object Sensor - Left Communication (terminal 7)	1	U0232	1	-
Side Object Sensor - Left Communication (terminal 2)	1	U0233	1	-
Side Object Sensor - Right Ground (terminal 8)	-	U0233	1	-
Side Object Sensor - Right Ground (terminal 3)	-	U0233	1	-
Side Object Sensor - Right B+	1	U0233	-	-
Side Object Sensor - Right Communication	1	U0233	1	-
Side Object Sensor - Left Indicator Low Reference Circuit	-	1	1	-
Side Object Sensor - Left Indicator Control Circuit	1	1	1	-
Side Object Sensor - Right Indicator Low Reference Circuit	-	1	1	-
Side Object Sensor - Right Indicator Control Circuit	1	1	1	-
1. Side Blind Zone Alert Malfunction				

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

When the system detects a vehicle in the side blind zone while driving, the left or right side object sensor will supply power to the appropriate outside rearview mirror. Ground is provided through the outside rearview mirror harness. The amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes. An audible alert will also sound.

Side blind zone alert is active when the vehicle is out of park or the parking brake is off on manual transmission vehicles and at speeds up to approximately 140 km/h (87 MPH). If a vehicle is detected in the blind zone, the warning symbols will turn illuminate on the appropriate side. When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating. The warning symbols will vary brightness based on the ambient light conditions.

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > DIAGNOSTIC AIDS

- The conditions for disabling the side blind zone alert system are captured by DTCs. The drivers information center will display Service Side Detection System if one of the sensors has failed. A B101E 47 Electronic Control Unit Software VIN Not Programmed DTC in history will not affect sensor operation and the module should not be replaced for this DTC.
- The side blind zone system can be disabled if any off the following occur:
 - The driver has selected the Off mode through vehicle personalization menus. The selected mode is retained over ignition cycles. A driver information center message stating that the side blind zone system is off shall be displayed and the outside mirror indicators will be OFF.
 - There is a loss of serial data communication with a sensor or between modules.
- The side blind zone may be temporarily unavailable due to the following:
 - A blockage condition exists (i.e. mud/snow buildup in front of the sensor). A driver information message "Side Detection System Unavailable" will be displayed. The side blind zone system transitions back to the normal operating state when the blockage is removed. Bumper sticks, fascia damage, labels, and heavy rain storms may also cause this condition. The blockage determination is performed with the vehicle in a drive gear.
 - The side blind zone alert system will read the GPS latitude and longitude on the serial data bus and calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.
- Because the sensors are identical, they may be swapped from one side of the vehicle to the other in an attempt to isolate a concern. Sensors should NOT be swapped from one vehicle to another.
- The side blind zone system is designed to ignore stationary objects; however, the system may occasionally detect guard rails, signs, trees, shrubs, or other stationary objects as an object in the blind zone. This is normal system operation and does not require service.

- The side blind zone system may indicate an object in the blind zone if a trailer is attached to the vehicle, or a bicycle or object is extending out to either side of the vehicle. This is normal operation and does not require service.

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Side Blind Zone Alert Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.

2. Verify the scan tool can communicate with the left side object sensor.

1. If the scan tool can not communicate with the left side object sensor

Refer to Circuit/System Testing - Left Side Object Sensor Malfunction.

1. If the scan tool can communicate with the left side object sensor

3. Verify the scan tool can communicate with the right side object sensor.

1. If the scan tool can not communicate with the right side object sensor

Refer to Circuit/System Testing - Right Side Object Sensor Malfunction.

1. If the scan tool can communicate with the right side object sensor

4. Ignition OFF, ignition ON.
5. Verify that both side blind zone alert system indicators located in the outside rearview mirrors briefly turn ON and then turn OFF during the system self test.

1. If both side blind zone alert indicators do not briefly turn ON and OFF

1. Verify the system is enabled

1. If disabled, refer to diagnostic aids for cause of disable.

1. If enabled, refer to Circuit/System Testing - Side Object Indicator Malfunction.

1. If only one indicator does not briefly illuminate during the self test

Refer to Circuit/System Testing - Side Object Indicator Malfunction.

1. If both side blind zone alert indicators briefly turn ON and OFF

6. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT SYSTEM MALFUNCTION > CIRCUIT/SYSTEM TESTING

Left Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. Disconnect the harness connector at the B218L Side Object Sensor Module - Left. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between ground circuit terminal 8 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition Off.

2. Test for less than 2 Ω in the B+ circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.
2. Test for infinite resistance between the B+ circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the B218L Side Object Sensor Module - Left.

1. If the test lamp illuminates

4. Ignition OFF and all vehicle systems OFF. Disconnect the It may take up to 2 minutes for all vehicle systems to power down.

5. Test for less than 2 Ω between the serial data circuit terminal 2 and the DLC terminal 1.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

6. Replace B218L Side Object Sensor Module - Left.

Right Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. Disconnect the harness connector at the B218R Side Object Sensor Module - Right. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the following ground circuit terminals and ground.

1. Terminal 3
2. Terminal 8

1. If 10 Ω or greater

1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.

1. If the test lamp does not illuminate and the circuit fuse is good

1. Ignition Off.
2. Test for less than 2 Ω in the B+ circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

1. If the test lamp does not illuminate and the circuit fuse is open

1. Ignition OFF.

2. Test for infinite resistance between the B+ circuit and ground.

1. If less than infinite resistance, repair the short to ground on the circuit.

2. If infinite resistance, replace the B218R Side Object Sensor Module - Right.

1. If the test lamp illuminates

4. Ignition OFF and all vehicle systems OFF. It may take up to 2 min for all vehicle systems to power down.

5. Test for less than 2 Ω between the serial data circuit terminal 7 and the DLC terminal 1.

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

6. Replace B218R Side Object Sensor Module - Right.

Side Object Indicator Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector for the appropriate A9 Outside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.

1. X510 - Driver Door Harness to Outside Rearview Mirror

2. X610 - Passenger Door Harness to Outside Rearview Mirror

2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

1. If 10 Ω or greater

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

1. If 2 Ω or greater, repair the open/high resistance in the circuit.

2. If less than 2 Ω , repair the open/high resistance in the ground connection.

1. If less than 10 Ω

3. Ignition ON, connect a test lamp between the control circuit terminal 15 and the ground circuit terminal 5.

4. Verify the test lamp turns ON and OFF when commanding the appropriate Object Detection Alert Indicators ON and OFF with a scan tool.

1. If the test lamp is always OFF

1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object Sensor Module.
2. Test for infinite resistance between the control circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 1. If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the B218 Side Object Sensor Module.

1. If the test lamp is always ON

1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.
2. Test for less than 1 V between the control circuit and ground.
 1. If 1 V or greater, repair the short to voltage on the circuit.
 2. If less than 1 V, replace the B218 Side Object Sensor Module.

1. If the test lamp turns ON and OFF

5. Test or replace the A9 Outside Rearview Mirror Glass.

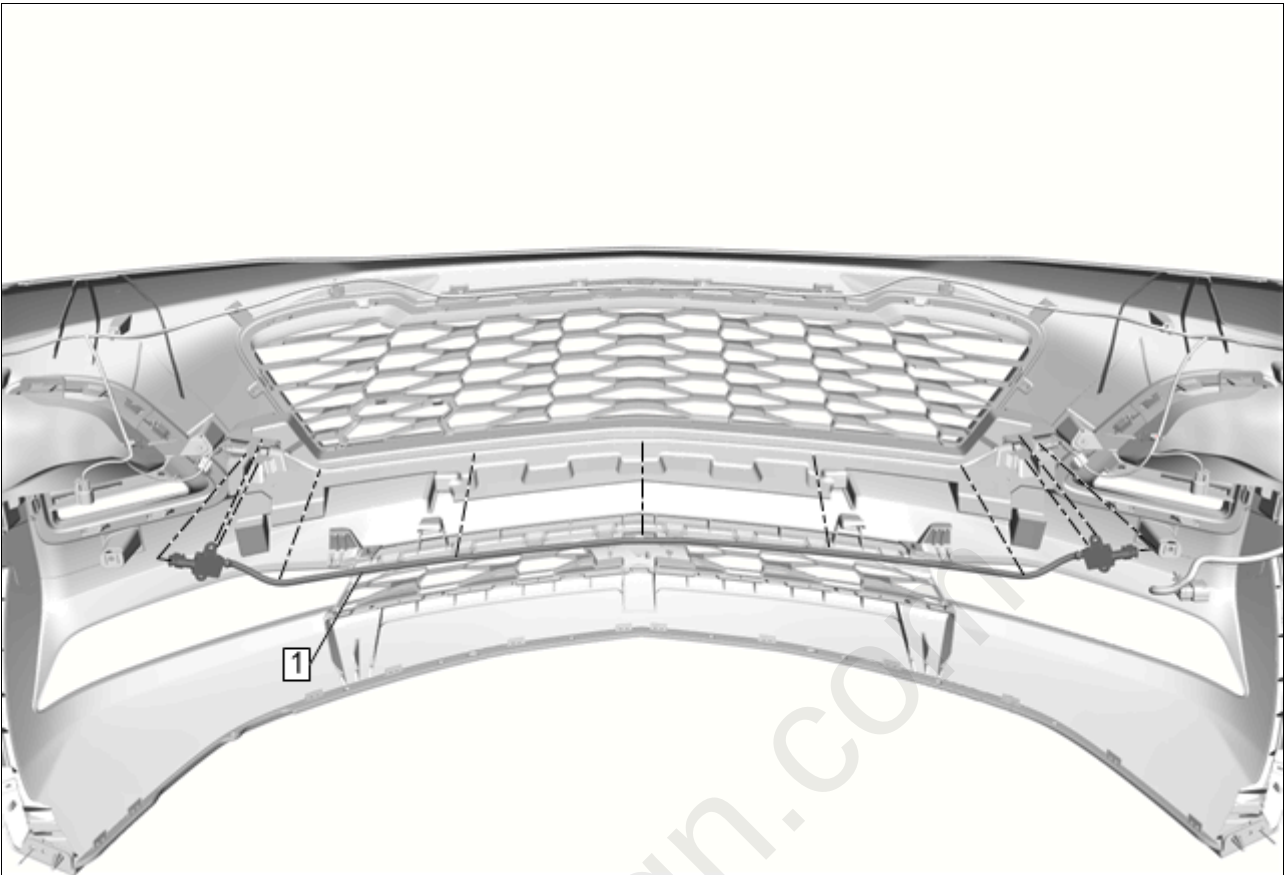
**DIAGNOSTIC INFORMATION AND PROCEDURES > SIDE BLIND ZONE ALERT
SYSTEM MALFUNCTION > REPAIR INSTRUCTIONS**

Perform the Diagnostic Repair Verification after completing the repair.

- Outside Rearview Mirror Glass Replacement
- Control Module References for control module replacement, programming and setup.

**REPAIR INSTRUCTIONS > PEDESTRIAN IMPACT DETECTION SENSOR
REPLACEMENT - FRONT UPPER BEAM**

Fig 1: Pedestrian Impact Detection Sensor - Front Upper Beam



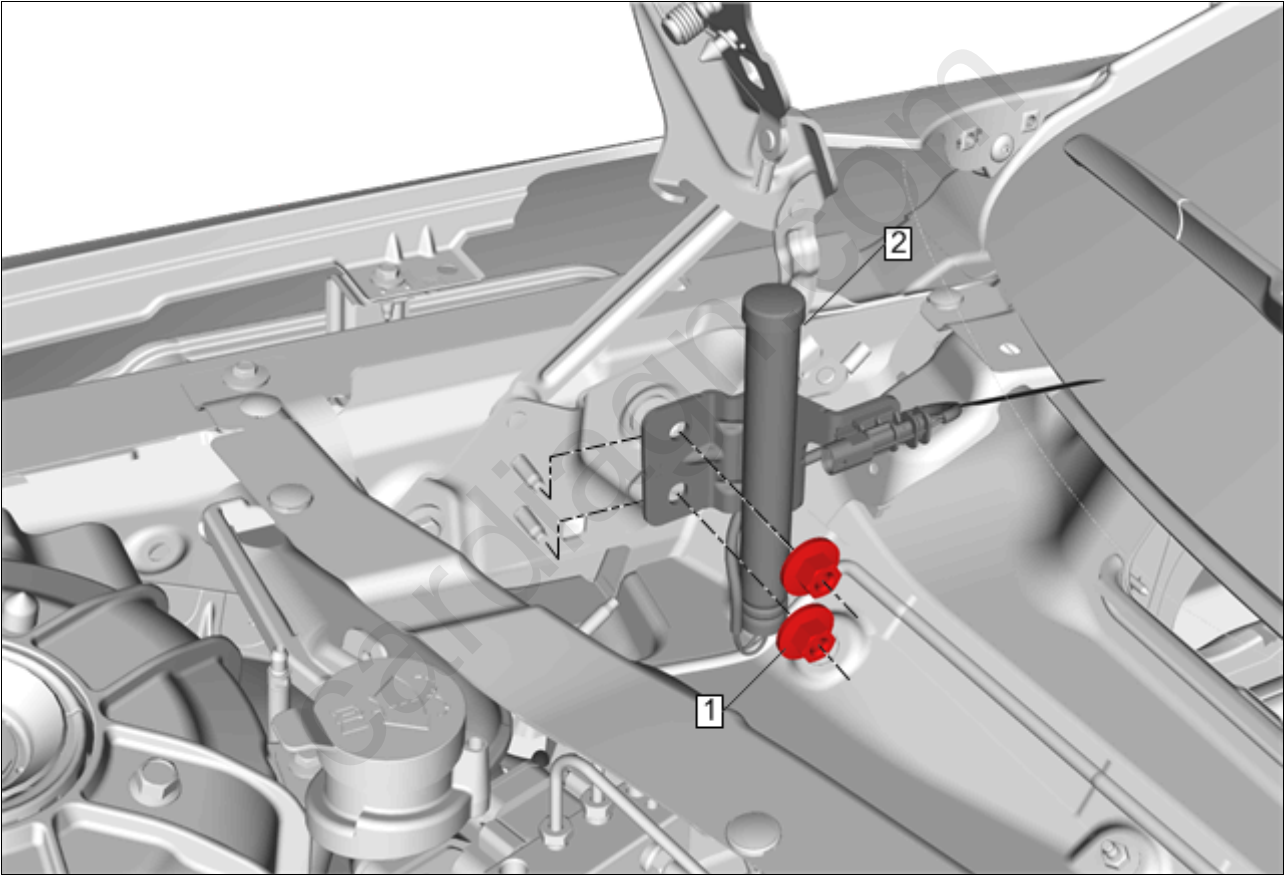
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Disable the pedestrian impact detection system. Pedestrian Impact Detection System Disabling and Enabling 2. Front Bumper Fascia Energy Absorber Replacement	
1	Pedestrian Impact Detection Sensor Procedure 1. Disconnect the electrical connector. 2. Carefully remove the pedestrian impact detection sensor from the front bumper fascia energy absorber. 3. Enable the pedestrian impact detection system. Pedestrian Impact Detection System Disabling and Enabling  NOTE:

- *Inspect the absorber / EA foam for any cracks or damage and inspect pedestrian sensor tube for any cuts or puncture holes.*
- *Replace front bumper fascia or sensor system if any damage is found. This can cause faulty readings with the pedestrian impact sensor.*
- *The pedestrian sensor is a press fit into the absorber.*

REPAIR INSTRUCTIONS > ACTIVE HOOD HINGE ACTUATOR REPLACEMENT

Fig 1: Active Hood Hinge Actuator



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Disable the system. Pedestrian Impact Detection System Disabling and Enabling	
1	Active Hood Hinge Actuator Nut (Qty: 2) CAUTION:

	<i>Refer to Fastener Caution .</i>
	Tighten 22 N.m (16 lb ft)
2	Active Hood Hinge Actuator Procedure 1. Disconnect the electrical connector. 2. If deployed, replace the following parts: 1. Left and right actuator 2. Left and right hood hinge 3. Hood 3. Inspect the hood latch and subsequent replacement if functionality or appearance is compromised. 4. Enable the system. Pedestrian Impact Detection System Disabling and Enabling

REPAIR INSTRUCTIONS > PEDESTRIAN IMPACT DETECTION SYSTEM HANDLING AND SCRAPPING

Special Tools

- **J38826-1** SIR Deployment Harness
- **J38826-45** PIDS Actuator Adapter

For equivalent regional tools, refer to Special Tools .

REPAIR INSTRUCTIONS > PEDESTRIAN IMPACT DETECTION SYSTEM HANDLING AND SCRAPPING > LIVE AND UNDEPLOYED PEDESTRIAN IMPACT DETECTION SYSTEM ACTUATOR

Take special care when handling or storing an undeployed Pedestrian Detection Impact System (PIDS) Actuator. A PIDS Actuator deployment produces a rapid generation of gas. This may cause the PIDS Actuator, or an object in front of the PIDS Actuator, to project through the air in the event of an unlikely deployment.

REPAIR INSTRUCTIONS > PEDESTRIAN IMPACT DETECTION SYSTEM HANDLING AND SCRAPPING > SCRAPPING PROCEDURE

During the course of a vehicles useful life, certain situations may arise which will require the disposal of a live and undeployed PIDS Actuator. Do NOT dispose a live and undeployed PIDS Actuator through normal disposal channels until the PIDS Actuator has been deployed.

Do not deploy the PIDS Actuator in the following situations:

1. After replacement of a PIDS Actuator under warranty the PIDS Actuator may need to be returned undeployed to the manufacturer.
2. If the vehicle is the subject of a Product Liability report, GM-1241, or Special Field Investigation (SFI), related to the PIDS system and is subject to a preliminary investigation do NOT alter the PIDS Actuator system in any manner.
3. If the vehicle is involved in a campaign affecting the PIDS Actuator follow the instructions in the Campaign Service Bulletin for proper PIDS Actuator handling procedures.

REPAIR INSTRUCTIONS > PEDESTRIAN IMPACT DETECTION SYSTEM HANDLING AND SCRAPPING > DEPLOYMENT PROCEDURES

Deploy the PIDS Actuators outside of the vehicle.

Deployment Outside Vehicle

Deploy the PIDS Actuator outside of the vehicle when the vehicle will be returned to service. Situations that require deployment outside of the vehicle include the following:

- Using the PIDS diagnostics, you determine that the PIDS Actuator is malfunctioning.
- The PIDS Actuator is cosmetically damaged, scratched, or broken.
- The PIDS Actuator pigtail is damaged.
- The PIDS Actuator connector is damaged.
- The PIDS Actuator connector terminals are damaged.

Deployment and disposal of a malfunctioning PIDS Actuator is subject to any required retention period.

WARNING:

In order to prevent accidental deployment and the risk of personal injury, do not dispose of an undeployed Pedestrian Impact Detection System (PIDS) Actuator as normal shop waste. Undeployed PIDS Actuators contain substances that could cause severe illness or personal injury if their sealed containers are damaged during disposal. Use the following deployment procedures to safely dispose of an undeployed PIDS Actuators. Failure to observe the following disposal methods may be a violation of Federal law.

1. Turn OFF the ignition.

2. Remove the ignition key.
3. Put on safety glasses.
4. Remove the PIDS Actuator.
5. Place the PIDS Actuator on a work bench, with connector side facing up and away from the surface.
6. Clear a space on the ground about 1.85 m (6 ft) in diameter for deployment of the PIDS Actuator. If possible, use a paved, outdoor location free of activity. Otherwise, use a space free of activity on the shop floor. Ensure you have sufficient ventilation.
7. Clear the area of loose or flammable objects.
8. Place PIDS Actuator in the center.
9. Inspect the SIR deployment harness and the PIDS Actuator adapter for damage. Replace as needed.
10. Short the 2 SIR deployment harness leads together using one banana plug seated into the other.
11. Connect the appropriate pigtail adapter to the SIR deployment harness.
12. Extend the SIR deployment harness and adapter to the full length of 5 m from the deployment area.
13. Connect the PIDS actuator to the adapter on the SIR deployment harness.
14. Place a 12 volt minimum/4 amp minimum power source, such as a vehicle battery, near the shorted end of the harness.

 NOTE:

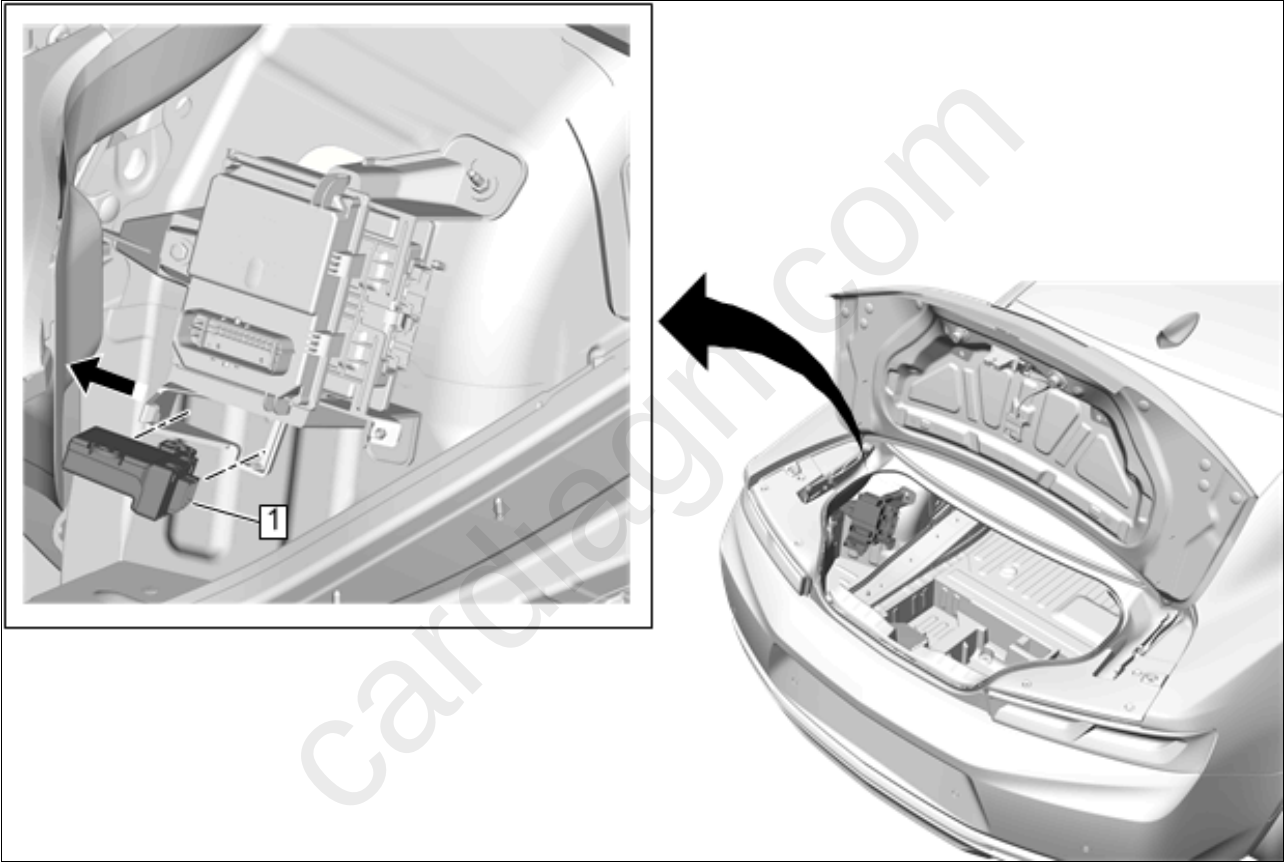
The rapid expansion of gas involved with deploying a PIDS Actuator is very loud. Notify all the people in the immediate area that you intend to deploy the PIDS Actuator.

15. Clear the area of people.
16. Separate the 2 banana plugs on the PIDS deployment harness that were shorted together earlier in the procedure.
17. Connect the SIR deployment harness wires to the power source. Deployment of the PIDS Actuator will occur when contact is made.
18. Disconnect the SIR deployment harness from the power source after the PIDS Actuator deploys.
19. If the PIDS Actuator did not deploy, disconnect the adapter and discontinue the procedure and contact the Technical Assistance Group. If deployment was successful, proceed to the following steps.
20. Seat one banana plug into the other in order to short the deployment harness leads.

- 21. Put on a pair of shop gloves.
- 22. Disconnect the pigtail adapter from the PIDS actuator as soon as possible.
- 23. Inspect the pigtail adapter and the SIR deployment harness. Replace as needed.
- 24. Dispose of the deployed PIDS Actuator through normal refuse channels.
- 25. Wash your hands with a mild soap.

REPAIR INSTRUCTIONS > PARKING ASSIST CONTROL MODULE REPLACEMENT

Fig 1: Parking Assist Control Module



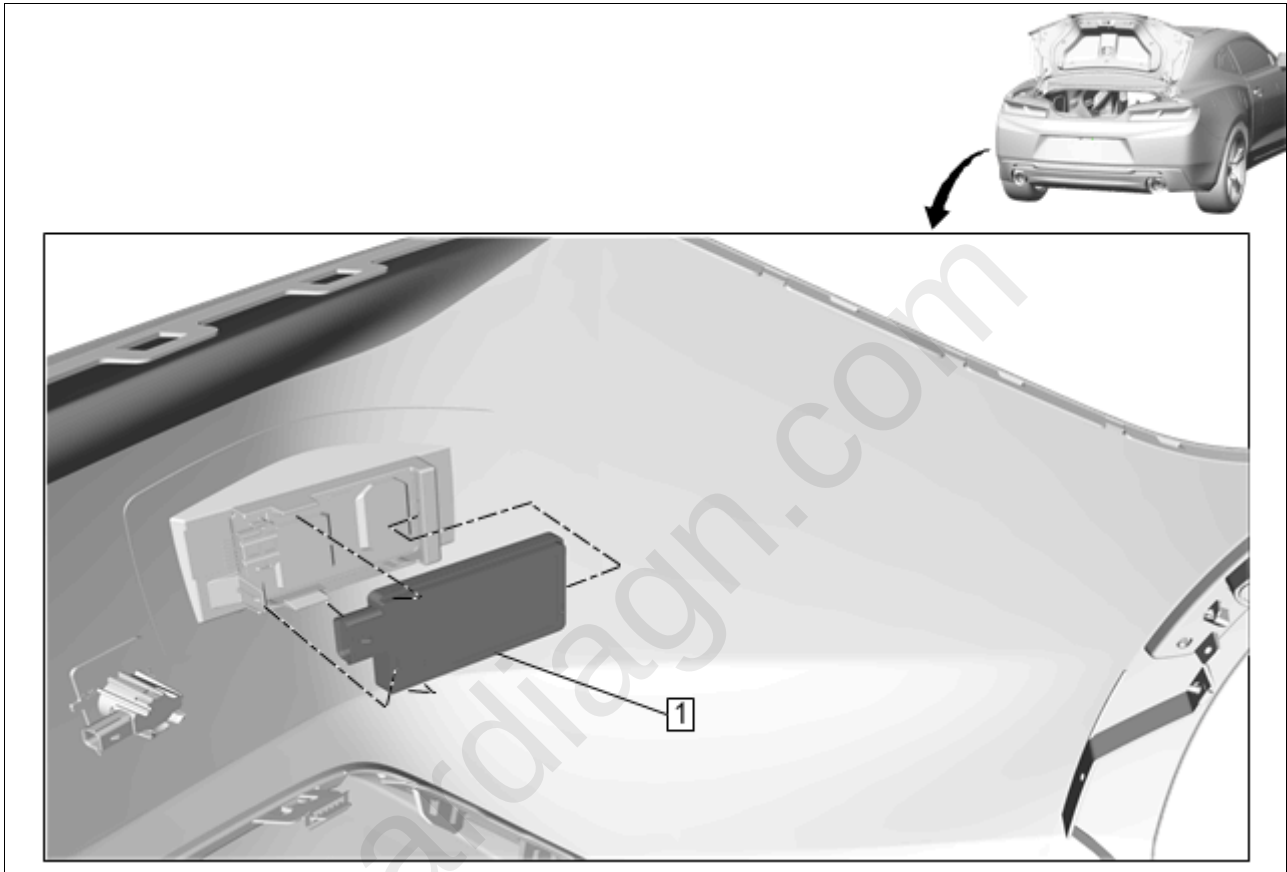
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Compartment Side Trim Replacement - Left Side (Coupe) Rear Compartment Side Trim Replacement - Left Side (Convertible)	
1	Parking Assist Control Module Procedure 1. Disconnect the electrical connectors.

2. Release the retaining tab.
3. Control Module References for programming and set up procedures, if required.

REPAIR INSTRUCTIONS > SIDE OBJECT SENSING ALERT MODULE REPLACEMENT

Fig 1: Side Object Sensing Alert Module

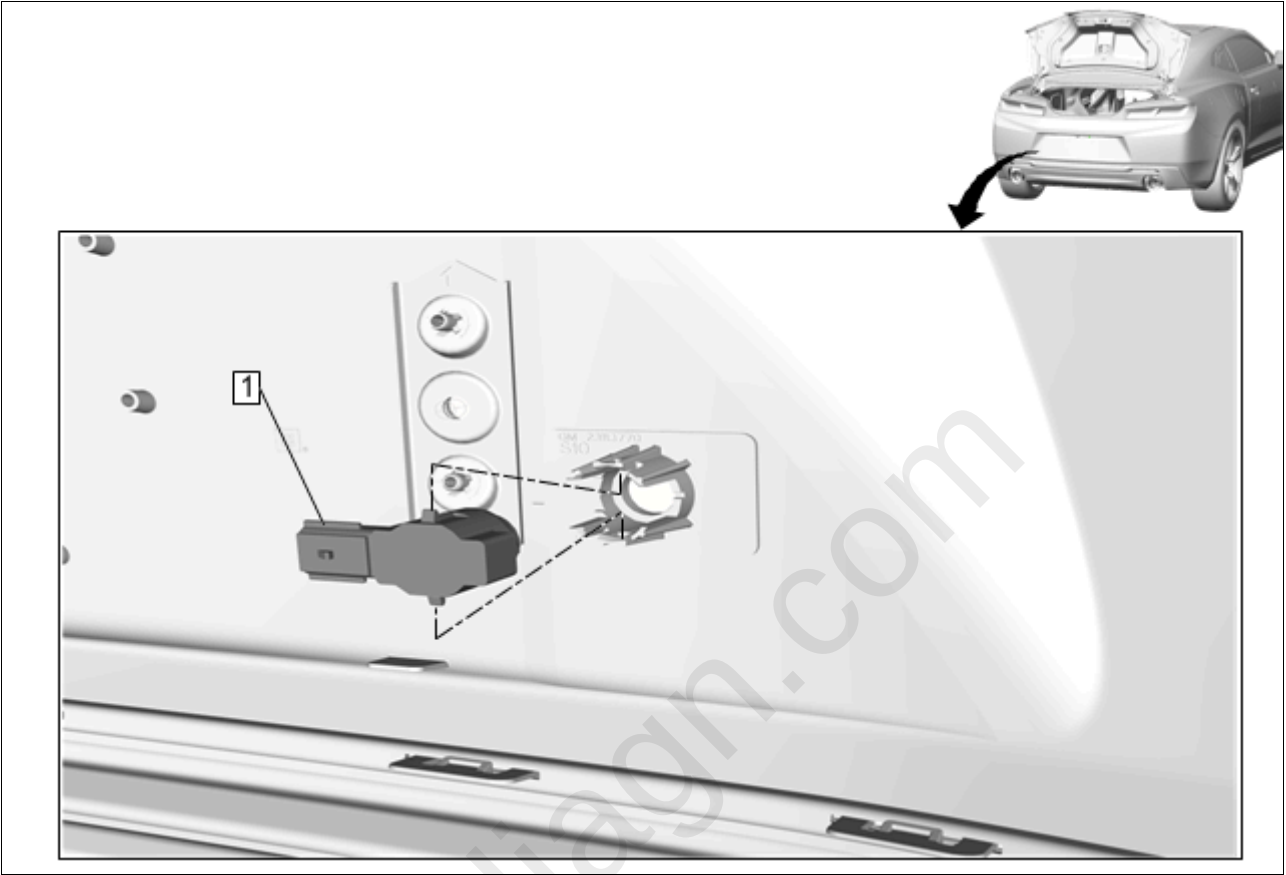


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Bumper Fascia Energy Absorber Replacement .	
1	Side Object Sensing Alert Module Procedure 1. Disconnect the electrical connector. 2. Release the tab retainers and slide the module up and out of the retaining bracket. 3. Control Module References for programming and setup information, if required.

REPAIR INSTRUCTIONS > REAR PARKING ASSIST ALARM SENSOR REPLACEMENT

Fig 1: Rear Parking Assist Alarm Sensor

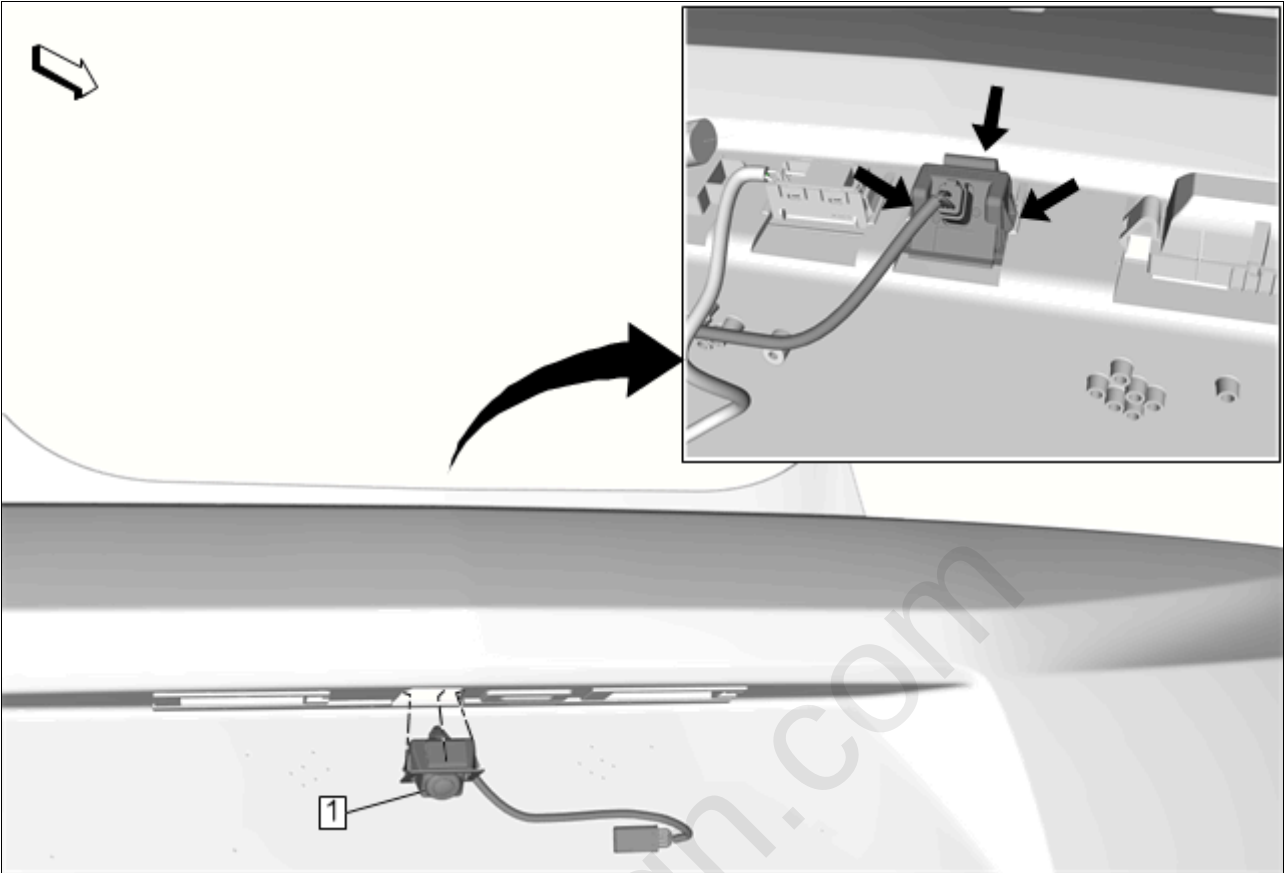


Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Bumper Fascia Energy Absorber Replacement	
1	Rear Parking Assist Alarm Sensor Procedure 1. Disconnect the electrical connector. 2. Lift the locking tabs on the housing and remove the rear parking assist alarm sensor.

REPAIR INSTRUCTIONS > REARVIEW DRIVER INFORMATION CAMERA REPLACEMENT

Fig 1: Rearview Driver Information Camera



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Bumper Fascia Replacement	
1	Rearview Camera Procedure 1. Disconnect all electrical connectors. 2. Depress the clip fingers and push outward to remove the rearview camera from the rear fascia.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR PARK ASSIST, UD7)

The parking assist system is designed to identify and notify the driver of an object in the vehicle path when moving forward or reversing at speeds of less than 8 km/h (5 MPH). The distance and location of the object is determined by 8 object sensors: 4 located in the rear bumper and 4 located in the front bumper. The parking assist system will notify the driver using audible beeps through the radio or haptic

pulses through the driver's seat. The driver can select between audible or haptic alerts in the vehicle personalization menus. See the user's manual for more detailed information on vehicle personalization.

The parking assist system is made up of the following components:

- Parking assist control module
- Front object sensors
- Rear object sensors
- Parking assist switch
- Parking assist indicator
- Radio
- Safety Alert Seat, if equipped.

Parking Assist Control Module

The parking assist control module provides a reference voltage and a low reference to the 8 object alarm sensors. The parking assist control module receives individual signals from each of the 8 sensors and determines the location and distance of an object based on these inputs. When an object is detected, the parking assist control module will send a data message via serial data to the radio requesting an audible alert.

Object Sensors

The object sensors are located in the front and rear bumpers of the vehicle. The sensors are used to determine the distance between an object and the bumper. Each sensor emits an ultrasonic frequency which is reflected off any object located in front of or behind the vehicle. These reflections are received by the sensors. The time difference between the emission of the frequency and when the reflection is received is known as sensor echo time, it is used to determine the distance to the object. The sensors report this information to the parking assist control module.

Parking Assist Switch

The parking assist can be activated and deactivated by pressing the parking assist switch. By engaging the reverse gear the parking assist can also be activated. By subsequently pressing the parking assist switch the parking assist can be disabled again.

Parking Assist Indicator

The indicator in the parking assist switch shows the status of the parking assist. If the lamp is ON, the parking assist is activated.

Radio

The radio controls the audible alert for the park assist alert. If the an object is detected the radio will command beeps as an audible alert to the driver.

Safety Alert Seat

The memory seat module controls the haptic alert provided by the seats. If an object is detected, the memory seat module will command pulses to the driver's seat.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR PARK ASSIST, UD7) > PARKING ASSIST OPERATION

When an object is within the measuring range of the sensor, the ultrasonic pulse is reflected and is received by the sending or a neighboring sensor. The sensor converts this signal into a voltage signal and sends this signal to the parking assist control module. The parking assist control module evaluates the received sensor signals. As soon as an object is within the measuring range, the parking assist control module sends a message via serial data to either the radio or seat module to provide an alert signal.

The parking assist system can detect objects greater than 7.6 cm (3 in) wide and 25.4 cm (10 in) tall. The system cannot detect objects below the bumper, underneath the vehicle. If an object is detected, one of the following will occur:

- The measuring range of the front object sensors is between 30-120 cm (11.8-47.2 in). From a distance of 120 cm (47.2 in), the acoustic signal is active. The frequency of the beep sound increases with decreasing distance. From a distance less than 30 cm (11.8 in), the sound becomes continuous.
- The measuring range of the rear object sensors is between 30-250 cm (11.8-98.4 in). From a distance of 250 cm (98.4 in), the acoustic signal is active. The frequency of the beep sound increases with decreasing distance. From a distance less than 30 cm (11.8 in), the sound becomes continuous.

The parking assist can be activated and deactivated by pressing the parking assist switch. When REVERSE gear is selected, park assist automatically is engaged for both front and rear sensors. When the vehicle is put into DRIVE from REVERSE the front assist sensors will be active up to speeds of 8 km/h (5 MPH) to assist with parking maneuvers. Once the vehicle is above 8 km/h (5 MPH) the front sensors are disabled and will not be re-enabled until either REVERSE gear is selected or the parking assist switch is pressed to activate the system. Once the parking assist switch is pressed during a key cycle the front sensors become active at speeds under 8 km/h (5 MPH). If the park assist switch is pressed again in the same key cycle the message "Park Assist Off" will be displayed in the driver information center if the vehicle speed is under 8 km/h (5 MPH) and front sensors detect an object within 120 cm (47.2 in). The LED indicator on the parking assist switch provides the ON/OFF state of the system. If the indicator is ON, the system is active and ready to assist.

The parking assist control module carries out a self test and monitors the sensors for electrical and mechanical faults. Monitored is the power supply of each sensor and the sensor signals, which need to alter when the vehicle moves. If this is not the case, the sensor is acoustically blocked or faulty. Mud, ice and snow may cause obstruction of the function of the sensors. The parking assist control module also checks whether the correct type of sensor is installed. If any of these tests fails, a DTC with corresponding symptom is set, the parking assist is deactivated and the parking assist indicator in the instrument panel cluster is activated.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR PARK ASSIST, UD7) > PARKING ASSIST SYSTEM DRIVER INFORMATION CENTER MESSAGES

SERVICE PARK ASSIST

The driver information center displays SERVICE PARK ASSIST when the parking assist control module detects a malfunction in the parking assist system and the system is disabled. The driver information center also displays SERVICE PARK ASSIST when a loss of communication occurs with the parking assist control module.

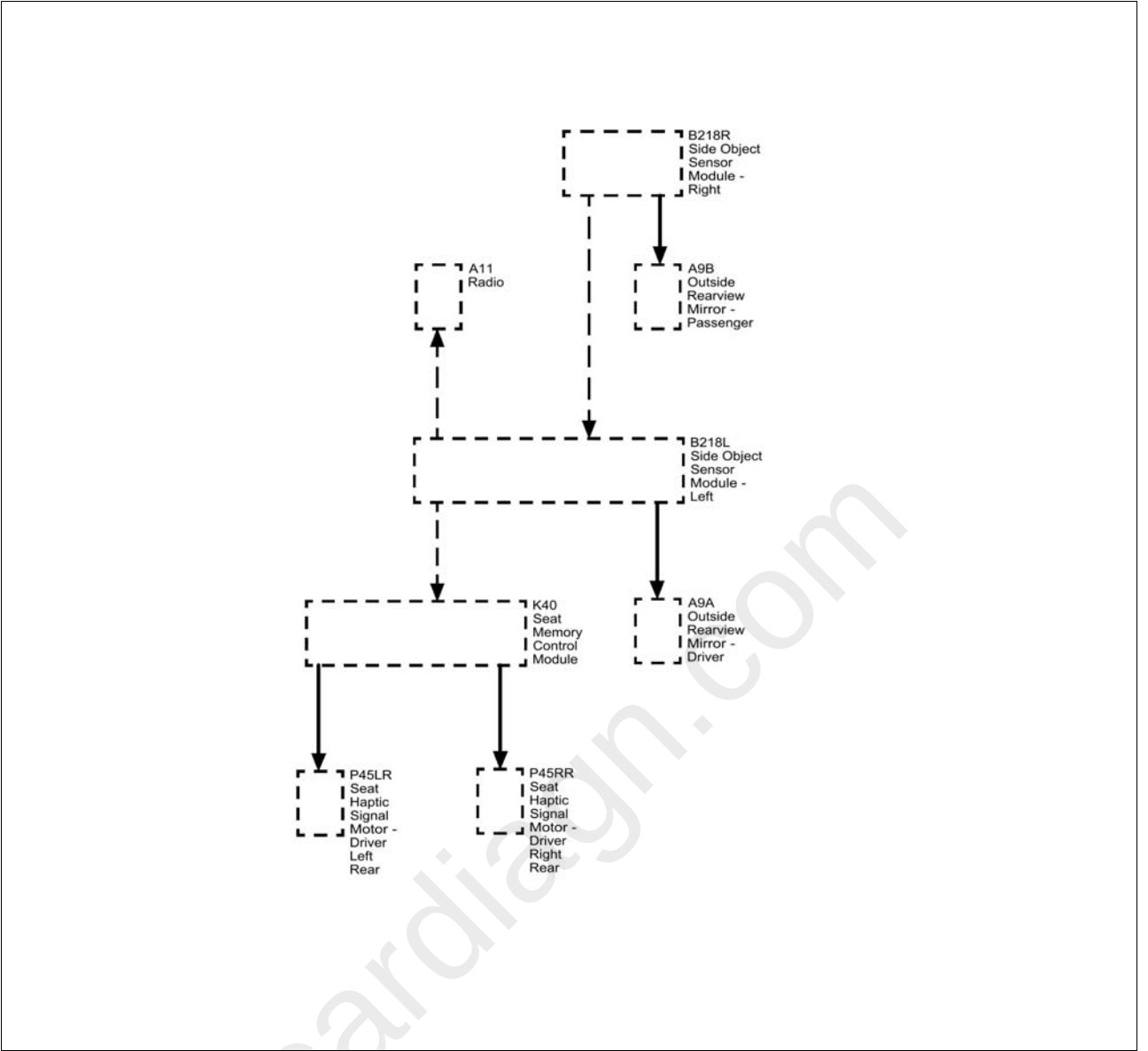
PARK ASSIST OFF

The PARK ASSIST OFF message is displayed in the driver information center when the parking assist system is disabled due to conditions that disable or inhibit the system. The parking assist control module requests the driver information center display PARK ASSIST OFF when it detects that one of the following conditions:

- The parking assist system is manually disabled using the parking assist switch.
- An object is attached to the rear of the vehicle, such as a trailer, bicycle rack, trailer hitch receiver, or tow bar. Also, an object extending beyond a lowered tailgate will disable the system.
- The parking assist sensors are covered by snow, mud, dirt, slush, or ice.
- The vehicle bumper is damaged.
- Excessive paint thickness on a replacement parking assist sensor.
- The parking assist sensors are disrupted by vibrations, like those caused by a large nearby vehicle or from heavy equipment such as a jackhammer.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, N AMERICA)

Fig 1: Side Blind Zone Alert Block Diagram (with Side Blind Zone Alert, UFT, North America)



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B218R	B218R Side Object Sensor Module - Right
A9B	A9B Outside Rearview Mirror - Passenger
A11	A11 Radio
B218L	B218L Side Object Sensor Module - Left
A9A	A9A Outside Rearview Mirror - Driver
K40	K40 Seat Memory Control Module
P45LR	Seat Haptic Movement Motor - Driver Left Rear
P45RR	Seat Haptic Movement Motor - Driver Right Rear

**NOTE:**

Not all items in block diagram may apply to specific vehicle. Refer to schematics for specific vehicle wiring diagrams.

Description and Operation

The side blind zone alert system shall detect and report "objects of interest" on either side of the vehicle, within a specified "blind spot" zone. The system is designed to alert the driver, with a visual display placed on the side view mirror, to the presence of objects of interest that may not be visible in the inside rearview mirror and outside rear view mirrors. Although this system is intended to help drivers avoid lane change crashes, it does not replace driver vision and therefore should be considered a lane change aid. Even with the side blind zone alert system, the driver must check carefully for objects outside of the reporting zone (e.g., a fast approaching vehicle) before changing lanes. In the event that the system senses a malfunction through its diagnostic routines, the system will be disabled and the driver will be visually notified.

When the system detects a vehicle in the side blind zone while driving forward, an amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes.

Side blind zone alert is active when the vehicle is out of park or the parking brake is off on manual transmission vehicles and at speeds up to approximately 140 km/h (87 MPH). If a vehicle is detected in the blind zone, the warning symbols will turn illuminate on the appropriate side. When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating. The warning symbols will vary brightness based on the ambient light conditions.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, N AMERICA) > SIDE BLIND ZONE ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Left side object sensor module (also used for rear cross traffic alert)
- Right side object sensor module (also used for rear cross traffic alert)
- Driver outside rearview mirror
- Passenger outside rearview mirror

Side Object Sensor Modules

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of objects nearby. When an object is detected in the side blind zone, the side object sensor module supplies voltage to illuminate the visual indicator on the appropriate side rear view mirror. Each sensor is supplied B+ and ground. The right sensor receives an additional ground. Both sensors communicate independently on the serial data line. The serial data enters the left sensor in a pass-thru configuration,

that connects to the right sensor. The scan tool is able to individually communicate with each sensor.

Outside Rearview Mirrors

The outside rearview mirrors contain an icon that is backlit with high intensity, amber-colored LED's located on the mirror surface. The display brightness adapts to day/night conditions. The side blind zone alert indicator icon in the left or right outside rearview mirror is illuminated if the left or right side object sensor module detects a vehicle in the side blind zone to inform the driver that there is a vehicle driving in the blind spot zone.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, N AMERICA) > SIDE BLIND ZONE ALERT OPERATION

When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating. The system is designed to detect objects of interest as small as a 125cc motorcycle with rider. The detection zone starts at the outside rearview mirror and extends out to 3.5 m (11 ft) at the back corner of the vehicle and 3 m (10 ft) behind the vehicle at a height of 0.5 m (1.5 ft) to 2.0 m (6 ft) above the ground. The system may light up an indicator due to guardrails, signs, trees, shrubs, and other non-moving objects. This is normal system operation; the vehicle does not need service.

When the system detects a vehicle in the side blind zone while driving forward, independent if passing a vehicle or being passed, an amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes.

Foul weather may affect the operation of the side blind zone system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the side blind zone system may not function properly and the indicators may illuminate intermittently or remain illuminated all the time.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, N AMERICA) > SIDE BLIND ZONE ALERT DRIVER INFORMATION CENTER MESSAGES

SIDE BLIND ZONE ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

SERVICE SIDE DETECTION SYSTEM

This message indicates that the system requires service. When the message is displayed, the indicators will remain illuminated at all times, notifying the driver that the side blind zone system should not be relied upon when changing lanes. Since the sensors are also used for rear cross traffic alert, this

feature will also be inoperative.

SIDE DETECTION SYSTEM UNAVAILABLE

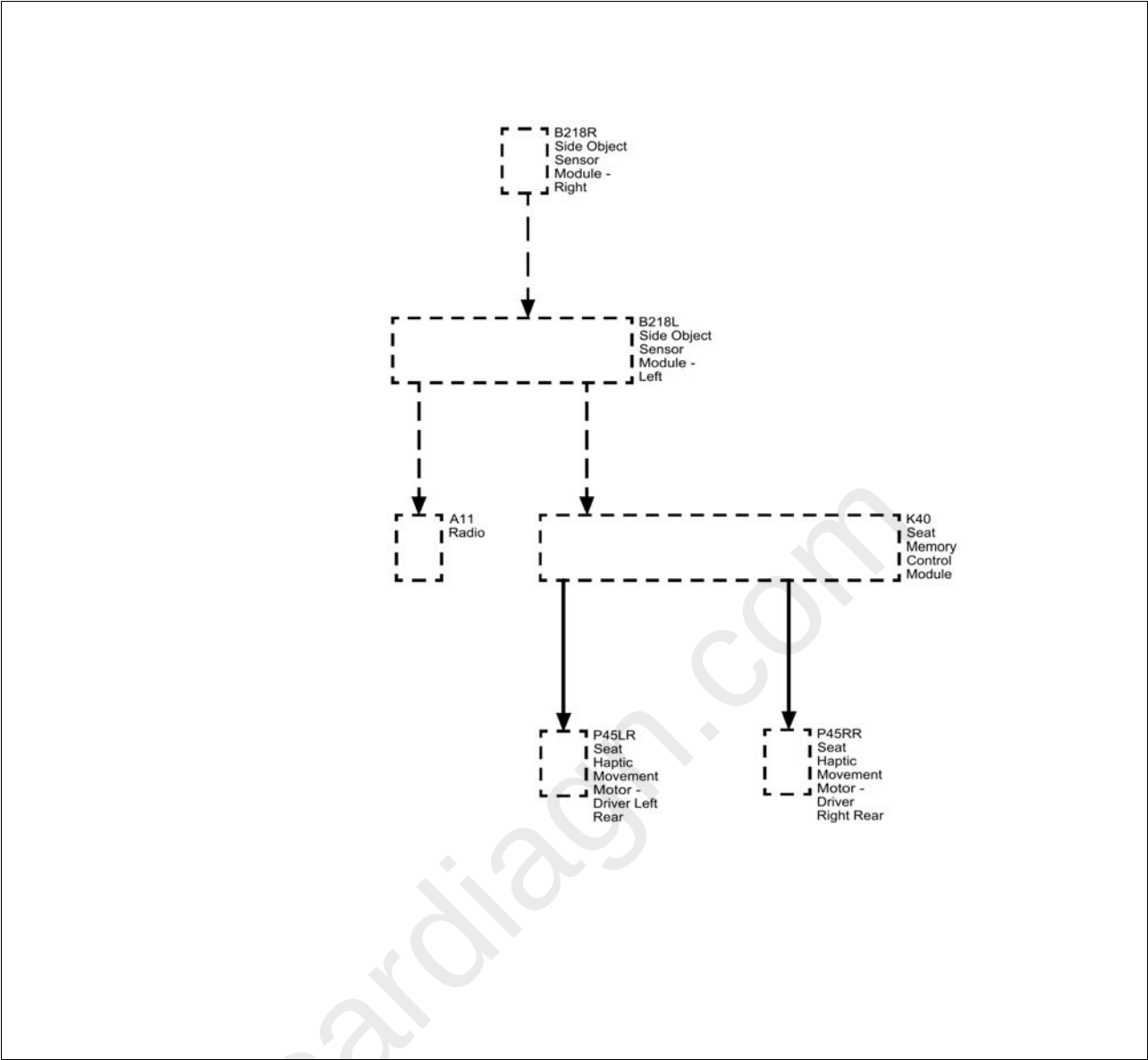
This message indicates that the system has been temporarily disabled because the sensor is blocked or can otherwise not accurately detect vehicles or objects. Such instances may be mud, dirt, snow, ice, or slush build-up on the rear fascia, heavy rainfall, excessive road spray, fascia damage or stickers.

The rear cross traffic alert system will read the GPS latitude and longitude on the serial data bus and calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, N AMERICA)

cardiagn.com

Fig 1: Rear Cross Traffic Alert Block Diagram (with Rear Cross Traffic Alert, UFG, N America)



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B218R	B218R Side Object Sensor Module - Right
B218L	B218L Side Object Sensor Module - Left
A11	A11 Radio
K40	K40 Seat Memory Control Module
P45LR	Seat Haptic Movement Motor - Driver Left Rear
P45RR	Seat Haptic Movement Motor - Driver Right Rear

The rear cross traffic alert system is designed to provide enhanced customer visibility while backing up by providing warnings to the driver on impending rear cross traffic. The rear cross traffic alert system is

designed to detect and track objects of interest within a specified coverage zone behind the vehicle. The system is designed to alert the driver, with a visual display and either an audible sound or a haptic warning, to the presence of objects of interest that may cause a collision with the host vehicle. Although the system is intended to assist drivers in backing up, it does not replace driver's vision. The driver is responsible to check carefully for objects outside of the coverage zone (e.g., a fast approaching vehicle) for a safe backing maneuver. In the event that the system senses a malfunction through its diagnostic functions, the system will be disabled and the driver will be visually notified.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, N AMERICA) > REAR CROSS TRAFFIC ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Left side object sensor module (also used for side blind zone alert)
- Right side object sensor module (also used for side blind zone alert)
- Visual Display Icons located on the rear vision display screen
- Audio System chime or Haptic Seat notification

Side Object Sensor Modules

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of objects nearby. When an object is detected in the rear cross traffic zone, the module will send out a signal through serial data communication to turn on the visual icons and also audio chime or haptic notification. Each sensor is supplied B+ and ground. The right sensor receives an additional ground. Both sensors communicate independently on the serial data line. The serial data enters the left sensor in a pass-thru configuration, that connects to the right sensor. The scan tool is able to individually communicate with each sensor.

Display Icons

The rear cross traffic alert system visual alert display consists of two visual icons, one on each side of the display screen of the rear vision camera, that are used to alert the driver on rear cross traffic from each side of the host vehicle respectively.

Audio or Haptic Notification

The alert output type can be driver selected to either audio or haptic. The chime location will be left rear for left rear cross traffic alert and right rear for right rear cross traffic alert. The haptic seat system response will be to generate 3 repetitions of haptic vibration in the left rear area of the seat for left cross traffic alert and right rear area of the seat for right cross traffic alert. If there is a problem with the haptic seats, the audio chime will be substituted.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, N AMERICA) > REAR CROSS TRAFFIC ALERT OPERATION

The rear cross traffic alert system is designed to detect objects of interest as small as a 125cc motorcycle with rider. The detection zone extends approximately 30m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45m (1.5 ft) to 2M (6.5 ft) above ground. The system operates when vehicle speed is 10 kph (6 mph) or less and is designed to detect objects moving at speeds up to 36 kph (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object of interest. The rear cross traffic alert function will only alert on objects of interest that pose a potential collision with the host vehicle. The system is not designed to provide an alert to objects that have no potential collision with vehicle. In addition, the system will not alert to stationary objects such as signs, parked cars, etc.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, N AMERICA) > REAR CROSS TRAFFIC ALERT DRIVER INFORMATION CENTER MESSAGES

REAR CROSS TRAFFIC ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

SERVICE SIDE DETECTION SYSTEM

This message indicates that the system requires service. Since the sensors are also used for side blind zone alert, this feature will also be inoperative.

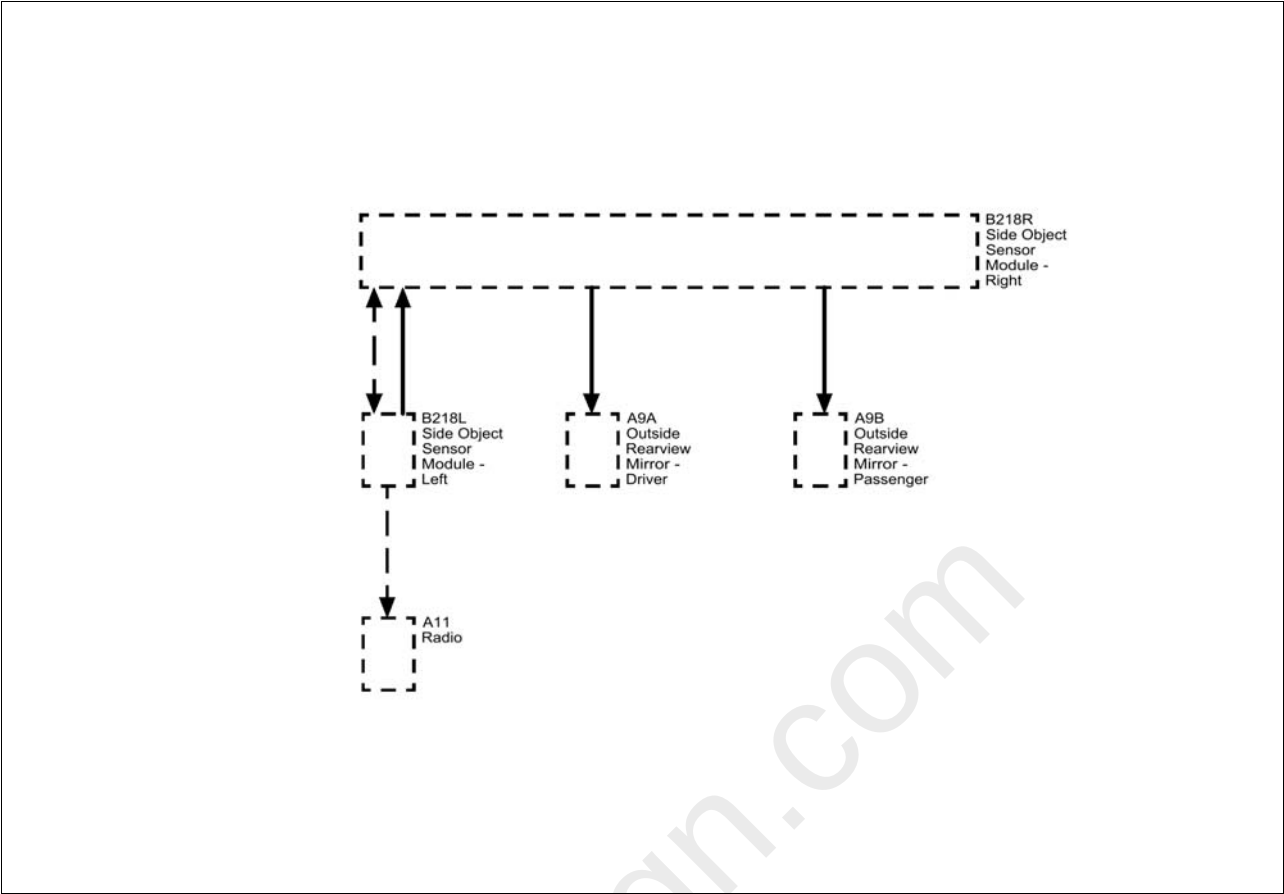
SIDE DETECTION SYSTEM UNAVAILABLE

This message indicates that the system has been temporarily disabled because the sensor is blocked or can otherwise not accurately detect vehicles or objects. Such instances may be mud, dirt, snow, ice, or slush build-up on the rear fascia, heavy rainfall, excessive road spray, fascia damage or stickers.

The rear cross traffic alert system will read the GPS latitude and longitude on the serial data bus and calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, EXCEPT N AMERICA)

Fig 1: Side Blind Alert Block Diagram (with Side Blind Zone Alert, UFT, Except North America)



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B218R	B218R Side Object Sensor Module - Right
B218L	B218L Side Object Sensor Module - Left
A11	A11 Radio
A9A	A9A Outside Rearview Mirror - Driver
A9B	A9B Outside Rearview Mirror - Passenger



NOTE:

Not all items in block diagram may apply to specific vehicle. Refer to schematics for specific vehicle wiring diagrams.

The side blind zone alert system is a feature that utilizes two side object sensor modules to provide enhanced customer convenience by sensing and reporting to the driver that an object is present in one of the driver's side blind zones. This is communicated to the driver by illuminating an icon on the left or right side view mirror, depending on what side of the vehicle the object is detected. This lane change assist system is radar based system in which the sensors transmit and receives energy that is reflected

from external objects and used to determine if that object is an object of interest. Although this system is intended to help drivers avoid lane change crashes, it does not replace driver vision and therefore should be considered a lane change aid.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, EXCEPT N AMERICA) > SIDE BLIND ZONE ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Left side object sensor module
- Right side object sensor module
- Driver outside rearview mirror
- Passenger outside rearview mirror

Side Object Sensor Modules

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of objects nearby. The left side object sensor is the master that communicates on serial data. There is a private communication network between the left and right sensors. The scan tool is able to communicate only with the left sensor.

When an object is detected in the left side blind zone, the side object sensor module sends a message to the right sensor through serial data. The right sensor then supplies voltage to illuminate the visual indicator on the left side outside rear view mirror. When an object is detected in the right side blind zone, the right side object sensor will supply a voltage to illuminate the visual indicator on the right side outside rear view mirror. Each sensor is supplied B+ and ground.

Outside Rearview Mirrors

The outside rearview mirrors contain an icon that is backlit with high intensity, amber-colored LED's located on the mirror surface. The display brightness adapts to day/night conditions. The side blind zone alert indicator icon in the left or right outside rearview mirror is illuminated if the left or right side object sensor module detects a vehicle in the side blind zone to inform the driver that there is a vehicle driving in the blind zone.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, EXCEPT N AMERICA) > SIDE BLIND ZONE ALERT OPERATION

The side blind zone alert system shall detect and report "objects of interest" on either side of the vehicle, within a specified "blind spot" zone. The system is designed to alert the driver, with a visual display placed on the side view mirror, to the presence of objects of interest that may not be visible in the inside rearview mirror and outside rear view mirrors. Although this system is intended to help drivers avoid lane change crashes, it does not replace driver vision and therefore should be considered a lane change aid. Even with the side blind zone alert system, the driver must check carefully for objects outside of the

reporting zone before changing lanes. In the event that the system senses a malfunction through its diagnostic routines, the system will be disabled and the driver will be visually notified.

When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating. The warning symbols will vary brightness based on the ambient light conditions. Side blind zone alert is active when the vehicle is out of park or the parking brake is off on manual transmission vehicles. When the system detects a vehicle in the side blind zone while driving forward, an amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes.

The system is designed to detect objects of interest as small as a 125cc motorcycle with rider. The detection zone starts at the outside rearview mirror and extends out to 3.5 m (11 ft) at the back corner of the vehicle and 5m (16 ft) behind the vehicle at a height of 0.5 m (1.5 ft) to 2.0 m (6 ft) above the ground. The system may light up an indicator due to guardrails, signs, trees, shrubs, and other non-moving objects. This is normal system operation; the vehicle does not need service.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the side blind zone system may not function properly and the indicators may illuminate intermittently or remain illuminated all the time. The driver information center may display "SIDE DETECTION SYSTEM UNAVAILABLE".

Foul weather may affect the operation of the side blind zone system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system. The warning symbols will vary brightness based on the ambient light conditions.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND ZONE ALERT, UDQ, EXCEPT N AMERICA) > REAR CROSS TRAFFIC ALERT OPERATION

The rear cross traffic alert system is designed to detect moving objects of interest as small as a 125cc motorcycle with rider. The detection zone extends approximately 30m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45 m (1.5 ft) to 2 m (6.5 ft) above ground. The system operates when vehicle speed is 10 k/ph (6 mph) or less and is designed to detect objects moving at speeds up to 36 k/ph (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object. The rear cross traffic alert function will only alert on objects of interest that pose a potential collision with the host vehicle. The system is not designed to provide an alert to objects that have no potential collision with vehicle.

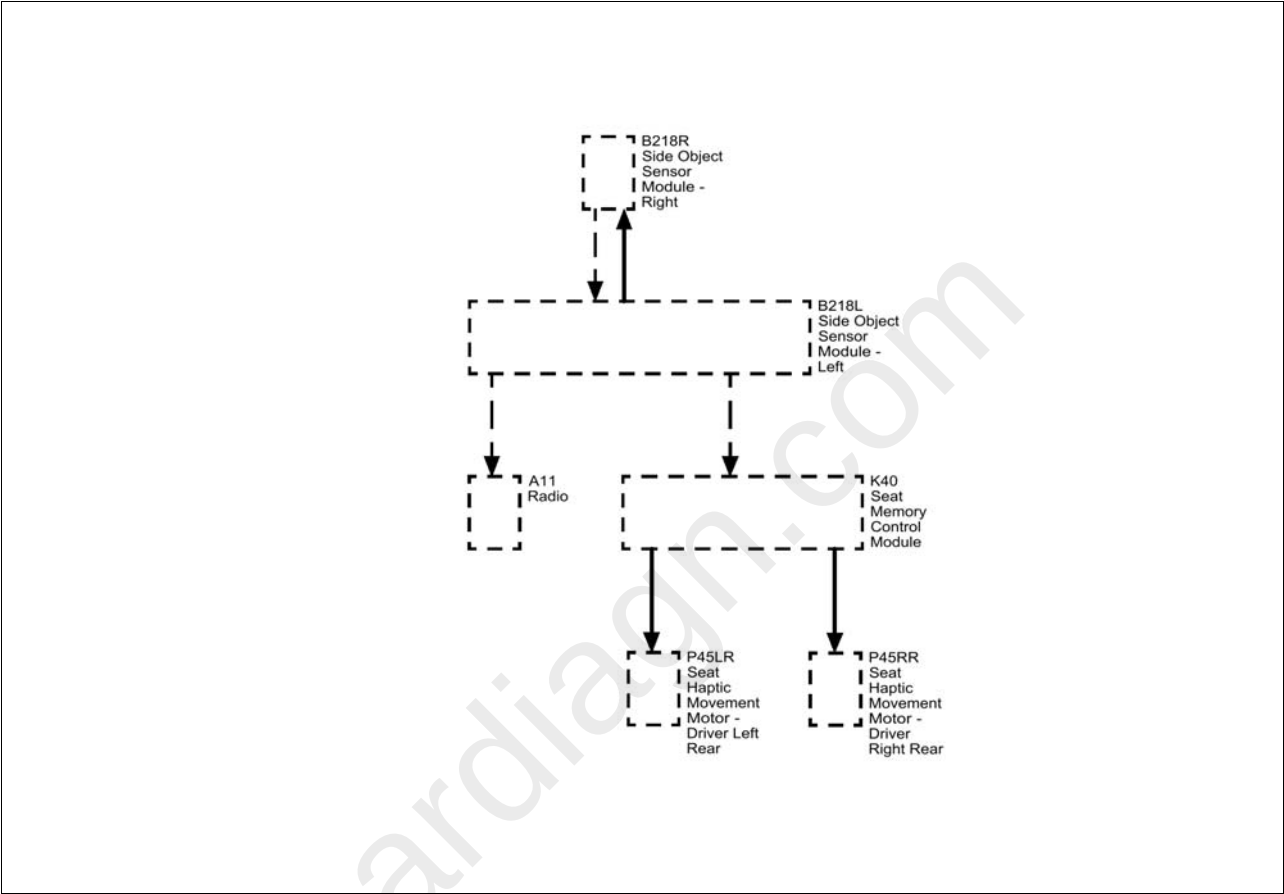
If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the rear cross traffic alert system may not function properly.

Foul weather may affect the operation of the rear cross traffic alert system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts

will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, EXCEPT N AMERICA)

Fig 1: Rear Cross Traffic Alert Block Diagram (with Rear Cross Traffic Alert, UFT, Except N America)



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
B218R	B218R Side Object Sensor Module - Right
B218L	B218L Side Object Sensor Module - Left
A11	A11 Radio
K40	K40 Seat Memory Control Module
P45LR	Seat Haptic Movement Motor - Driver Left Rear
P45RR	Seat Haptic Movement Motor - Driver Right Rear

The rear cross traffic alert system is a feature that utilized two side object sensor modules to provide enhanced customer convenience while backing up by sensing and providing warnings to the driver on impending rear cross traffic. The rear cross traffic alert system is designed to detect and track moving

objects as small as a 125cc motorcycle with rider within a specified coverage zone behind the vehicle. The system is designed to alert the driver, with a visual display and either an audible sound or a haptic warning, if equipped and enabled, to the presence of moving objects of interest that may cause a collision with the host vehicle. Although the system is intended to assist drivers in backing up, it does not replace driver's vision. The driver is responsible to check carefully for objects outside of the coverage zone (e.g., a fast approaching vehicle) for a safe backing maneuver.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, EXCEPT N AMERICA) > REAR CROSS TRAFFIC ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Left side object sensor module
- Right side object sensor module
- Visual Display Icons located on the infotainment display screen
- Audio system chime
- Haptic safety seat (if equipped)

Side Object Sensor Modules

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of moving objects nearby. The left side object sensor is the master that communicates on serial data. There is a private communication network between the left and right sensors. The scan tool is able to communicate only with the left sensor.

When a moving object is detected in the left rear cross traffic zone while the engine is running and the transmission in reverse, the side object sensor module sends a serial data message to the human interface module and memory seat module to provide alerts. Each sensor is supplied B+ and ground.

Display Icons

The rear cross traffic alert system visual alert display consists of two visual icons, one on each side of the display screen of the rearview camera display, that are used to alert the driver on rear cross traffic from each side of the host vehicle respectively. In addition to visual indicators, the audio system will beep (if enabled) and the haptic safety seat will vibrate (if equipped and enabled). Refer to owner's manual for vehicle customization.

Audio or Haptic Notification

The alert output type can be driver selected to either audio or haptic. The chime location will be left rear for left rear cross traffic alert and right rear for right rear cross traffic alert. The haptic seat system response will be to generate 3 repetitions of haptic vibration in the left rear area of the seat for left cross traffic alert and right rear area of the seat for right cross traffic alert. If there is a problem with the haptic seats, the audio chime will be substituted.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, EXCEPT N AMERICA) > REAR CROSS TRAFFIC ALERT OPERATION

The rear cross traffic alert system is designed to detect moving objects of interest as small as a 125cc motorcycle with rider. The detection zone extends approximately 30m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45m (1.5 ft) to 2m (6.5 ft) above ground. The system operates when vehicle speed is 10 kph (6 mph) or less and is designed to detect objects moving at speeds up to 36 kph (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object of interest. The rear cross traffic alert function will only alert on objects of interest that pose a potential collision with the host vehicle. The system is not designed to provide an alert to objects that have no potential collision with vehicle. In addition, the system will not alert to stationary objects such as signs, parked cars, etc.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the rear cross traffic alert system may not function properly.

Foul weather may affect the operation of the rear cross traffic alert system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system.

DESCRIPTION AND OPERATION > OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REAR CROSS TRAFFIC ALERT, UFG, EXCEPT N AMERICA) > REAR CROSS TRAFFIC ALERT DRIVER INFORMATION CENTER MESSAGES

REAR CROSS TRAFFIC ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

SERVICE SIDE DETECTION SYSTEM

This message indicates that the system requires service. Since the side object sensors are also used for side blind zone alert and/or lane change alert, these feature will also be inoperative. Check vehicle for DTCs to determine the cause of this notification.

SIDE DETECTION SYSTEM TEMPORARILY UNAVAILABLE

This message indicates that the system has been temporarily disabled because the sensors are blocked or can otherwise not accurately detect vehicles or objects. Verify there is no damage to rear fascia or there are any bumper stickers that may interfere with the radar signals. Ask the customer if any of the following circumstances that present when the system became unavailable: mud, dirt, snow, ice, or slush build-up on the rear fascia, heavy rainfall, or excessive road spray.

DESCRIPTION AND OPERATION > PARKING ASSIST DESCRIPTION AND OPERATION

The parking assist system is designed to identify and notify the driver of an object in the vehicle's path when moving forward or reversing at speeds of less than 8 km/h (5 MPH). The distance and location of the object is determined by eight object sensors: four located in the rear bumper and four located in the front bumper. The parking assist system will notify the driver using an audible beep signal through the radio.

The automatic parking assist feature uses two additional sensors located on the front fascia, just ahead of the wheel opening. These sensors face toward the side of the vehicle and are used to aid the driver in positioning the vehicle in a parallel parking maneuver.

DESCRIPTION AND OPERATION > PARKING ASSIST DESCRIPTION AND OPERATION > PARKING ASSIST COMPONENTS

The parking assist system is made up of the following components:

- Front and rear parking assist control module
- Front object sensors
- Rear object sensors
- Side object sensors
- Parking assist switch
- Parking assist switch indicator
- Automatic parking assist switch
- Front radio speakers - when moving forward
- Rear radio speakers - when moving rearward

Front and Rear Parking Assist Control Module

The front and rear parking assist control module provides a 12 V reference and a low reference to the 10 object sensors. The front and rear parking assist control module receives individual signals from each of the eight sensors and determines the location and distance of an object based on these inputs. While driving at speeds less than 8 km/h (5 MPH) and an object is detected, the front and rear parking assist control module will send a data message via serial data to the radio requesting an audible alert.

Front, Rear, and Side Object Sensors

The 10 object sensors are located in the front and rear bumpers of the vehicle. The sensors are used to determine the distance between an object and the bumper. Each sensor emits an ultrasonic frequency which is reflected off any object located in front of or behind the vehicle. These reflections are received by the sensors. The time difference between the emission of the frequency and when the reflection is received is used to determine the distance to the object. The sensors report this information to the front and rear parking assist control module.

Parking Assist Switch

The parking assist can be enabled and disabled by pressing the parking assist switch. When driving at speeds less than 8 km/h (5 MPH) or when engaging the reverse gear, the parking assist is activated. By subsequently pressing the parking assist switch the parking assist can be disabled again.

Parking Assist Switch Indicator

The indicator in the parking assist switch shows the status of the parking assist. If the LED is ON, the parking assist is activated.

Automatic Parking Assist Switch

The automatic parking assist can be activated and deactivated by pressing the parking assist switch for approximately one second.

DESCRIPTION AND OPERATION > PARKING ASSIST DESCRIPTION AND OPERATION > PARKING ASSIST OPERATION



NOTE:

A problem sensor may be located at the front or the rear of the vehicle by identifying the frequency of the beeping tone. The rear park assist gives a lower frequency tone compared to the front park assist.

When an object is within the measuring range of the sensor, the ultrasonic pulse is reflected and is received by the sending or a neighboring sensor. The sensor converts this signal into a voltage signal and sends this signal to the front and rear parking assist control module. The front and rear parking assist control module evaluates the received sensor signals. As soon as an object is within the measuring range, the front and rear parking assist control module sends a message via serial data to the radio in order to give out the acoustic distance signal.

The measuring range of the front object sensors is between 30-120 cm (11.8-47.2 in). From a distance of 120 cm (47.2 in), the acoustic signal is active. The frequency of the beep sound being emitted from the front speakers increases with decreasing distance. From a distance less than 30 cm (11.8 in), the sound becomes continuous.

The measuring range of the rear object sensors is between 30-250 cm (11.8-98.4 in). From a distance of 250 cm (98.4 in), the acoustic signal is active. The frequency of the beep sound being emitted from the rear speakers increases with decreasing distance. From a distance less than 30 cm (11.8 in), the sound becomes continuous.

The parking assist can be enabled and disabled by pressing the parking assist switch. When driving at speeds less than 8 km/h (5 MPH) or when engaging the reverse gear, the parking assist is activated. By subsequently pressing the parking assist switch the parking assist can be disabled again.

The front and rear parking assist control module carries out a self test and monitors the sensors for electrical and mechanical faults. Monitored is the power supply of each sensor and the sensor signals, which need to alter when the vehicle moves. If this is not the case, the sensor is acoustically blocked or faulty. Mud, ice and snow may cause obstruction of the function of the sensors. The front and rear

parking assist control module also checks whether the correct type of sensor is installed. If any of these tests fails, a DTC with corresponding symptom is set, the parking assist is deactivated and a message is sent to the driver information center.

DESCRIPTION AND OPERATION > PARKING ASSIST DESCRIPTION AND OPERATION > AUTOMATIC PARKING ASSIST OPERATION

The automatic parking assist system aids the driver when attempting a parallel parking maneuver. The front and rear parking assist control module uses the two side object sensors located in the front fascia, along with the four front and four rear park assist sensors, to guide the driver into a parking space.

The automatic parking assist switch is used to initiate the parallel parking assist system. While driving along a row of vehicles in which the driver wishes to parallel park, the automatic parking assist switch is pressed for approximately one second. This will enable the parallel parking assist system and the front and rear parking assist control module will begin measuring potential parking spots using the parallel parking assist sensor.

When a parking spot of suitable size is found, the front and rear parking assist control module will display a stop message on the driver information center. The front and rear parking assist control module will then instruct the driver to begin reversing. Using the side object sensor, the front and rear parking assist control module will determine the appropriate time to begin turning the steering wheel to enter the parking spot and again when to turn the steering wheel in the opposite direction to fully enter the parking spot. Each time the steering wheel is to be turned, a message instructing the driver to do so is displayed on the driver information center. Once in the spot, the front and rear parking assist control module uses the front and rear park assist sensors to center the vehicle in the parking spot.

If the parallel parking assist system is unable to complete a parallel parking maneuver, a message indicating that the maneuver has been aborted will be displayed on the driver information center.

DESCRIPTION AND OPERATION > PARKING ASSIST DESCRIPTION AND OPERATION > PARKING ASSIST SYSTEM DRIVER INFORMATION CENTER MESSAGES

SERVICE PARK ASSIST

The driver information center displays SERVICE PARK ASSIST when the front and rear parking assist control module detects a malfunction in the parking assist system and the system is disabled. The driver information center also displays SERVICE PARK ASSIST when a loss of communication occurs with the front and rear parking assist control module.

PARK ASSIST TEMPORARILY UNAVAILABLE

The PARK ASSIST TEMPORARILY UNAVAILABLE message is displayed in the driver information center when the parking assist system is disabled due to conditions that disable or inhibit the system. The front and rear parking assist control module requests the driver information center display PARK ASSIST TEMPORARILY UNAVAILABLE when it detects that one of the following conditions:

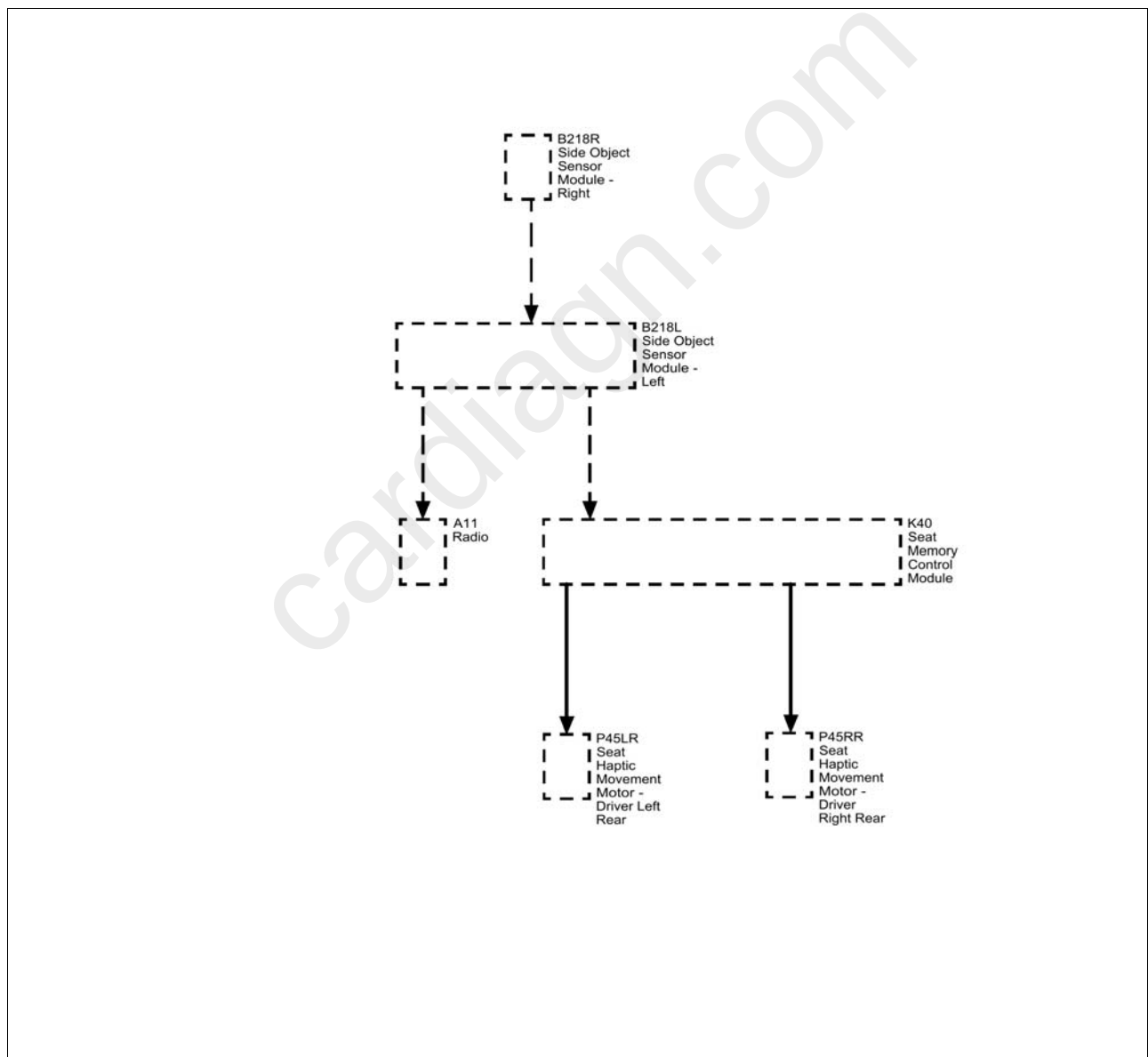
- The parking assist system is manually disabled using the park assist switch.
- An object is attached to the vehicle which is interfering with the park assist system field of view. Example items are a trailer, bicycle rack, trailer hitch receiver, tow bar, aftermarket front license

plate frame, or a bent front license plate.

- The parking assist sensors are covered by snow, mud, dirt or ice.
- The vehicle bumper is damaged.
- Excessive paint thickness on a replacement parking assist sensor.
- The parking assist sensors are disrupted by vibrations, like those caused by a large nearby vehicle or from heavy equipment such as a jackhammer.

DESCRIPTION AND OPERATION > CROSS TRAFFIC ALERT DESCRIPTION AND OPERATION

Fig 1: Rear Cross Traffic Alert Block Diagram (with Rear Cross Traffic Alert, UFG, N America)



Callout	Component Name
B218R	B218R Side Object Sensor Module - Right
B218L	B218L Side Object Sensor Module - Left
A11	A11 Radio
K40	K40 Seat Memory Control Module
P45LR	Seat Haptic Movement Motor - Driver Left Rear
P45RR	Seat Haptic Movement Motor - Driver Right Rear

The rear cross traffic alert system is designed to provide enhanced customer visibility while backing up by providing warnings to the driver on impending rear cross traffic. The rear cross traffic alert system is designed to detect and track objects of interest within a specified coverage zone behind the vehicle. The system is designed to alert the driver, with a visual display and either an audible sound or a haptic warning, to the presence of objects of interest that may cause a collision with the host vehicle. Although the system is intended to assist drivers in backing up, it does not replace driver's vision. The driver is responsible to check carefully for objects outside of the coverage zone (e.g., a fast approaching vehicle) for a safe backing maneuver. In the event that the system senses a malfunction through its diagnostic functions, the system will be disabled and the driver will be visually notified.

DESCRIPTION AND OPERATION > CROSS TRAFFIC ALERT DESCRIPTION AND OPERATION > REAR CROSS TRAFFIC ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Left side object sensor module (also used for side blind zone alert)
- Right side object sensor module (also used for side blind zone alert)
- Visual Display Icons located on the rear vision display screen
- Audio System chime or Haptic Seat notification

Side Object Sensor Modules

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of objects nearby. When an object is detected in the rear cross traffic zone, the module will send out a signal through serial data communication to turn on the visual icons and also audio chime or haptic notification. Each sensor is supplied B+ and ground. The right sensor receives an additional ground. Both sensors communicate independently on the serial data line. The serial data enters the left sensor in a pass-thru configuration, that connects to the right sensor. The scan tool is able to individually communicate with each sensor.

Display Icons

The rear cross traffic alert system visual alert display consists of two visual icons, one on each side of the display screen of the rear vision camera, that are used to alert the driver on rear cross traffic from each side of the host vehicle respectively.

Audio or Haptic Notification

The alert output type can be driver selected to either audio or haptic. The chime location will be left rear for left rear cross traffic alert and right rear for right rear cross traffic alert. The haptic seat system response will be to generate 3 repetitions of haptic vibration in the left rear area of the seat for left cross traffic alert and right rear area of the seat for right cross traffic alert. If there is a problem with the haptic seats, the audio chime will be substituted.

DESCRIPTION AND OPERATION > CROSS TRAFFIC ALERT DESCRIPTION AND OPERATION > REAR CROSS TRAFFIC ALERT OPERATION

The rear cross traffic alert system is designed to detect objects of interest as small as a 125cc motorcycle with rider. The detection zone extends approximately 30m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45m (1.5 ft) to 2M (6.5 ft) above ground. The system operates when vehicle speed is 10 kph (6 mph) or less and is designed to detect objects moving at speeds up to 36 kph (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object of interest. The rear cross traffic alert function will only alert on objects of interest that pose a potential collision with the host vehicle. The system is not designed to provide an alert to objects that have no potential collision with vehicle. In addition, the system will not alert to stationary objects such as signs, parked cars, etc.

DESCRIPTION AND OPERATION > CROSS TRAFFIC ALERT DESCRIPTION AND OPERATION > REAR CROSS TRAFFIC ALERT DRIVER INFORMATION CENTER MESSAGES

REAR CROSS TRAFFIC ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

SERVICE SIDE DETECTION SYSTEM

This message indicates that the system requires service. Since the sensors are also used for side blind zone alert, this feature will also be inoperative.

SIDE DETECTION SYSTEM UNAVAILABLE

This message indicates that the system has been temporarily disabled because the sensor is blocked or can otherwise not accurately detect vehicles or objects. Such instances may be mud, dirt, snow, ice, or slush build-up on the rear fascia, heavy rainfall, excessive road spray, fascia damage or stickers.

The rear cross traffic alert system will read the GPS latitude and longitude on the serial data bus and calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan

and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION

The side blind zone alert system is a lane-changing aid that assists drivers with avoiding crashes that occur with vehicles in the side blind zone (or spot) areas. When the vehicle is moving forward, the left or right side mirror display will illuminate if a vehicle is detected in the blind zone. If the turn signal is activated and a vehicle is also detected on the same side, the display will flash as an extra warning not to change lanes. The side blind zone alert monitors the blind spot area along side the vehicle, approximately 3.5 m (11 ft) from the side of the vehicle, extending 5 m (16 ft) behind the mid-point of the vehicle.

The lane change alert system is a lane-changing aid that assists drivers with avoiding lane change crashes that occur with vehicles rapidly approaching the side blind zone (or spot) areas from behind. The lane change alert warning display will illuminate in the corresponding outside rearview mirror and will flash as an extra warning not to change lanes if the turn signal is on. The lane change alert system monitors the lane area along side the vehicle, approximately 3.5 m (11 ft) from the side of the vehicle, extending up 70 m (230 ft) beyond the rear bumper.

While in reverse, the rear cross traffic alert system displays a triangle with a left or right pointing arrow on the info display module to warn of traffic coming from the left or right. This system detects objects coming from up to 20 m (65 ft) from the left or right side of the vehicle. When an object is detected, either three beeps sound from the left or right or three safety alert seat pulses occur on the left or right side, depending on the direction of the detected vehicle.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT SYSTEM COMPONENTS

The side blind zone alert system is made up of the following components:

- Side object sensor module - left
- Side object sensor module - right
- Driver outside rearview mirror
- Passenger outside rearview mirror
- Infotainment system
- Safety alert seat

Side Object Sensor Module

The side object sensor modules are located on each side of the vehicle behind the rear fascia and are not directly visible from outside the vehicle. The sensors use radar to determine the presence of objects nearby. The side object sensor module - left is the master that communicates on vehicle serial data bus. There is a private serial data bus between the left and right sensors. The scan tool is able to communicate only with the left sensor. The sensors are unique and not interchangeable from side to

side.

The side object sensor module - right controls both side blind zone indicators located on the left and right outside rearview mirrors. Each indicators receives ground at all times. When an object has been detected in the vehicle's blind spot or a vehicle is fast approaching from the rear, the side object sensor module - right will apply voltage to the appropriate indicator, illuminating it. If the turn signal is on, indicating the driver intends to change lanes, side object sensor module - right will flash the appropriate indicator as an additional means of alert.

Outside Rearview Mirrors

The outside rearview mirrors contain an icon that is backlit with high intensity, amber-colored LED's located on the mirror surface. The display brightness adapts to day and night conditions. The side object sensor module - right controls both side blind zone indicators.

Infotainment System

The infotainment system controls the audible alerts for the rear cross traffic alert system. If cross traffic is present, the side object sensor module - left will command the infotainment system issue an audible alert to the driver. The audible alert will sound from the side of the vehicle where traffic is approaching from.

The infotainment system also includes the info display module. When in R, any cross traffic warnings will be overlaid over the rear vision camera image on the info display module.

Safety Alert Seat

The memory seat module controls the haptic alert provided by the seats. If cross traffic is present, the side object sensor module - left will command the safety alert seat issue a haptic alert to the driver on the side of the seat where traffic is approaching from.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT OPERATION

When the vehicle is started, both side blind zone indicators located on the left and right outside rearview mirrors will briefly illuminate to indicate that the system is operating. The system is designed to detect objects in an area approximately between 0.5 m (1.5 ft) and 2 m (6 ft) off the ground. The side blind zone alert monitors the blind sport area along side the vehicle, approximately 3.5 m (11 ft) from the side of the vehicle, extending 5 m (16 ft) behind the mid-point of the vehicle. The system may light up an indicator due to guardrails, signs, trees, shrubs, and other non-moving objects. This is normal system operation; the vehicle does not need service.

When the system detects a vehicle in the side blind zone while driving forward, an amber warning symbol will illuminate on the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes.

Foul weather may affect the operation of the side blind zone system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the

vehicle, the side blind zone system may not function properly and the indicators may illuminate intermittently or remain illuminated all the time.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION > LANE CHANGE ALERT OPERATION

The lane change alert system shall detect and report objects in the driver's blind zone, or approaching on either side of the vehicle, within a specified lane change zone. The system is designed to alert the driver, with a visual display placed on the side view mirror, to the presence of objects of interest that may not be visible in the inside rearview mirror and outside rear view mirrors. Although this system is intended to help drivers avoid lane change crashes, it does not replace driver vision and therefore should be considered a lane change aid. Even with the lane change alert system, the driver must check carefully for objects outside of the reporting zone before changing lanes. In the event that the system senses a malfunction through its diagnostic routines, the system will be disabled and the driver will be visually notified.

When the vehicle is started, both outside mirror displays will briefly come on to indicate that the system is operating. The warning symbols will vary brightness based on the ambient light conditions. Lane change alert is active when the vehicle is out of park or the parking brake is off on manual transmission vehicles. When the system detects a vehicle in the side blind zone or approaching in the lane change alert zone while driving forward, an amber warning symbol will light up in the appropriate outside mirror. This indicates that it may be unsafe to change lanes. If the driver then activates the turn signal, the amber warning symbol starts flashing as an extra warning not to change lanes.

The system is designed to detect objects of interest as small as a 125cc motorcycle with rider. The detection zone starts at the outside rearview mirror and extends out to 3.5 m (11 ft) at the back corner of the vehicle and 70 m (230 ft) behind the vehicle at a height between 0.5 m (1.5 ft) and 2.0 m (6 ft) above the ground. The system may light up an indicator due to guardrails, signs, trees, shrubs, and other non-moving objects. This is normal system operation; the vehicle does not need service.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the lane change alert system may not function properly and the indicators may illuminate intermittently or remain illuminated all the time. The driver information center may display "SIDE DETECTION SYSTEM UNAVAILABLE".

Foul weather may affect the operation of the lane change alert system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system. The warning symbols will vary brightness based on the ambient light conditions.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION > REAR CROSS TRAFFIC ALERT OPERATION

The rear cross traffic alert system is designed to detect moving objects approaching the side of the vehicle while backing up. The detection zone extends approximately 30 m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45 m (1.5 ft) to 2 m (6.5 ft) above ground. The system operates when vehicle speed is 10 km/h (6 mph) or less and is designed to detect objects moving at speeds up to 36 km/h (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object of interest. The rear cross traffic alert function will only alert on objects that pose a potential collision with the host vehicle. The system is not designed to provide an alert to objects that have no potential collision with vehicle.

If the vehicle is towing a trailer or has an object such as a bicycle rack attached to the rear of the vehicle, the rear cross traffic alert system may not function properly.

Foul weather may affect the operation of the rear cross traffic alert system. Occasional missed alerts can occur under normal circumstances and will increase in wet conditions. The number of missed alerts will increase with increased rainfall or road spray. Heavy rainfall, as well as mud, dirt, snow, ice, or slush build-up on the rear fascia, can completely disable the system.

DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION > SIDE BLIND ZONE ALERT DRIVER INFORMATION CENTER MESSAGES

SIDE BLIND ZONE ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

LANE CHANGE ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

REAR CROSS TRAFFIC ALERT OFF

This message indicates that the system has been disabled through the driver information center. Refer to the vehicle owners manual for instructions on how to set personalization options on the driver information center.

SERVICE SIDE DETECTION SYSTEM

This message indicates that the system requires service. When the message is displayed, the indicators will remain illuminated at all times, notifying the driver that the side blind zone and lane change alert should not be relied upon when changing lanes and the rear cross traffic alert will also be inoperative

SIDE DETECTION SYSTEM UNAVAILABLE

This message indicates that the system has been temporarily disabled because the sensor is blocked or can otherwise not accurately detect vehicles or objects. Such instances may be mud, dirt, snow, ice, or slush build-up on the rear fascia, heavy rainfall, excessive road spray, fascia damage or stickers.

The rear cross traffic alert system will read the GPS latitude and longitude on the serial data bus and

calculate if the vehicle is within a Radio Astronomy zone. These zones are located in Europe and Japan and require the sensors to be turned off. The "Side Detection System Unavailable" message will be displayed to the driver when this occurs.

DESCRIPTION AND OPERATION > PEDESTRIAN IMPACT DETECTION DESCRIPTION AND OPERATION > PEDESTRIAN IMPACT DETECTION SYSTEM DESCRIPTION AND OPERATION

The pedestrian impact detection systems primary function is to provide supplemental protection to vulnerable road users involved in vehicle impacts. The pedestrian impact detection system is also known as the active pedestrian protection system. The pedestrian impact detection system is a functional system for raising the hood to provide sufficient vertical deformation space under the hood. In Europe and Japan an active pedestrian impact detection system is necessary for vehicles which do not provide the required deformation space under the hood. The pedestrian impact detection system includes the following components

- Inflatable Restraint Sensing and Diagnostic Module
- Pedestrian Impact Detection Sensor - Upper Beam Front Left
- Pedestrian Impact Detection Sensor - Upper Beam Front Right
- Two Hood Hinge Actuators

Inflatable Restraint Sensing and Diagnostic Module

The K36 Inflatable Restraint Sensing and Diagnostic Module performs the Pedestrian Impact Detection functions as well as Inflatable Restraints, for more information refer to Supplemental Inflatable Restraint System Description and Operation

The pedestrian impact detection system will sense and discriminate vulnerable road user impacts and deploy the hood hinge actuators to lift the rear section of the hood in a timely manner to help reduce pedestrian head injuries. The term "deployment" applies to the activation of the hood via the hood actuators. The pedestrian impact detection system is designed to sense and discriminate road user impacts (eg. pedestrian, cyclist) from other types of impacts in order to properly deploy the hood actuators. No actions or inputs are required from the driver or passenger to trigger this device. The pedestrian impact detection module uses two Pedestrian Impact Detection Sensors connected together by a tube to get force information needed for the deployment of the hood hinge actuators. The pedestrian impact detection module deploys the hood actuators using two deployment loops. The pedestrian impact detection system only operates at vehicles speeds between 22 km/h (14 mph) to 50 km/h (31 mph). The pedestrian impact detection module detects internal and interface faults and commands the Service Pedestrian Protection System message in the driver information center to indicate a system fault.

After a deployment event, the vehicle operator is able to reset the hood to its normal driving position. Refer to the Owner's Manual for more information. After resetting the hood, the pedestrian impact detection system is not required to be fully functional. For full functionality, it is necessary to replace system component(s) at an approved service facility.

Pedestrian Impact Detection Sensors

The K36 Inflatable Restraint Sensing and Diagnostic Module provides a two wire current loop interface to the Pedestrian Impact Detection Sensor - Right Front and Pedestrian Impact Detection Sensor - Left

Front. The pedestrian impact detection module also provides power and ground to the sensors over the same two wire discrete interface. The two sensors are connected together by a tube and are serviced as an assembly.

If the sensors are replaced, visually inspect the front fascia and front bumper fascia energy absorber for cracks or other damage that may interfere with proper operation of the system. Replace any damaged parts.

Hood Hinge Actuators

The pedestrian hood actuators deploy only when a valid signal whose energy is capable of triggering deployment of the hood is present. The pedestrian hood actuators only deploy in those events where the activation of the hood is expected. The hood actuator is not expected to deploy in low severity event where the risk of injury is low or in a high severity event like car to car crash. During a frontal pedestrian impact of sufficient force, the pedestrian impact detection module will allow current to flow through the deployment loops in order to deploy the hood hinge actuators. The pedestrian impact detection module also performs continuous diagnostic tests on the deployment loops to check for proper circuit continuity, shorts to ground and shorts voltage. In order to prevent unwanted deployment of the actuator during service, the hood hinge actuator contains 2 shorting bars that will short both high and low circuit pins when disconnected. The pedestrian impact detection module only issues a deployment command when a valid Pedestrian Impact Detection Sensor signal or confirmation has been generated. No inadvertent deployments will occur in any deployment loop due to a single point fault.

DESCRIPTION AND OPERATION > REAR VISION CAMERA DESCRIPTION AND OPERATION > REAR VISION CAMERA SYSTEM OPERATION

The rear vision camera system consists of a video camera located at the rear of the vehicle and the radio.

When the transmission is placed into REVERSE, a 12 volt signal is sent to the rear vision camera by the body control module (BCM). This signal indicates to the camera that the vehicle is in reverse and image display is requested. The rear vision camera receives ignition voltage and a constant ground to power the camera. Video signal + and video signal - circuits carry the video image from the rear vision camera to the radio. Additionally, the video signal circuits are shielded to prevent any interference which may lead to a loss of video signal resolution and a degraded video image. The shield is provided a ground path by the rear vision camera.

The following conditions may cause a degraded rear vision camera image:

- Ice, snow, or mud has built up on the rear vision camera
- Dark conditions
- Extreme light conditions, such as glare from the sun or the headlights of another vehicle
- Damage to the rear of the vehicle
- Extreme high temperatures or extreme temperature changes

If a malfunction is detected in the system, Service Rear Vision Camera may be displayed on the navigation radio as an indicator to the customer that a problem exists that requires service.

