

2017 ACCESSORIES & EQUIPMENT

Object Detection and Pedestrian Protection - Encore, Trax

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Forward Collision Alert Display Bolt-Buick	2.5 N.m (22 lb in)
Forward Collision Alert Display Bolt-Chevrolet	0.8 N.m (7 lb in)
Parking Assist Alarm Control Module Nut	5 N.m (44 lb in)
Side Object Sensing Alert Module Fastener	2.5 N.m (22 lb in)

SCHEMATIC WIRING DIAGRAMS

OBJECT DETECTION WIRING SCHEMATICS (BUICK)

Lane Departure Warning (Buick with UFL)

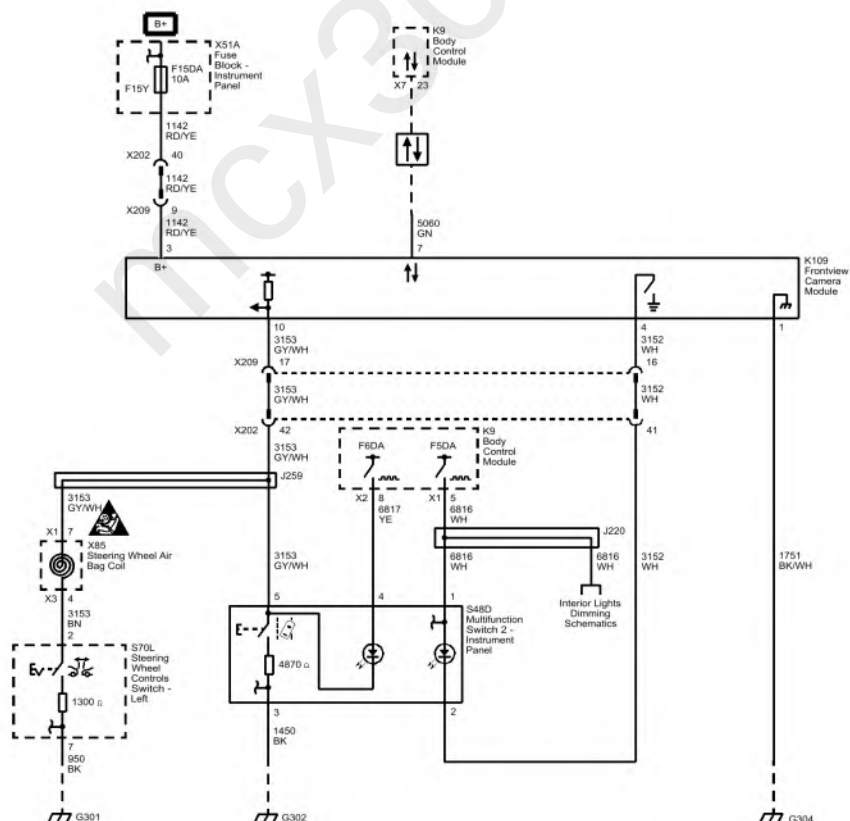


Fig. 1: Lane Departure Warning (Buick with UFL).

Courtesy of GENERAL MOTORS COMPANY

Rearview Camera (Buick with UVC)

Front Sensors (Buick with UD5)

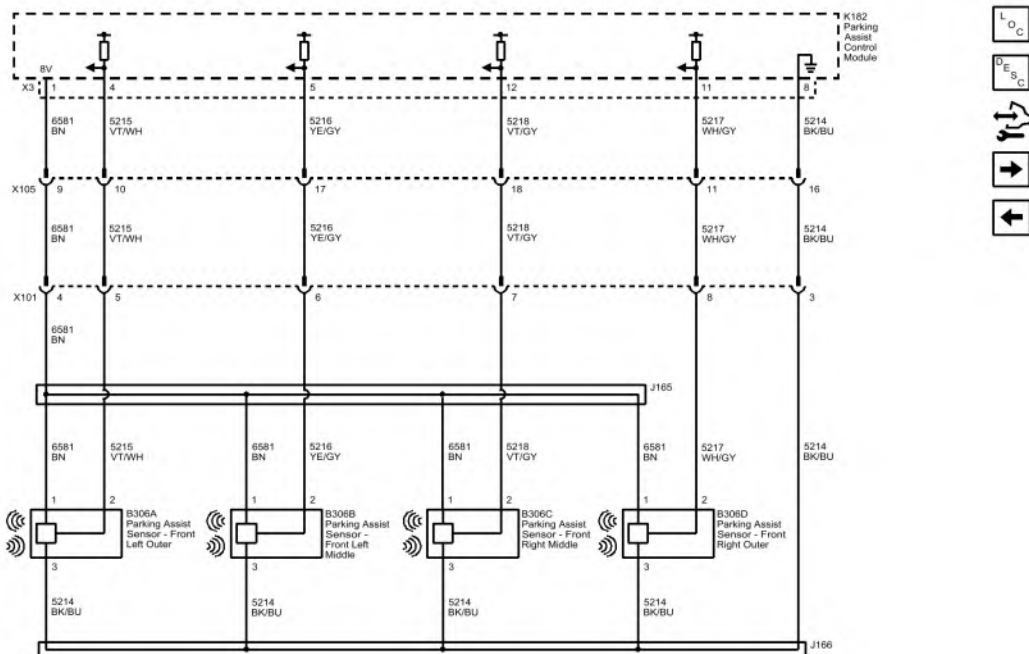


Fig. 4: Front Sensors (Buick with UD5)
Courtesy of GENERAL MOTORS COMPANY

Rear Sensors (Buick with UD5)

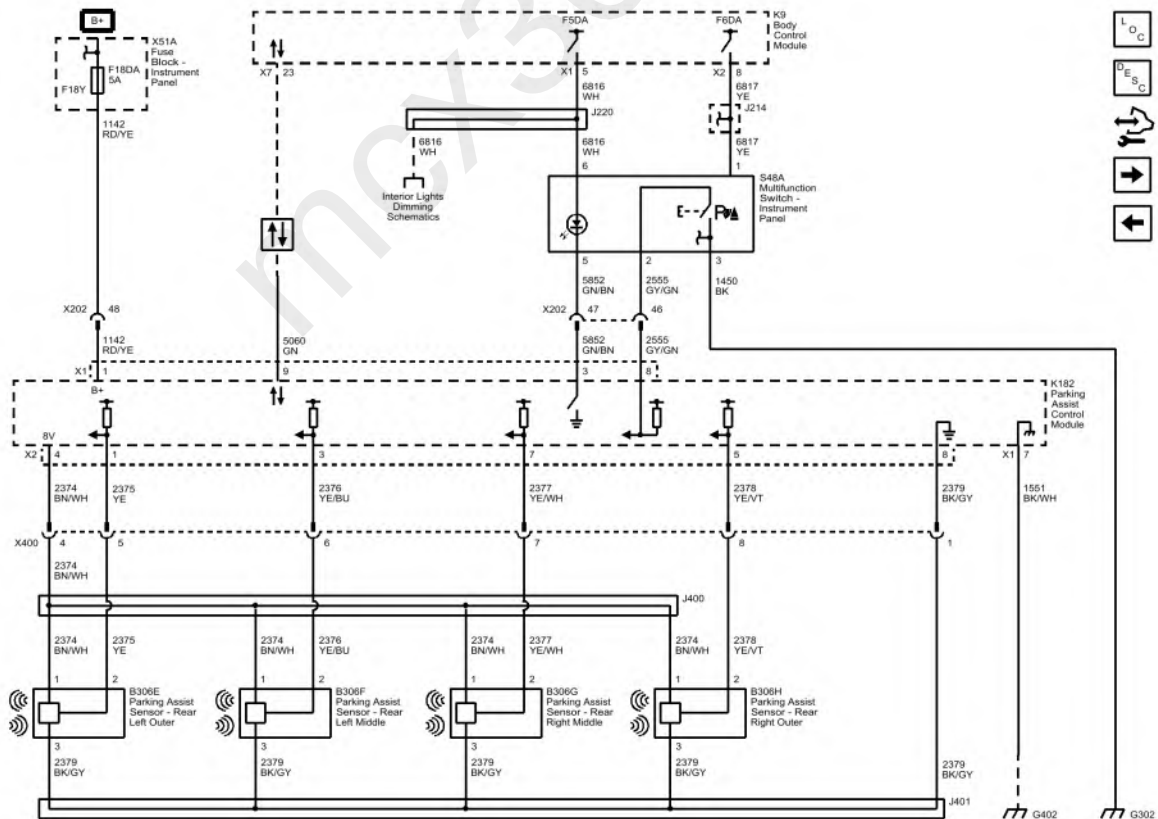


Fig. 5: Rear Sensors (Buick with UD5)
Courtesy of GENERAL MOTORS COMPANY

Side Object Detection (Buick with UFT)

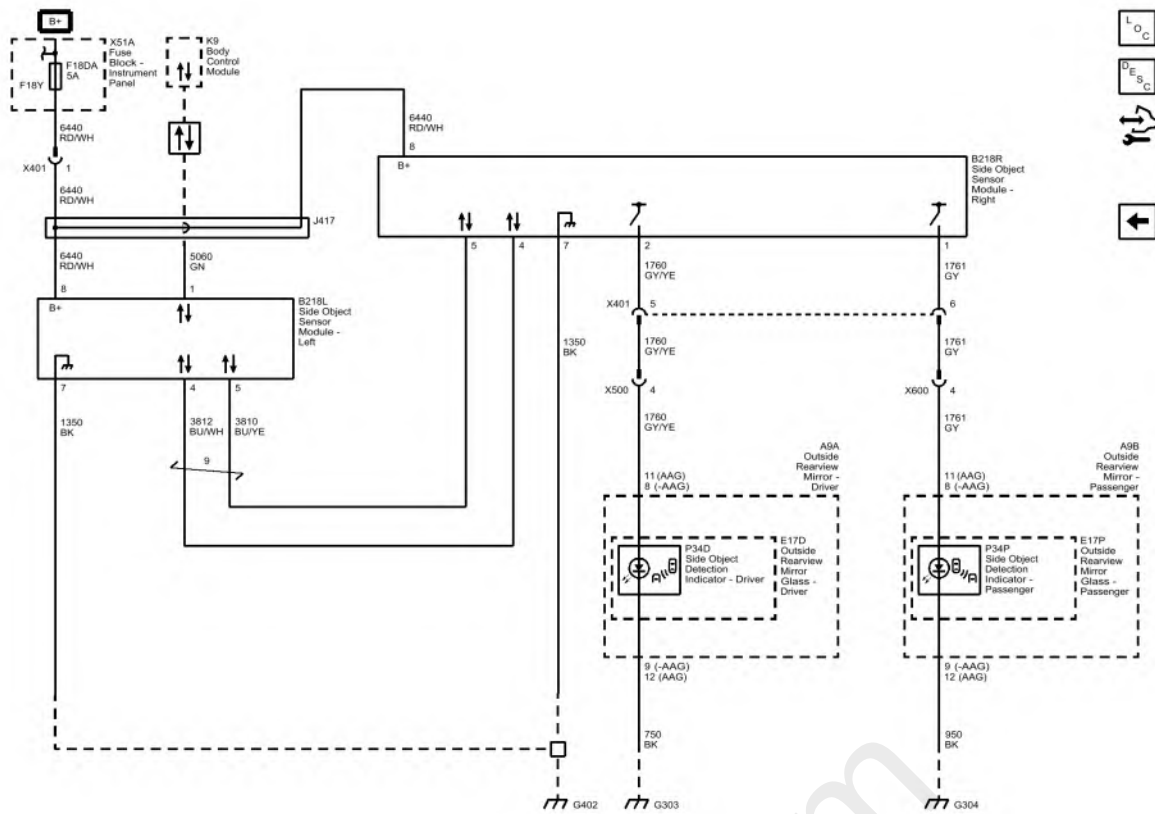


Fig. 6: Side Object Detection (Buick with UFT)
Courtesy of GENERAL MOTORS COMPANY

OBJECT DETECTION WIRING SCHEMATICS (CHEVROLET)

Rearview Camera (Chevrolet with UVC)

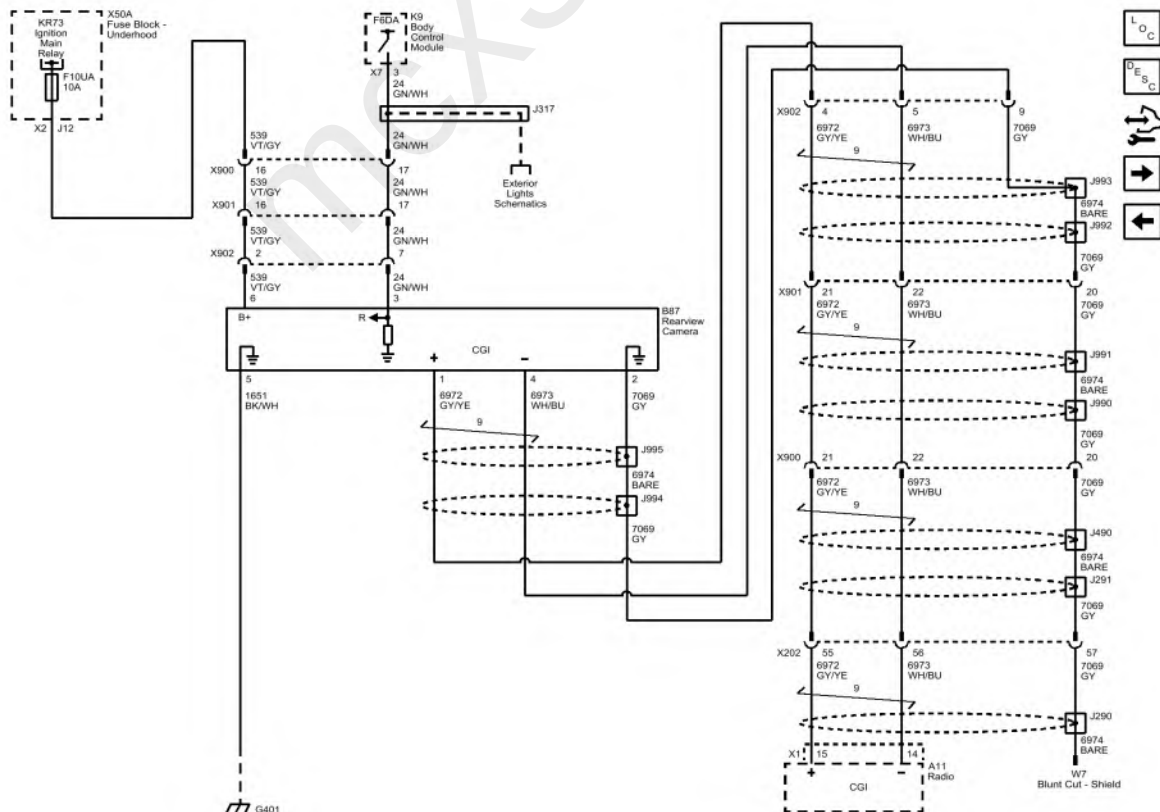


Fig. 7: Rearview Camera (Chevrolet with UVC)
Courtesy of GENERAL MOTORS COMPANY

Rear Park Assist (Chevrolet with UD7)

Lane Departure Warning with Forward Collision Alert (UFL)

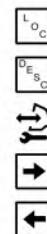
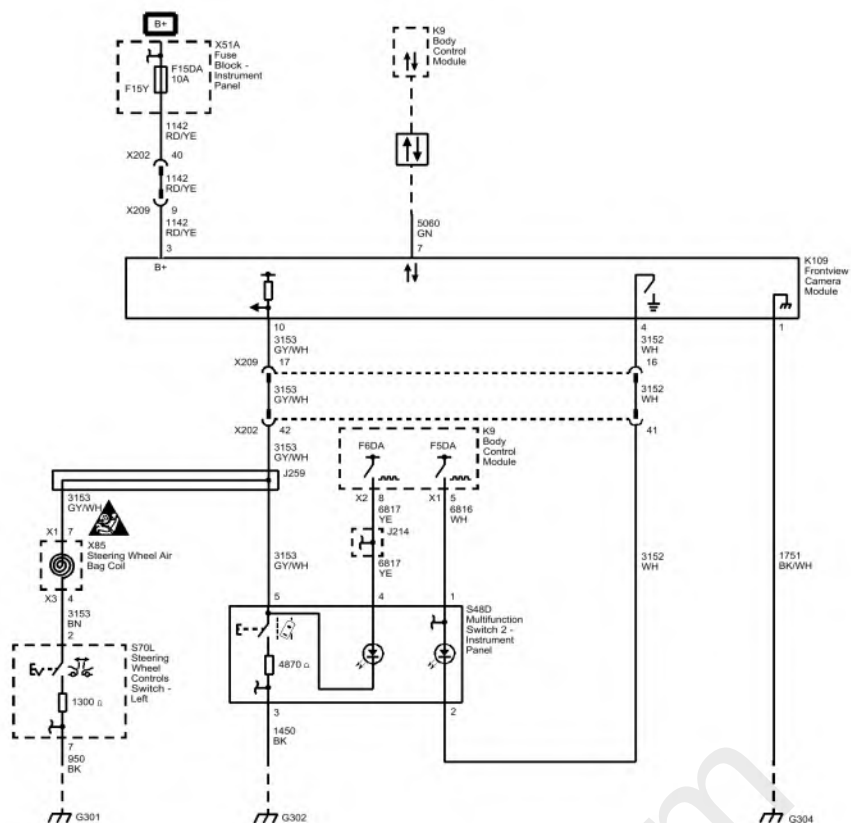


Fig. 10: Lane Departure Warning with Forward Collision Alert (UFL)
Courtesy of GENERAL MOTORS COMPANY

Side Blind Zone Alert (UFT)

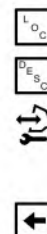
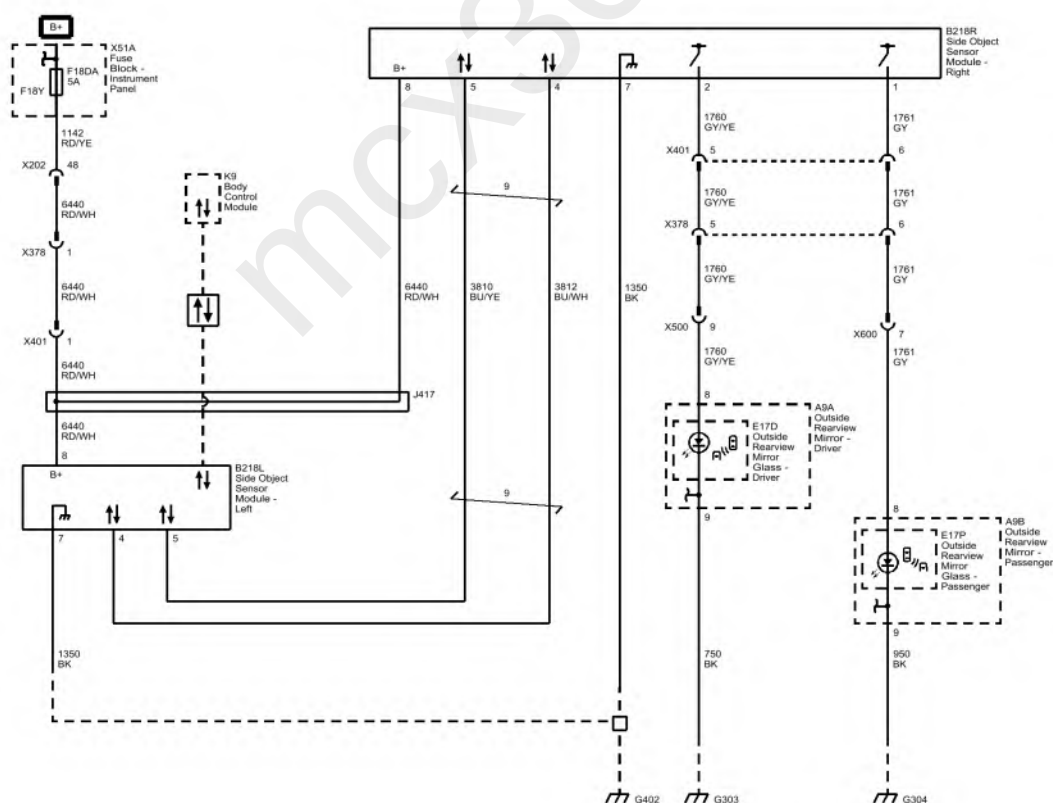


Fig. 11: Side Blind Zone Alert (UFT)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B094C: RIGHT SIDE 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B094C

Right Side Object Detection Control Module

For symptom byte information, refer to [Symptom Byte List](#) .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Indicator Control - Left	B094C 39	1	2	-
Indicator Control - Right	B094C 39	3	4	-
Ground - Left	-	1	-	-
Ground - Right	-	3	-	-
1. Left side blind spot indicator inoperative 2. Left side blind spot indicator always on 3. Right side blind spot indicator inoperative 4. Right side blind spot indicator always on				

Circuit/System Description

The side object sensor module - left communicates on a private communication data bus with the side object sensor module - right. The side object sensor module - left is the master and is responsible for communicating with other control modules on the vehicle, as well as setting DTCs for both side object sensor modules.

The side object sensor module - right is responsible for illuminating the left and right side blind spot indicators. The indicators are located on each outside rearview mirror glass. The indicators each receive ground at all times and are controlled by side object sensor module - right through a discrete control circuit. When a vehicle is located in the vehicle's blind spot or is in an adjacent lane, approaching the side of the vehicle, the side object sensor module - right will illuminate the indicator by applying voltage to the appropriate control circuit. If the driver turns on a turn signal, indicating an intention to change lanes, the side object sensor module - right will flash the indicator as an additional warning.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The side object sensor module - right has detected an internal malfunction or a malfunction with one of the indicator control circuits.

Action Taken When the DTC Sets

- The side object sensor system is disabled.
- A service message may be displayed on the driver information center.

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 40, without a repeat of the malfunction.

Diagnostic Aids

- The side object sensor module - left and side object sensor module - right are different parts and cannot be swapped from side to side.
- This DTC may be stored as a history DTC without affecting the operation of the side object sensor module - right. Do not replace side object sensor module - right based only on DTC B094C being set in history.
- The side object sensor module - right communicates on a private communication data bus with the side object sensor module - left. If programming is needed for module replacement, you must program the side object sensor module - left, which will then program the side object sensor module - right.

Reference Information

Schematic Reference

[Object Detection Schematics \(Buick\)](#)[Object Detection Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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

Circuit/System Verification

1. Ignition ON.
2. Verify that both side blind spot indicators turn ON and OFF when commanding the Object Detection Alert Indicators On and Off with a scan tool.
 - **If both indicators do not turn ON and OFF**
Replace the B218R Side Object Sensor Module - Right.
 - **If one indicator does not turn ON and OFF**
Refer to Circuit/System Testing.
 - **If both indicators turn ON and OFF**
3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate A9 Outside Rearview Mirror. It may take up to 2 mins for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 9 (without AAG) or 12 (with AAG) and ground.
 - **If 2 Ω or greater**

1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the ground circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 2 Ω**
3. Ignition ON.
4. Test for less than 1 V between the control circuit terminal 8 (without AAG) or 11 (with AAG) and ground.
 - **If 1 V or greater**
 1. Ignition OFF, disconnect the harness connector at the B218R Side Object Sensor Module - Right.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 2 Ω , replace the B218R Side Object Sensor Module - Right.
 - **If less than 1 V**
5. Command the Object Detection Alert Indicators On with a scan tool.
6. Test for greater than 3 V between the control circuit terminal 8 (without AAG) or 11 (with AAG) and ground.
 - **If 3 V or less**
 1. Ignition OFF, disconnect the harness connector at the B218R Side Object Sensor Module - Right.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
 - 3. Ignition OFF.
 - 4. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the B218R Side Object Sensor Module - Right.
 - **If greater than 3 V**
7. Replace the appropriate E17 Outside Rearview Mirror Glass.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Outside Rearview Mirror Glass Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

DTC B0954, B0955, B0956, OR B0957: PARKING ASSIST FRONT SENSOR CIRCUITS

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B0954

Parking Assist Front Sensor Left Corner Circuit

DTC B0955

Parking Assist Front Sensor Left Middle Circuit

DTC B0956

Parking Assist Front Sensor Right Middle Circuit

DTC B0957

Parking Assist Front Sensor Right Corner Circuit

For symptom byte information, refer to [Symptom Byte List](#)

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	-	-
Left Front Object Sensor Signal	B0954 02	B0954 04	B0954 01	B0954 08, B0954 22
Left Middle Front Object Sensor Signal	B0955 02	B0955 04	B0955 01	B0955 08, B0955 22
Right Middle Front Object Sensor Signal	B0956 02	B0956 04	B0956 01	B0956 08, B0956 22
Right Front Object Sensor Signal	B0957 02	B0957 04	B0957 01	B0957 08, B0957 22
Low Reference	-	B0954 01, B0955 01, B0956 01, B0957 01, B0958 01, B0959 01, B0960 01, B0961 01	-	-

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 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.

Conditions for Running the DTC

- Ignition ON
- Parking assist is activated.

Conditions for Setting the DTC

B0954 01, B0955 01, B0956 01, or B0957 01

The parking assist control module has determined the sensor signal voltage is too high.

B0954 02, B0955 02, B0956 02, or B0957 02

The parking assist control module has determined the sensor signal circuit is shorted to ground.

B0954 04, B0955 04, B0956 04, or B0957 04

The parking assist control module has determined the sensor signal circuit is open.

B0954 08, B0955 08, B0956 08, or B0957 08

The parking assist control module has received an invalid signal.

B0954 18, B0955 18, B0956 18, or B0957 18

The parking assist control module has determined the sensor signal voltage is too low.

B0954 22, B0955 22, B0956 22, or B0957 22

The parking assist control module determines no change in the position of an object while the vehicle is in motion.

B0954 3A, B0955 3A, B0956 3A, or B0957 3A

The parking assist control module determines the wrong sensor type is installed.

B0954 3B, B0955 3B, B0956 3B, or B0957 3B

The parking assist control module determines the sensor self test has not successfully completed.

Action Taken When the DTC Sets

- The parking assist system is disabled.
- A service message may be displayed on the driver information center.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE)COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7)Parking Assist Description and Operation (with Front and Rear Park Assist, UD5)

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

Circuit/System Verification

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

- **If the DTC is not set**
- 3. Verify that DTC B0954 01, B0955 01, B0956 01, B0957 01 B0954 22, B0955 22, B0956 22 or B0957 22 is not set.
 - **If the DTC is set**
 1. Verify the B78 Front Object Sensors are not contaminated with snow, mud, dirt, slush, or ice.
 - If contaminated, clean the B78 Front Object Sensors.
 - If there is no contamination
 2. Refer to Circuit/System Testing.
 - **If the DTC is not set**
- 4. Verify that DTC B0954 3A, B0955 3A, B0956 3A or B0957 3A is not set.
 - **If the DTC is set**

Replace the appropriate B78 Front Object Sensor with the correct sensor type.

- **If the DTC is not set**
- 5. Ignition ON, transmission in R.
- 6. Verify the scan tool Parking Assist System Status parameter is Enabled.
 - **If the parameter is Disabled**

Refer to Circuit/System Testing.
 - **If the parameter is Enabled**
- 7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness at the appropriate B78 Front Object Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the X3 harness connector at the K182 Parking Assist Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω replace the K182 Parking Assist Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the 12 V reference circuit terminal 1 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the X3 harness connector at the K182 Parking Assist Control Module.
 2. Test for infinite resistance between the 12 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 12 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K182 Parking Assist Control Module.
 - **If the test lamp illuminates**
5. Test for 10.0 - 12.0 V between the signal circuit terminal 2 and ground.
 - **If less than 10.0 V**

1. Ignition OFF, disconnect the X3 harness connector at the K182 Parking Assist Control Module.
2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K182 Parking Assist Control Module.
- **If greater than 12.0 V**
 1. Ignition OFF, disconnect the X3 harness connector at the K182 Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K182 Parking Assist Control Module.
- **If between 10.0 - 12.0 V**
6. Test or replace the B78 Front Object Sensor.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Front Object Alarm Sensor Housing Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

DTC B0958, B0959, B0960, OR B0961: PARKING ASSIST REAR SENSOR CIRCUITS

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

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 Fault Information

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

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Parking Assist Sensor Signal	B0958 02	B0958 04	B0958 01	B0958 08, B0958 22
Left Middle Parking Assist Sensor Signal	B0959 02	B0959 04	B0959 01	B0959 08, B0959 22
Right Middle Parking Assist Sensor Signal	B0960 02	B0960 04	B0960 01	B0960 08, B0960 22
Right Parking Assist Sensor Signal	B0961 02	B0961 04	B0961 01	B0961 08, B0961 22
Low Reference	-	B0958 01, B0959 01, B0960 01, B0961 01	-	-

Circuit/System Description

The parking assist 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 12 V to the parking assist 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.

Conditions for Running the DTC

- Ignition ON
- Parking assist is activated.

Conditions for Setting the DTC

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

The parking assist control module has determined the sensor signal voltage is too high.

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

The parking assist control module has determined the sensor signal circuit is shorted to ground.

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

The parking assist control module has determined the sensor signal circuit is open.

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 determined the sensor signal voltage is too low.

B0958 22, B0959 22, B0960 22, or B0961 22

The parking assist control module 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, B0959 3B, B0960 3B, or B0961 3B

The parking assist control module determines the sensor self test has not successfully completed.

Action Taken When the DTC Sets

- The parking assist system is disabled.
- A service message may be displayed on the driver information center.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7)Parking Assist Description and Operation (with Front and Rear Park Assist, UD5)

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

Circuit/System Verification

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

Refer to DTC B1405 (Rear Park Assist - UD7)DTC B1405 (Front and Rear Park Assist - UD5)

- **If the DTC is not set**
3. Verify that DTC B0958 01, B0959 01, B0960 01, B0961 01, B0958 22, B0959 22, B0960 22 or B0961 22 is not set.
 - **If the DTC is set**
 1. Verify the B306 Parking Assist Sensors are not contaminated with snow, mud, dirt, slush, or ice.
 - If contaminated, clean the B306 Parking Assist Sensors.
 - If there is no contamination
 2. Refer to Circuit/System Testing.
 - **If the DTC is not set**
 4. Verify that DTC B0958 3A, B0959 3A, B0960 3A or B0961 3A is not set.
 - **If the DTC is set**

Replace the appropriate B306 Parking Assist Sensor with the correct sensor type.

- **If the DTC is not set**

5. Ignition ON, transmission in R.

6. Verify the scan tool Parking Assist System Status parameter is Enabled.

- **If the parameter is Disabled**

Refer to Circuit/System Testing.

- **If the parameter is Enabled**

7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness at the appropriate B306 Parking Assist Sensor. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the low reference circuit terminal 3 and ground.

- **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.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω replace the K182 Parking Assist Control Module.

- **If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the 12 V reference circuit terminal 1 and ground.

- **If the test lamp does not illuminate**

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.

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

3. Test for less than 2 Ω in the 12 V reference circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K182 Parking Assist Control Module.

- **If the test lamp illuminates**

5. Test for 10.0 - 12.0 V between the signal circuit terminal 2 and ground.

- **If less than 10.0 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.

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

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K182 Parking Assist Control Module.

- **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.

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

- **If between 10.0 - 12.0 V**

6. Test or replace the B306 Parking Assist Sensor.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Rear Parking Assist Alarm Sensor Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

DTC B0967 OR B0968: PARKING ASSIST ON/OFF SWITCH

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B0967 02

Parking Assist On/Off Switch Circuit Short to Ground

DTC B0968 01

Parking Assist On/Off Switch Indicator Circuit Short to Battery

DTC B0968 06

Parking Assist On/Off Switch Indicator Circuit Low Voltage/Open

DTC B0968 0B

Parking Assist On/Off Switch Indicator Circuit High Current

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Parking Assist Switch Indicator Ignition	B0968 06, 2	B0968 06, 2	-	-
Parking Assist Switch Signal	B0967 02, 1	1	-	-
Parking Assist Switch Indicator Control	B0968 06, 2	B0968 06, 2	B0968 01, B0968 0B	-
Parking Assist Switch Ground	-	1	-	-
1. Parking Assist Switch Malfunction 2. Parking Assist Switch Indicator Malfunction				

Circuit/System Description

The parking assist can be enabled/disabled by pressing the parking assist switch. If the parking assist is enabled, engaging the reverse gear activates the parking assist feature. By subsequently pressing the parking assist switch the parking assist can be disabled.

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

The indicator and switch are connected to the Park Assist Module and the system operates as a stand-alone feature.

Conditions for Running the DTC

- Ignition ON

- The parking assist is activated. The activation takes place by putting in the reverse gear while the system is enabled.

Conditions for Setting the DTC

B0967 02

The Parking Assist Control Module has detected a short to ground.

B0968 01

The Parking Assist Control Module has detected a short to battery.

B0968 06

The Parking Assist Control Module has detected a short to ground or open.

B0968 0B

The Active Safety Module has detected a short to ground or open in the control circuit.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7)Parking Assist Description and Operation (with Front and Rear Park Assist, UD5)

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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Park Assist Switch parameter changes between Active and Inactive when cycling the parking assist switch.
 - **If the Parking Assist Switch parameter does not change between Active and Inactive**

Refer to Parking Assist Switch Malfunction.

- **If the Parking Assist Switch parameter changes between Active and Inactive**

3. Verify the Park Assist Switch Indicator turns ON and OFF when cycling the parking assist switch.

- **If the indicator does not turn ON and OFF**

Refer to Parking Assist Indicator Malfunction.

- **If the indicator turns ON and OFF**

4. All OK.

Circuit/System Testing

Parking Assist Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 3 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

- **If less than 10 Ω**

3. Ignition ON.

4. Verify the scan tool Park Assist Switch parameter is Inactive.

- **If not Inactive**

1. Ignition OFF, disconnect the harness connector X1 at the K182 Parking Assist Control Module.

2. Test for infinite resistance between the signal circuit terminal 8 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K182 Parking Assist Control Module.

- **If Inactive**

5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and ground.

6. Verify the scan tool Park Assist Switch parameter is Active.

- **If not Active**

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

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

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

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K182 Parking Assist Control Module.

- **If Active**

7. Test or replace the S48A Multifunction Switch - Instrument Panel.

Parking Assist Switch Indicator Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel. It may take up to 2 minutes for all vehicle systems to power down. Ignition ON.

NOTE: Verify interior dimming is set to full bright

2. Test for 11 V or greater between the control circuit terminal 6 and ground.
 - **If the voltage is under 11 V and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the voltage is under 11 V and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K182 Parking Assist Control Module.
 - **If the test voltage 11 V or greater**
3. Connect a test lamp between B+ and the control circuit terminal 5.
4. Verify the test lamp turns ON and OFF when commanding the Parking Assist Switch Indicator ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the harness connector at the K182 Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Ignition OFF.
 4. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω replace the K182 Parking Assist Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the K182 Parking Assist Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K182 Parking Assist Control Module.
 - **If the test lamp turns ON and OFF**
5. Test or replace the S48A Multifunction Switch - Instrument Panel.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel.
2. Test for infinite resistance between terminal 2 and terminal 3 with the switch in the open position.
 - **If less than infinite resistance**

Replace the S48A Multifunction Switch - Instrument Panel.
 - **If infinite resistance**
3. Test for less than 10 Ω between terminal 2 and terminal 3 with the switch in the closed position.
 - **If 10 Ω or greater**

Replace the S48A Multifunction Switch - Instrument Panel.
 - **If less than 10 Ω**
4. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Parking Assist Alarm Disable Switch Replacement](#)
- Refer to [Control Module References](#) for Control Module replacement, programming and setup.

DTC B0987: VEHICLE DIRECTION CAMERA 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B0987 01

Vehicle Direction Camera Indicator Circuit Short to Battery

DTC B0987 06

Vehicle Direction Camera Indicator Circuit Low Voltage/Open

DTC B0987 0B

Vehicle Direction Camera Indicator Circuit High Current

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Lane Departure Warning Switch Indicator Ignition	B2625 02	B0987 06	-	-
Lane Departure Warning Switch Indicator Control	-	B0987 06, B0987 0B	B0987 01, B0987 0B	-

Circuit/System Description

The lane departure warning is enabled and disabled through the lane departure warning switch located in the center console. When enabled, the frontview camera module will illuminate the indicator located in the switch.

The BCM supplies voltage to the indicator from the lighting dimming circuit. The frontview camera module turns on the indicator by providing the ground.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

B0987 01

The frontview camera module detects a short to voltage in the control circuit.

B0987 06

The frontview camera module detects a short to ground or an open/high resistance in the control circuit.

B0987 0B

The frontview camera module detects high current in the control circuit.

Action Taken When the DTC Sets

- Lane departure warning is disabled
- The driver information center displays "Service Front Camera".

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Lane Departure Warning 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

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B356A is not set.
 - **If the DTC is set**
Refer to DTC B356A
 - **If the DTC is not set**
3. Verify the lane departure warning indicator turns ON and OFF when pressing and releasing the lane departure warning switch.
 - **If the indicator does not turn ON and OFF**
Refer to Circuit/System Testing.
 - **If the indicator turns ON and OFF**
4. All OK.

Circuit/System Testing

1. Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel, ignition ON.
2. Test for 9.1 - 12.6 V between the dimming control circuit terminal 1 and ground.

NOTE: Verify interior lighting dimming is turned all the way up.

- **If less than 9.1 V**

1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , refer to [Interior Backlighting Malfunction](#).
- **If greater than 12.6 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, refer to [Interior Backlighting Malfunction](#).
- **If between 9.1- 12.6 V**
 3. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
 4. Test for less than 1 V between the control circuit terminal 4 and ground.
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 1 V**
 5. Ignition OFF.
 6. Test for infinite resistance between the control circuit terminal 4 and ground.
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **If infinite resistance**
 7. Test for less than 5 Ω between the K109 Frontview Camera Module terminal 4 and S48D Multifunction Switch 2 - Instrument Panel circuit terminal 2.
 - **If greater than 5 Ω**

Repair the open/high resistance in the circuit.
 - **If less than 5 Ω**
 8. Test or replace the S48D Multifunction Switch - Center Console.
 9. Verify the lane departure switch Indicator turns ON and OFF when pressing and releasing the lane departure warning switch.
 - **If indicator does not turn on and off**

Replace K109 Frontview Camera Module.
 - **If indicator turns on and off**
10. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Instrument Panel Center Accessory Function Switch Replacement \(Buick\)](#)
[Instrument Panel Center Accessory Function Switch Replacement \(Chevrolet\)](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC B1011: SYSTEM DISABLED INFORMATION STORED 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B1011 00

System Disabled Information Stored Malfunction

Circuit/System Description

The frontview camera module permanently monitors the serial data bus for error messages. When a malfunction is detected by the frontview camera module, the system will be disabled and an error message will be stored in the frontview camera module disable history buffer which is used to store information about the front camera features that are disabled.

Conditions for Running the DTC

- Ignition ON
- Frontview camera enabled

Conditions for Setting the DTC

The frontview camera module detects a malfunction.

Action Taken When the DTC Sets

- The frontview camera module is disabled.
- The frontview camera module disable history buffer stores information why the system was disabled.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Diagnostic Aids

The frontview camera module disable history buffers are used to store information about the frontview camera module features that are disabled. The buffers will only update if the disable condition changes.

Example: If the data received from the steering wheel angle sensor is Invalid across many ignition cycles then it will only appear in 1 history buffer and not all history buffers. If this condition is the current reason why the frontview camera module is disabled then it will be set in frontview camera module disable history buffer 1. If a new reason occurs, such as vehicle speed validity is invalid, then the invalid steering wheel angle sensor fault will shift into disable history buffer 2 and vehicle speed validity invalid will be in disable history buffer 1. Since there are only 4 disable history buffers, the invalid steering wheel angle sensor will age out if 4 other disable reasons occur since the last invalid steering wheel angle sensor event occurred. Frontview camera module disable history buffer 1 contains the current reason that one of the frontview camera module features is disabled.

The frontview camera module disable history buffers can display the following values:

- Lane Departure Warning Indicator Malfunction
- Lane Departure Warning Switch Malfunction
- Camera Obstructed
- Accelerator Pedal Position Out of Range
- Driven Wheel Speed Signal Invalid
- Non-Driven Wheel Speed Signal Invalid
- Brake Pedal Moderate Travel Signal Invalid
- Brake Pedal Initial Travel Position Achieved

- Lost Communication with Steering Wheel Angle Sensor Module
- Invalid Data Received From Steering Wheel Angle Sensor Module
- Forward Collision Alert Switch Malfunction
- Clutch Pedal Position (CPP) Sensor Performance
- Clutch Pedal Position (CPP) Sensor Performance
- Transmission Gear Engaged
- Acceleration Sensor Longitudinal Signal
- Invalid Data Received From Yaw Rate Sensor Module
- Power Mode Controlled by Backup Device
- System Power Mode
- Overvoltage
- Undervoltage
- Undefined

Reference Information

Schematic Reference

Object Detection Schematics (Buick) Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

- Lane Departure Warning Description and Operation
- Forward Collision 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

Circuit/System Verification

NOTE: Do not replace K109 Frontview Camera Module for this DTC. DTC B1011 is an information DTC.

1. Ignition ON.
2. Verify no other DTC is set except for DTC B1011.

- **If any other DTCs are set**

Diagnose those first. Refer to Diagnostic Trouble Code (DTC) List - Vehicle .

- **If no other DTCs are set**

3. Verify the scan tool can communicate with all equipped high speed GMLAN devices.

- **If the scan tool does not communicate with high speed GMLAN devices**

Refer to Scan Tool Does Not Communicate with High Speed GMLAN Device .

- If the scan tool communicates with all equipped high speed GMLAN devices

NOTE: When referring to Frontview Camera Disable History, some items such as Non-Driven Wheel Speed Signal Invalid and Driven Wheel Speed Signal Invalid may routinely be stored without B1011 being set. If B1011 has not set, disregard any information stored in the buffers as it is not indicative of a problem.

4. Refer to Diagnostic Aids and Frontview Camera Disable History for what caused B1011 to set. Diagnose the system that set the malfunction.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module programming and setup

DTC B1015: VEHICLE IDENTIFICATION NUMBER INFORMATION

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B1015

Vehicle Identification Number Information

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

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

Conditions for Running the DTC

Ignition voltage is between 9-16 V.

Conditions for Setting the DTC

The stored VIN does not match the received VIN.

Action Taken When the DTC Sets

- The associated system is disabled.
- A service message may be displayed on the driver information center.

Conditions for Clearing the DTC

The stored VIN matches the VIN stored in the BCM.

Reference Information

Schematic Reference

[Object Detection Schematics \(Buick\)](#)[Object Detection Schematics \(Chevrolet\)](#)

Connector End View Reference

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

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B1015 is not set.
 - **If the DTC is set**
 1. Program the control module that set the DTC.
 2. Ignition ON.
 3. Verify DTC B1015 is not set.
 - If the DTC is set, replace the control module that set the DTC.
 - If the DTC is not set
 4. All OK
 - **If the DTC is not set**
3. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for the control module replacement, programming, and setup.

DTC B101D: 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B101D

Electronic Control Unit Hardware

For symptom byte information, refer to [Symptom Byte List](#).

Circuit/System Description

The side detection system uses two modules B218L Side Object Sensor Module - Left and B218R Side Object Sensor Module - Right. The left module is the master and is on the vehicle's serial data bus and communicates to the right module on a private bus. The internal fault detection is handled inside the B218L Side Object Sensor Module - Left. No external circuit diagnosis is involved.

Conditions for Running the DTC

The B218L Side Object Sensor Module - Left is awake and communicating.

Conditions for Setting the DTC

The B218L Side Object Sensor Module - Left has detected an internal malfunction.

Action Taken When the DTC Sets

- The side object sensor system is disabled.
- The driver information center displays SERVICE SIDE DETECTION SYSTEM

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 Aids

- This DTC may be stored as a history DTC without affecting the operation of the B218L Side Object Sensor Module - Left.
- Do not replace B218L Side Object Sensor Module - Left based only on DTC B101D being set in history.
- If DTC B101D is set as current, replace the B218L Side Object Sensor Module - Left.
- Since the left module is the master, if it is replaced, there still may be a problem with the right side as the module may have been unable to report it. Once the left module is replaced, check DTCs and verify operation of the system to assure proper functionality.

Reference Information

Schematic Reference

- [Data Communication Schematics \(Buick\)](#), [Data Communication Schematics \(Chevrolet\)](#)
- [Control Module References](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B101D is not set.
 - **If DTC B101D is set**
 1. Replace the B218L Side Object Sensor Module - Left.
 2. Verify no new DTCs set and side object system operates properly.

- If there are new DTCs refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) , or if the system does not operate properly, refer to [Symptoms - Object Detection](#).
- If there are no new DTCs and the side object system operates properly
- **If DTC B101D is not set**

3. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC B127B: REAR VISION CAMERA (BUICK)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-	-
Reverse Signal	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	1	-
Video Signal +	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-
Video Signal -	2	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-
Ground	-	B127B 2B, B127B 08, 1	-	-
Shield	-	2	-	-
1. Rear Vision Camera Malfunction 2. Poor Quality Image				

Circuit/System Description

When the transmission is placed into R, a 12 V signal is sent to the rearview camera indicating that camera operation is requested. Ignition voltage and ground are supplied to the rearview camera. The rearview camera sends video information to the Human Machine Interface Control Module through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera is not received by the Human Machine Interface Control Module for 2.5 s.

Action Taken When the DTC Sets

- The Human Machine Interface Control Module stores the DTC in memory.
- The driver information center may display a system service message.

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 Aids

- A poor video image can be caused by ice, snow, and mud buildup on the lens of the rearview camera. Also, extreme lighting conditions can affect performance, such as operating in the dark or with bright sunlight shining on the camera. Extreme high or low temperatures can also affect the image quality. An open in the shield of the video signal circuit can also cause a distorted screen.
- Terminal fretting or incorrectly seated connectors can cause a poor image displayed condition. Check the circuit terminals for fretting or incorrectly seated connector. If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE)

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](#)

Circuit/System Verification

NOTE: If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Ignition ON.
2. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**

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

Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#).
 - **If the backup lamps are illuminated**
5. Engine running, transmission in R.
6. Verify a clear rear vision image is displayed on the P17 Info Display Module.

- **If a clear image is not displayed**

Refer to Circuit/System Testing.

- **If a clear image is displayed**

7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B87 Rearview Camera. It may take up to 2 min for all vehicle systems to power down.

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

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

- **If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 6 and ground.

- **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.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).

- **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.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the B87 Rearview Camera.

- **If the test lamp illuminates**

5. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

6. Verify a test lamp illuminates between the control circuit terminal 3 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF.

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

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

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#).

- **If the test lamp illuminates**

7. Ignition OFF, disconnect the X4 harness connector at the K74 Human Machine Interface Control Module, ignition ON.

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

- K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4
- K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

9. Ignition OFF.

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

- K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4
- K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

11. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4 and the B87 Rearview Camera signal (+) circuit terminal 1

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

12. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4 and the B87 Rearview Camera signal (-) circuit terminal 4

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

13. Replace the B87 Rearview Camera.

14. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

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

- **If a clear rear vision image is not displayed**

Replace the K74 Human Machine Interface Control Module.

- **If a clear rear vision image is displayed**

16. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Rearview Driver Information Camera Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup

DTC B127B: REAR VISION CAMERA (CHEVROLET)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B	B127B 2B	-	-
Reverse Signal	B127B 2B	B127B 2B	1	-
Video Signal +	B127B 2B	B127B 2B	B127B 2B	-
Video Signal -	2	B127B 2B	B127B 2B	-
Ground	-	B127B 2B	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Shield	-	2	-	-
1. Rear Vision Camera Malfunction 2. Poor Quality Image				

Circuit/System Description

When the transmission is placed into R, a 12 V signal is sent to the rearview camera indicating that camera operation is requested. Ignition voltage and ground are supplied to the rearview camera. The rearview camera sends video information to the Radio through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera is not received by the Radio for 2.5 s.

Action Taken When the DTC Sets

- The Radio stores the DTC in memory.
- The driver information center may display a system service message.

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 Aids

A poor video image can be caused by ice, snow, and mud buildup on the lens of the rearview camera. Also, extreme lighting conditions can affect performance, such as operating in the dark or with bright sunlight shining on the camera. Extreme high or low temperatures can also affect the image quality. An open in the shield of the video signal circuit can also cause a distorted screen.

Terminal fretting or incorrectly seated connectors can cause a poor image displayed condition. Check the circuit terminals for fretting or incorrectly seated connector. If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

Reference Information

Schematic Reference

Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

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](#)

Circuit/System Verification

NOTE: If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Ignition ON.
2. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**
Clean the lens. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 - **If no debris on the lens**
3. Ignition ON, transmission in R.
4. Verify the backup lamps are illuminated.
 - **If the backup lamps are not illuminated**
Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#).
 - **If the backup lamps are illuminated**
5. Engine running, transmission in R.
6. Verify a clear rear vision image is displayed on the P17 Info Display Module.
 - **If a clear image is not displayed**
Refer to Circuit/System Testing.
 - **If a clear image is displayed**
7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B87 Rearview Camera. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 6 and ground.
 - **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.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).
 - **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.

- If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B87 Rearview Camera.
 - **If the test lamp illuminates**
5. Engine running, trunk/liftgate closed, park brake applied, transmission in R.
6. Verify a test lamp illuminates between the control circuit terminal 3 and ground.
- **If the test lamp does not illuminate**
 1. Ignition OFF.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , refer to [**Backup Lamps Malfunction \(Automatic Transmission\)**](#).
 - **If the test lamp illuminates**
7. Ignition OFF, disconnect the X1 harness connector at the A11 Radio, ignition ON.
8. Test for less than 1 V between the signal circuit terminal listed below and ground:
- A11 Radio signal (+) circuit terminal 15 X1
 - A11 Radio signal (-) circuit terminal 14 X1
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **If less than 1 V**
9. Ignition OFF.
10. Test for infinite resistance between the signal circuit terminal listed below and ground:
- A11 Radio signal (+) circuit terminal 15 X1
 - A11 Radio signal (-) circuit terminal 14 X1
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **If infinite resistance**
11. Test for less than 2 Ω between the A11 Radio signal (+) circuit terminal 15 X1 and the B87 Rearview Camera signal (+) circuit terminal 1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **If less than 2 Ω**
12. Test for less than 2 Ω between the A11 Radio signal (-) circuit terminal 14 X1 and the B87 Rearview Camera signal (-) circuit terminal 4
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **If less than 2 Ω**
13. Replace the B87 Rearview Camera.
14. Engine running, trunk/liftgate closed, park brake applied, transmission in R.
15. Verify a clear rear vision image is displayed on the P17 Info Display Module.
- **If a clear rear vision image is not displayed**

Replace the A11 Radio.
 - **If a clear rear vision image is displayed**

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Rearview Driver Information Camera Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup

DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT (REAR PARK ASSIST - UD7)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B1405 02

Control Module Voltage Reference Output 2 Circuit Short to Ground

DTC B1405 03

Control Module Voltage Reference Output 2 Circuit Low Voltage

DTC B1405 07

Control Module Voltage Reference Output 2 Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
8 V Reference	B1405 02	B0958 06, B0959 06, B0960 06, B0961 06, B1405 03	B0958 06, B0959 06, B0960 06, B0961 06, B1405 07	-
Low Reference	-	B0958 01, B0959 01, B0960 01, B0961 01	-	-

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 front and rear parking assist control module supplies 8 V to the object sensors via the object sensor supply voltage circuit and provides ground via the object sensor low reference circuit. The front and rear parking assist control module triggers the sensors in a sequential loop. After each sensor transmits, the front and rear parking assist control module uses the sensor echo received through the object sensor signal circuit to calculate the distance and position of an object.

Conditions for Running the DTC

- Ignition ON, engine RUNNING
- Transmission in REVERSE

Conditions for Setting the DTC

B1405 02

The rear parking assist control module has detected the object sensor supply voltage circuit is shorted to ground.

B1405 03

The rear parking assist control module has detected the object sensor supply voltage circuit is less than 7.2 V.

B1405 07

The rear parking assist control module has detected the object sensor supply voltage circuit is greater than 9.2 V.

Action Taken When the DTC Sets

- The parking assist system is disabled.
- The driver information center displays SERVICE PARK ASSIST.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7)

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

Circuit/System Testing

1. Ignition OFF, disconnect the X2 harness connector at the K41R Rear Parking Assist Control Module.
2. Test for infinite resistance between the 8 V reference circuit terminal 4 X2 and ground.
 - **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 8 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than 2 Ω , replace the appropriate B78 Rear Object Sensor.
 - **If infinite resistance**
3. Ignition ON.
4. Test for less than 1 V between the 8 V reference circuit terminal 4 X2 and ground.

- **If greater than 1 V**

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

2. Test for less than 1 V between the 8 V reference circuit and ground.

- If greater than 1 V, repair the short to voltage on the circuit.
- If less than 1 V, replace the appropriate B78 Rear Object Sensor.

- **If less than 1 V**

5. Connect the X2 harness connector at the K41R Rear Parking Assist Control Module, ignition ON.

6. Verify DTC B1405 is not set.

- **If DTC B1405 is set**

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

2. Verify DTC B1405 is not set.

- If DTC B1405 is set

Replace the K41R Rear Parking Assist Control Module.

- If DTC B1405 is not set.

3. Verify the DTC B1405 does not set while connecting the harness connector at each B78 Rear Object Sensors, one at a time.

- If DTC B1405 does set

Replace the B78 Rear Object Sensors that was connected immediately before DTC B1405.

- If DTC B1405 does not set.

All OK.

- **If DTC B1405 is not set.**

7. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC B1405: CONTROL MODULE VOLTAGE REFERENCE OUTPUT 2 CIRCUIT (FRONT AND REAR PARK ASSIST - UD5)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B1405 02

Control Module Voltage Reference Output 2 Circuit Short to Ground

DTC B1405 03

Control Module Voltage Reference Output 2 Circuit Low Voltage

DTC B1405 07

Control Module Voltage Reference Output 2 Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
8 V Reference	B1405 02	B0954 06, B0955 06, B0956 06, B0957 06, B0958 06, B0959 06, B0960 06, B0961 06, B1405 03	B0954 06, B0955 06, B0956 06, B0957 06, B0958 06, B0959 06, B0960 06, B0961 06, B1405 07	-
Low Reference	-	B0954 01, B0955 01, B0956 01, B0957 01, B0958 01, B0959 01, B0960 01, B0961 01	-	-

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 front and rear parking assist control module supplies 8 V to the object sensors via the object sensor supply voltage circuit and provides ground via the object sensor low reference circuit. The front and rear parking assist control module triggers the sensors in a sequential loop. After each sensor transmits, the front and rear parking assist control module uses the sensor echo received through the object sensor signal circuit to calculate the distance and position of an object.

Conditions for Running the DTC

- Ignition ON, engine RUNNING
- Transmission in REVERSE

Conditions for Setting the DTC

B1405 02

The front and rear parking assist control module has detected the object sensor supply voltage circuit is shorted to ground.

B1405 03

The front and rear parking assist control module has detected the object sensor supply voltage circuit is low.

B1405 07

The front and rear parking assist control module has detected the object sensor supply voltage circuit is high.

Action Taken When the DTC Sets

- The parking assist is disabled.
- The driver information center displays SERVICE PARK ASSIST.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

[Object Detection Schematics \(Buick\)](#)[Object Detection Schematics \(Chevrolet\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE), COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7) Parking Assist Description and Operation (with Front and Rear Park Assist, UD5)

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

Circuit/System Testing

1. Ignition OFF, disconnect the X2 and X3 harness connectors at the K41 Front and Rear Parking Assist Control Module.
2. Test for infinite resistance between the 8 V reference circuit terminal 4 X2 and ground.
 - **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 8 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than 2 Ω , replace the appropriate B78 Rear Object Sensor.
 - **If infinite resistance**
3. Test for infinite resistance between the 8 V reference circuit terminal 1 X3 and ground.
 - **If less than infinite resistance**
 1. Ignition OFF, disconnect the harness connector at each of the B78 Front Object Sensors.
 2. Test for infinite resistance between the 8 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If less than 2 Ω , replace the appropriate B78 Front Object Sensor.
 - **If infinite resistance**
4. Ignition ON.
5. Test for less than 1 V between the 8 V reference circuit terminal 4 X2 and ground.
 - **If greater than 1 V**
 1. Ignition OFF, disconnect the harness connector at each of the B78 Rear Object Sensors.
 2. Test for less than 1 V between the 8 V reference circuit and ground.
 - If greater than 1 V, repair the short to voltage on the circuit.
 - If less than 1 V, replace the appropriate B78 Front Object Sensor.
 - **If less than 1 V**
6. Test for less than 1 V between the 8 V reference circuit terminal 1 X3 and ground.
 - **If greater than 1 V**
 1. Ignition OFF, disconnect the harness connector at each of the B78 Front Object Sensors.
 2. Test for less than 1 V between the 8 V reference circuit and ground.
 - If greater than 1 V, repair the short to voltage on the circuit.
 - If less than 1 V, replace the appropriate B78 Front Object Sensor.
 - **If less than 1 V**

7. Connect the X2 and X3 harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.

8. Verify DTC B1405 is not set.

- **If DTC B1405 is set**

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

2. Verify DTC B1405 is not set.

- If DTC B1405 is set

Replace the K41 Front and Rear Parking Assist Control Module.

- If DTC B1405 is not set.

3. Verify the DTC B1405 does not set while connecting the harness connector at each B78 Object Sensor, one at a time.

- If DTC B1405 does set

Replace the B78 Object Sensor that was connected immediately before DTC B1405.

- If DTC B1405 does not set.

9. All OK.

- **If DTC B1405 is not set.**

10. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Front Object Alarm Sensor Housing Replacement](#)
- Refer to [Rear Parking Assist Alarm Sensor Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup.

DTC B356A: VEHICLE DIRECTION WARNING SWITCH CIRCUIT SHORT

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B356A 02

Vehicle Direction Warning Switch Circuit Short to Ground

DTC B356A 05

Vehicle Direction Warning Switch Circuit Short to Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B356A 02	1	B356A 05	-
Ground	-	1	1	-
1. Lane departure warning cannot be enabled or disabled, forward collision alert timing sensitivity not adjustable.				

Circuit/System Description

The lane departure warning feature is enabled and disabled through the lane departure switch located in the left steering wheel controls switch. When enabled, the frontview camera module will illuminate the indicator located in the switch. The forward collision alert distance is adjustable using the forward collision switch located in the center console. The setting is shown in the driver information center.

When the system is operating and can detect the lane markings, the frontview camera module will request via serial data communications that the instrument panel cluster illuminate the green lane departure ready-to-assist indicator. If the frontview camera module detects that the vehicle has crossed a lane marking without the turn signal being used, the module will request that the instrument cluster flash the yellow lane departure warning indicator. An audible warning will also sound three times when the yellow instrument cluster indicator is flashing.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

DTC B356A 02

The frontview camera module has detected a short to ground for more than 10 s.

DTC B356A 05

The frontview camera module has detected a short to voltage or an open/high resistance for more than 10 s.

Action Taken When the DTC Sets

- Lane departure and forward collision warning features are disabled.
- Service Front Camera is displayed on the driver information center.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear once 100 consecutive malfunction-free ignition cycles have occurred.

Diagnostic Aids

Manually pressing the lane departure warning switch or forward collision alert switch for approximately 10 s will cause this DTC to set.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE), COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Lane Departure Warning Description and Operation

Electrical Information Reference

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

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Lane Departure Warning Switch Status parameter changes between Open and Closed while pressing and releasing the lane departure warning switch.
 - **If the parameter does not change**

Refer to Circuit/System Testing.
 - **If the parameter changes**
3. Verify the driver information center displays and adjusts forward collision alert setting while repeatedly pressing and releasing the forward collision switch. The setting should change cycle between far, medium, near, and off.
 - **If the display does not change**

Refer to Circuit/System Testing.
 - **If the display changes**
4. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connectors at the S48D Multifunction Switch 2 - Instrument Panel and S70L Steering Wheel Controls Switch - Left. 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:
 - S48D Multifunction Switch 2 - Instrument Panel terminal 3
 - S70L Steering Wheel Controls Switch - Left terminal 7
 - **If 10 Ω or greater**
 1. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify the scan tool Lane Departure Warning Switch Status parameter is Open.
 - **If not Open**
 1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module.
 2. Test for infinite resistance between the S48D Multifunction Switch 2 - Instrument Panel signal circuit terminal 5 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K109 Frontview Camera Module.
 - **If Open**
5. Install a 3 A fused jumper wire between the S48D Multifunction Switch 2 - Instrument Panel signal circuit terminal 5 and ground.
6. Verify DTC B356A 02 sets in approximately 10 s.
 - **If DTC does not set**
 1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K109 Frontview Camera Module.

- **If DTC sets**

7. Test or replace the S48D Multifunction Switch 2 - Instrument Panel or S70L Steering Wheel Controls Switch - Left.

Component Test

Forward Collision Alert Switch

1. Ignition OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch - Left.

2. Test for infinite resistance between the control circuit terminal 2 and ground circuit terminal 7.

- **If less than infinite resistance**

Replace the S70L Steering Wheel Controls Switch - Left.

- **If infinite resistance**

3. Test for 1.0k - 1.5k Ω between the control circuit terminal 2 and ground circuit terminal 7 while pressing forward collision alert switch.

- **If not between 1.0k - 1.5k Ω**

Replace the S70L Steering Wheel Controls Switch - Left.

- **If between 1.0k - 1.5k Ω**

4. All OK.

Lane Departure Warning Switch

1. Ignition OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel.

2. Test for infinite resistance between the control circuit terminal 5 and ground circuit terminal 3.

- **If less than infinite resistance**

Replace the S48D Multifunction Switch 2 - Instrument Panel.

- **If infinite resistance**

3. Test for 3.8k - 5.8k Ω between the control circuit terminal 5 and ground circuit terminal 3 while pressing the lane departure warning switch.

- **If not between 3.8k - 5.8k Ω**

Replace the S48D Multifunction Switch 2 - Instrument Panel.

- **If between 3.8k - 5.8k Ω**

4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Instrument Panel Center Accessory Function Switch Replacement \(Buick\)](#), [Instrument Panel Center Accessory Function Switch Replacement \(Chevrolet\)](#)
- Refer to [Cruise Control Switch Replacement \(Buick\)](#), [Cruise Control Switch Replacement \(Chevrolet\)](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

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:
 - There are no DTCs set.
 - The control module can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to:
 - [Cross Traffic Alert Description and Operation](#)
 - [Forward Collision Alert Description and Operation](#)
 - [Lane Departure Warning Description and Operation](#)
 - [Parking Assist Description and Operation \(with Rear Park Assist, UD7\)](#)[Parking Assist Description and Operation \(with Front and Rear Park Assist, UD5\)](#)
 - [Rear Vision Camera Description and Operation](#)
 - [Side Blind Zone Alert Description and Operation](#)

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 rear bumper cover

Intermittent

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

Symptom List

- [Forward Collision Alert System Malfunction](#)
- [Lane Departure Warning System Malfunction](#)
- [Parking Assist System Malfunction](#)
- [Rear Vision Camera System Malfunction \(Buick\)](#)[Rear Vision Camera System Malfunction \(Chevrolet\)](#)
- [Rear Cross Traffic Alert System Malfunction](#)
- [Side Blind Zone Alert System Malfunction](#)

FORWARD COLLISION 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B0987 01

Vehicle Direction Camera Indicator Circuit Short to Battery

DTC B0987 06

Vehicle Direction Camera Indicator Circuit Low Voltage/Open

DTC B0987 0B

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Lane Departure Warning Switch Indicator Ignition	B2625 02	B0987 06	-	-
Lane Departure Warning Switch Indicator Control	-	B0987 06, B0987 0B	B0987 01, B0987 0B	-

Circuit/System Description

The lane departure warning is enabled and disabled through the lane departure warning switch located in the center console. When enabled, the frontview camera module will illuminate the indicator located in the switch.

The BCM supplies voltage to the indicator from the lighting dimming circuit. The frontview camera module turns on the indicator by proving the ground.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC**B0987 01**

The frontview camera module detects a short to voltage in the control circuit.

B0987 06

The frontview camera module detects a short to ground or an open/high resistance in the control circuit.

B0987 0B

The frontview camera module detects high current in the control circuit.

Action Taken When the DTC Sets

- Lane departure warning is disabled
- The driver information center displays "Service Front Camera".

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)**Object Detection Schematics (Chevrolet)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) **COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)**

Description and Operation

Lane Departure Warning 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

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B356A is not set.
 - **If the DTC is set**
Refer to [DTC B356A](#)
 - **If the DTC is not set**
3. Verify the lane departure warning indicator turns ON and OFF when pressing and releasing the lane departure warning switch.
 - **If the indicator does not turn ON and OFF**
Refer to Circuit/System Testing.
 - **If the indicator turns ON and OFF**
4. All OK.

Circuit/System Testing

1. Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel, ignition ON.
2. Test for 9.1 - 12.6 V between the dimming control circuit terminal 1 and ground.

NOTE: **Verify interior lighting dimming is turned all the way up.**

- **If less than 9.1 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , refer to [Interior Backlighting Malfunction](#).
 - **If greater than 12.6 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, refer to [Interior Backlighting Malfunction](#).
 - **If between 9.1- 12.6 V**
3. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
 4. Test for less than 1 V between the control circuit terminal 4 and ground.
 - **If 1 V or greater**
Repair the short to voltage on the circuit.
 - **If less than 1 V**

5. Ignition OFF.

6. Test for infinite resistance between the control circuit terminal 4 and ground.

- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

7. Test for less than 5 Ω between the K109 Frontview Camera Module terminal 4 and S48D Multifunction Switch 2 - Instrument Panel circuit terminal 2.

- **If greater than 5 Ω**

Repair the open/high resistance in the circuit.

- **If less than 5 Ω**

8. Test or replace the S48D Multifunction Switch - Center Console.

9. Verify the lane departure switch Indicator turns ON and OFF when pressing and releasing the lane departure warning switch.

- **If indicator does not turn on and off**

Replace K109 Frontview Camera Module.

- **If indicator turns on and off**

10. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Instrument Panel Center Accessory Function Switch Replacement \(Buick\)](#), [Instrument Panel Center Accessory Function Switch Replacement \(Chevrolet\)](#).
- Refer to [Control Module References](#) for control module replacement, programming and setup.

PARKING ASSIST 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptor

DTC B0967 02

Parking Assist On/Off Switch Circuit Short to Ground

DTC B0968 01

Parking Assist On/Off Switch Indicator Circuit Short to Battery

DTC B0968 06

Parking Assist On/Off Switch Indicator Circuit Low Voltage/Open

DTC B0968 0B

Parking Assist On/Off Switch Indicator Circuit High Current

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Parking Assist Switch Indicator Ignition	B0968 06, 2	B0968 06, 2	-	-
Parking Assist Switch Signal	B0967 02, 1	1	-	-
Parking Assist Switch Indicator Control	B0968 06, 2	B0968 06, 2	B0968 01, B0968 0B	-
Parking Assist Switch Ground	-	1	-	-
1. Parking Assist Switch Malfunction 2. Parking Assist Switch Indicator Malfunction				

Circuit/System Description

The parking assist can be enabled/disabled by pressing the parking assist switch. If the parking assist is enabled, engaging the reverse gear activates the parking assist feature. By subsequently pressing the parking assist switch the parking assist can be disabled.

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

The indicator and switch are connected to the Park Assist Module and the system operates as a stand-alone feature.

Conditions for Running the DTC

- Ignition ON
- The parking assist is activated. The activation takes place by putting in the reverse gear while the system is enabled.

Conditions for Setting the DTC

B0967 02

The Parking Assist Control Module has detected a short to ground.

B0968 01

The Parking Assist Control Module has detected a short to battery.

B0968 06

The Parking Assist Control Module has detected a short to ground or open.

B0968 0B

The Active Safety Module has detected a short to ground or open in the control circuit.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

[Object Detection Schematics \(Buick\)](#)[Object Detection Schematics \(Chevrolet\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE), COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Parking Assist Description and Operation (with Rear Park Assist, UD7) Parking Assist Description and Operation (with Front and Rear Park Assist, UD5)

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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Park Assist Switch parameter changes between Active and Inactive when cycling the parking assist switch.
 - **If the Parking Assist Switch parameter does not change between Active and Inactive**
Refer to Parking Assist Switch Malfunction.
 - **If the Parking Assist Switch parameter changes between Active and Inactive**
3. Verify the Park Assist Switch Indicator turns ON and OFF when cycling the parking assist switch.
 - **If the indicator does not turn ON and OFF**
Refer to Parking Assist Indicator Malfunction.
 - **If the indicator turns ON and OFF**
4. All OK.

Circuit/System Testing

Parking Assist Switch Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 3 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify the scan tool Park Assist Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the harness connector X1 at the K182 Parking Assist Control Module.

2. Test for infinite resistance between the signal circuit terminal 8 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K182 Parking Assist Control Module.
- **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 2 and ground.
6. Verify the scan tool Park Assist Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the harness connector at the K182 Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K182 Parking Assist Control Module.
 - **If Active**
7. Test or replace the S48A Multifunction Switch - Instrument Panel.

Parking Assist Switch Indicator Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel. It may take up to 2 minutes for all vehicle systems to power down. Ignition ON.

NOTE: **Verify interior dimming is set to full bright**

2. Test for 11 V or greater between the control circuit terminal 6 and ground.
 - **If the voltage is under 11 V and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the voltage is under 11 V and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K182 Parking Assist Control Module.
 - **If the test voltage 11 V or greater**
3. Connect a test lamp between B+ and the control circuit terminal 5.
4. Verify the test lamp turns ON and OFF when commanding the Parking Assist Switch Indicator ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the harness connector at the K182 Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Ignition OFF.
 4. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω replace the K182 Parking Assist Control Module.

- **If the test lamp is always ON**

1. Ignition OFF, disconnect the harness connector at the K182 Parking Assist Control Module.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K182 Parking Assist Control Module.
- **If the test lamp turns ON and OFF**
5. Test or replace the S48A Multifunction Switch - Instrument Panel.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch - Instrument Panel.
2. Test for infinite resistance between terminal 2 and terminal 3 with the switch in the open position.
 - **If less than infinite resistance**
Replace the S48A Multifunction Switch - Instrument Panel.
 - **If infinite resistance**
3. Test for less than 10 Ω between terminal 2 and terminal 3 with the switch in the closed position.
 - **If 10 Ω or greater**
Replace the S48A Multifunction Switch - Instrument Panel.
 - **If less than 10 Ω**
4. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Parking Assist Alarm Disable Switch Replacement](#)
- Refer to [Control Module References](#) for Control Module replacement, programming and setup.

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

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	Ã,Â
Side Object Sensor - Right Ground (terminal 8)	-	U0233	1	-
Side Object Sensor - Right Ground (terminal 3)	-	U0233	1	Ã,Â
Side Object Sensor - Right B+	1	U0233	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Side Object Sensor - Right Communication	1	U0233	1	-
1. Rear Cross Traffic Alert 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 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.

Reference Information

Schematic Reference

[Object Detection Schematics \(Buick\)](#)[Object Detection Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Cross Traffic 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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool can communicate with the left side object sensor.
 - **If the scan tool can not communicate with the left side object sensor**
Refer to Circuit/System Testing - Left Side Object Sensor Malfunction.
 - **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.
 - **If the scan tool can not communicate with the right side object sensor**
Refer to Circuit/System Testing - Right Side Object Sensor Malfunction.
 - **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.
 - **If alert indicators do not turn ON and OFF**
 1. Verify the system is enabled.
 - If disabled, refer to diagnostic aids for cause of disable.
 - If enabled test or replace the display.
 - **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.
 - **If the audible alert does not turn ON and OFF**
 1. Verify the system is enabled.
 - If disabled, refer to diagnostic aids for cause of disable.
 - If enabled refer to audio system malfunction.
 - **If audible alert turns ON and OFF**
6. All OK.

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.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - **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.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **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.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B218L Side Object Sensor Module - Left.
 - **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.
 - **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **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.
 - Terminal 3
 - Terminal 8
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - **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.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **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.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B218R Side Object Sensor Module - Right.
 - **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.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

6. Replace B218R Side Object Sensor Module - Right.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

Refer to [Control Module References](#) for side object sensor module replacement, programming and setup.

REAR VISION CAMERA SYSTEM MALFUNCTION (BUICK)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-	-
Reverse Signal	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	1	-
Video Signal +	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-
Video Signal -	2	B127B 2B, B127B 08, 1	B127B 2B, B127B 08, 1	-
Ground	-	B127B 2B, B127B 08, 1	-	-
Shield	-	2	-	-
1. Rear Vision Camera Malfunction 2. Poor Quality Image				

Circuit/System Description

When the transmission is placed into R, a 12 V signal is sent to the rearview camera indicating that camera operation is requested. Ignition voltage and ground are supplied to the rearview camera. The rearview camera sends video information to the Human Machine Interface Control Module through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera is not received by the Human Machine Interface Control Module for 2.5 s.

Action Taken When the DTC Sets

- The Human Machine Interface Control Module stores the DTC in memory.
- The driver information center may display a system service message.

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 Aids

- A poor video image can be caused by ice, snow, and mud buildup on the lens of the rearview camera. Also, extreme lighting conditions can affect performance, such as operating in the dark or with bright sunlight shining on the camera. Extreme high or low temperatures can also affect the image quality. An open in the shield of the video signal circuit can also cause a distorted screen.
- Terminal fretting or incorrectly seated connectors can cause a poor image displayed condition. Check the circuit terminals for fretting or incorrectly seated connector. If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE)

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](#)

Circuit/System Verification

NOTE: If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Ignition ON.
2. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**

Clean the lens. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 - **If no debris on the lens**
3. Ignition ON, transmission in R.
4. Verify the backup lamps are illuminated.

- **If the backup lamps are not illuminated**

Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#) .

- **If the backup lamps are illuminated**

5. Engine running, transmission in R.

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

- **If a clear image is not displayed**

Refer to Circuit/System Testing.

- **If a clear image is displayed**

7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B87 Rearview Camera. It may take up to 2 min for all vehicle systems to power down.

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

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

- **If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the ignition circuit terminal 6 and ground.

- **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.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Power Mode Mismatch](#) .

- **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.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the B87 Rearview Camera.

- **If the test lamp illuminates**

5. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

6. Verify a test lamp illuminates between the control circuit terminal 3 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF.

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

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

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#) .

- **If the test lamp illuminates**

7. Ignition OFF, disconnect the X4 harness connector at the K74 Human Machine Interface Control Module, ignition ON.

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

- K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4
- K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

9. Ignition OFF.

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

- K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4
- K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

11. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X4 and the B87 Rearview Camera signal (+) circuit terminal 1

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

12. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (-) circuit terminal 15 X4 and the B87 Rearview Camera signal (-) circuit terminal 4

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

13. Replace the B87 Rearview Camera.

14. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

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

- **If a clear rear vision image is not displayed**

Replace the K74 Human Machine Interface Control Module.

- **If a clear rear vision image is displayed**

16. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Rearview Driver Information Camera Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup

REAR VISION CAMERA SYSTEM MALFUNCTION (CHEVROLET)

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

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

Circuit/System Description

When the transmission is placed into R, a 12 V signal is sent to the rearview camera indicating that camera operation is requested. Ignition voltage and ground are supplied to the rearview camera. The rearview camera sends video information to the Radio through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera is not received by the Radio for 2.5 s.

Action Taken When the DTC Sets

- The Radio stores the DTC in memory.
- The driver information center may display a system service message.

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 Aids

A poor video image can be caused by ice, snow, and mud buildup on the lens of the rearview camera. Also, extreme lighting conditions can affect performance, such as operating in the dark or with bright sunlight shining on the camera. Extreme high or low temperatures can also affect the image quality. An open in the shield of the video signal circuit can also cause a distorted screen.

Terminal fretting or incorrectly seated connectors can cause a poor image displayed condition. Check the circuit terminals for fretting or incorrectly seated connector. If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

Reference Information

Schematic Reference

Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

Rear Vision Camera Description and Operation

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Circuit/System Verification

NOTE: If the condition is intermittent or cannot be duplicated, disconnect the connectors and add Nyogel lubricant 760G. This procedure will correct the high resistance condition due to terminal fretting corrosion.

1. Ignition ON.
2. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**

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

Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#).
 - **If the backup lamps are illuminated**
5. Engine running, transmission in R.
6. Verify a clear rear vision image is displayed on the P17 Info Display Module.
 - **If a clear image is not displayed**

Refer to Circuit/System Testing.
 - **If a clear image is displayed**
7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B87 Rearview Camera. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 6 and ground.
 - **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.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Power Mode Mismatch](#).

- **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.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the B87 Rearview Camera.

- **If the test lamp illuminates**

5. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

6. Verify a test lamp illuminates between the control circuit terminal 3 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF.

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

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

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#).

- **If the test lamp illuminates**

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

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

- A11 Radio signal (+) circuit terminal 15 X1
- A11 Radio signal (-) circuit terminal 14 X1
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

9. Ignition OFF.

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

- A11 Radio signal (+) circuit terminal 15 X1
- A11 Radio signal (-) circuit terminal 14 X1
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

11. Test for less than 2 Ω between the A11 Radio signal (+) circuit terminal 15 X1 and the B87 Rearview Camera signal (+) circuit terminal 1

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

12. Test for less than 2 Ω between the A11 Radio signal (-) circuit terminal 14 X1 and the B87 Rearview Camera signal (-) circuit terminal 4

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

13. Replace the B87 Rearview Camera.

14. Engine running, trunk/liftgate closed, park brake applied, transmission in R.

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

- **If a clear rear vision image is not displayed**

Replace the A11 Radio.

- If a clear rear vision image is displayed

16. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Rearview Driver Information Camera Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup

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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Side Object Sensor Module - Left B+	U0232	U0232	-	-
Side Object Sensor Module - Left Serial Data (terminal 1)	1	1	1	-
Side Object Sensor Module - Left Serial Data (terminal 4)	U18A6	U18A6	U18A6	-
Side Object Sensor Module - Left Serial Data (terminal 5)	-	U18A6	U18A6	-
Side Object Sensor - Left Control (terminal 3)	U18A6	U18A6	-	-
Side Object Sensor Module - Left Ground	-	1	-	-
Side Object Sensor Module - Right B+	U18A6	U18A6	-	-
Side Object Sensor Module - Right Control (terminal 2)	3	3	2	-
Side Object Sensor Module - Right Control (terminal 1)	3	3	2	-
Side Object Sensor Module - Right Ground	-	U18A6	-	-
1. No communication with side object sensor module - left 2. Side blind zone alert indicator illuminated at all times 3. Side blind zone alert indicator does not illuminate				

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 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 can 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. Ground is provided through the outside rearview mirror harness.

Diagnostic Aids

- When the ignition is turned on, or the engine is started, both outside rearview mirror displays will briefly come on to indicate that the system is operating.
- 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.
- The side blind zone system will be disabled if 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.
- The side blind zone may be temporarily unavailable if 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.
- Because the sensors are NOT identical, they must NOT be swapped from one side of the vehicle to the other in an attempt to isolate a concern. Sensors should also 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.

Reference Information

Schematic Reference

Object Detection Schematics (Buick) Object Detection Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

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

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool can communicate with the B218L Side Object Sensor Module - Left.
 - **If the scan tool cannot communicate with the B218R Side Object Sensor Module - Right**

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

- **If the scan tool can communicate with the B218L Side Object Sensor Module - Left**

3. Verify DTC U18A6 is not present

- **If DTC U18A6 is present**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If DTC U18A6 is not present**

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.

- **If both side blind zone alert indicators do not briefly turn ON and OFF**

1. Verify the system is enabled

- If disabled, refer to Diagnostic Aids for cause of disable.
- If enabled, refer to Circuit/System Testing - Side Object Indicator Malfunction.

- **If only one indicator does not briefly illuminate during the self test**

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

- **If both side blind zone alert indicators briefly turn ON and OFF**

6. All OK.

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 7 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

- **If less than 10 Ω**

3. Verify a test lamp illuminates between the B+ circuit terminal 8 and ground.

- **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.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

- **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.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the B218L Side Object Sensor Module - Left.

- **If the test lamp illuminates**

4. Ignition OFF and all vehicle systems OFF.

5. Test for less than 2 Ω between the B218L Side Object Sensor Module - Left serial data circuit terminal 1 and the X84 Data Link Connector serial data circuit terminal 1.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

6. Replace B218L Side Object Sensor Module - Left.

Side Object Indicator Malfunction

1. Ignition OFF and all vehicle systems OFF, remove the appropriate outside rearview mirror glass. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the P34 Side Object Detection Indicator ground circuit terminal and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Ignition ON, connect a test lamp between the P34 Side Object Detection Indicator control circuit terminal and ground.
4. Verify the test lamp turns ON and OFF when commanding the Object Detection Alert Indicators ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the harness connector at the B218R Side Object Sensor Module - Right.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the B218R Side Object Sensor Module - Right.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the B218R Side Object Sensor Module - Right, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the B218R Side Object Sensor Module - Right.
 - **If the test lamp turns ON and OFF**
5. Test or replace the A9 Outside Rearview Mirror Glass.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- Refer to [Outside Rearview Mirror Glass Replacement](#)
- Refer to [Control Module References](#) for control module replacement, programming, and setup.

LANE DEPARTURE WARNING 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.
- Refer to [Diagnostic Procedure Instructions](#) to provide an overview of each diagnostic category.

DTC Descriptors

DTC B0987 01

DTC B0987 06

Vehicle Direction Camera Indicator Circuit Low Voltage/Open

DTC B0987 0B

Vehicle Direction Camera Indicator Circuit High Current

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Lane Departure Warning Switch Indicator Ignition	B2625 02	B0987 06	-	-
Lane Departure Warning Switch Indicator Control	-	B0987 06, B0987 0B	B0987 01, B0987 0B	-

Circuit/System Description

The lane departure warning is enabled and disabled through the lane departure warning switch located in the center console. When enabled, the frontview camera module will illuminate the indicator located in the switch.

The BCM supplies voltage to the indicator from the lighting dimming circuit. The frontview camera module turns on the indicator by proving the ground.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC**B0987 01**

The frontview camera module detects a short to voltage in the control circuit.

B0987 06

The frontview camera module detects a short to ground or an open/high resistance in the control circuit.

B0987 0B

The frontview camera module detects high current in the control circuit.

Action Taken When the DTC Sets

- Lane departure warning is disabled
- The driver information center displays "Service Front Camera".

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Object Detection Schematics (Buick)**Object Detection Schematics (Chevrolet)**

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) **COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)**

Lane Departure Warning 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

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B356A is not set.
 - **If the DTC is set**

Refer to [DTC B356A](#)
 - **If the DTC is not set**
3. Verify the lane departure warning indicator turns ON and OFF when pressing and releasing the lane departure warning switch.
 - **If the indicator does not turn ON and OFF**

Refer to Circuit/System Testing.
 - **If the indicator turns ON and OFF**
4. All OK.

Circuit/System Testing

1. Ignition OFF, and all vehicle systems OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel, ignition ON.
2. Test for 9.1 - 12.6 V between the dimming control circuit terminal 1 and ground.

NOTE: **Verify interior lighting dimming is turned all the way up.**

- **If less than 9.1 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , refer to [Interior Backlighting Malfunction](#) .
- **If greater than 12.6 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, refer to [Interior Backlighting Malfunction](#) .
- **If between 9.1- 12.6 V**

3. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
4. Test for less than 1 V between the control circuit terminal 4 and ground.
 - **If 1 V or greater**
Repair the short to voltage on the circuit.
 - **If less than 1 V**
5. Ignition OFF.
6. Test for infinite resistance between the control circuit terminal 4 and ground.
 - **If less than infinite resistance**
Repair the short to ground on the circuit.
 - **If infinite resistance**
7. Test for less than 5 Ω between the K109 Frontview Camera Module terminal 4 and S48D Multifunction Switch 2 - Instrument Panel circuit terminal 2.
 - **If greater than 5 Ω**
Repair the open/high resistance in the circuit.
 - **If less than 5 Ω**
8. Test or replace the S48D Multifunction Switch - Center Console.
9. Verify the lane departure switch Indicator turns ON and OFF when pressing and releasing the lane departure warning switch.
 - **If indicator does not turn on and off**
Replace K109 Frontview Camera Module.
 - **If indicator turns on and off**
10. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair

- Refer to [Instrument Panel Center Accessory Function Switch Replacement \(Buick\)](#), [Instrument Panel Center Accessory Function Switch Replacement \(Chevrolet\)](#)
- Refer to [Control Module References](#) for control module replacement, programming and setup.

REPAIR INSTRUCTIONS

FORWARD COLLISION ALERT DISPLAY REPLACEMENT (BUICK)

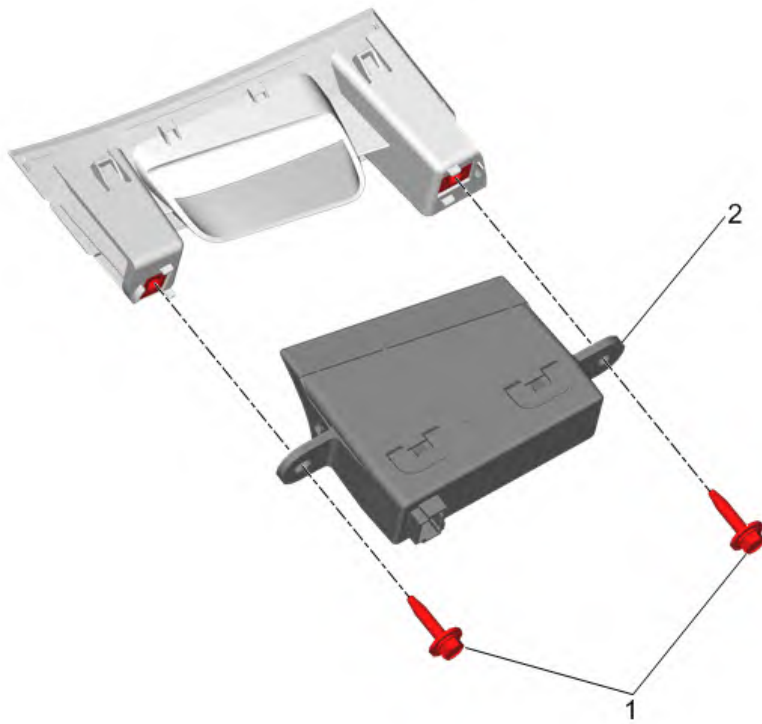


Fig. 12: Forward Collision Alert Display (Encore).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Forward Collision Alert Display Bezel. Refer to Forward Collision Alert Display Bezel Replacement (With UEU, Buick) , Forward Collision Alert Display Bezel Replacement (Without UEU, Buick) .	
1	Forward Collision Alert Display Bolt (Qty: 2) CAUTION: Refer to Fastener Caution Tighten 2.5 N.m (22 lb in)
2	Forward Collision Alert Display

FORWARD COLLISION ALERT DISPLAY REPLACEMENT (CHEVROLET)

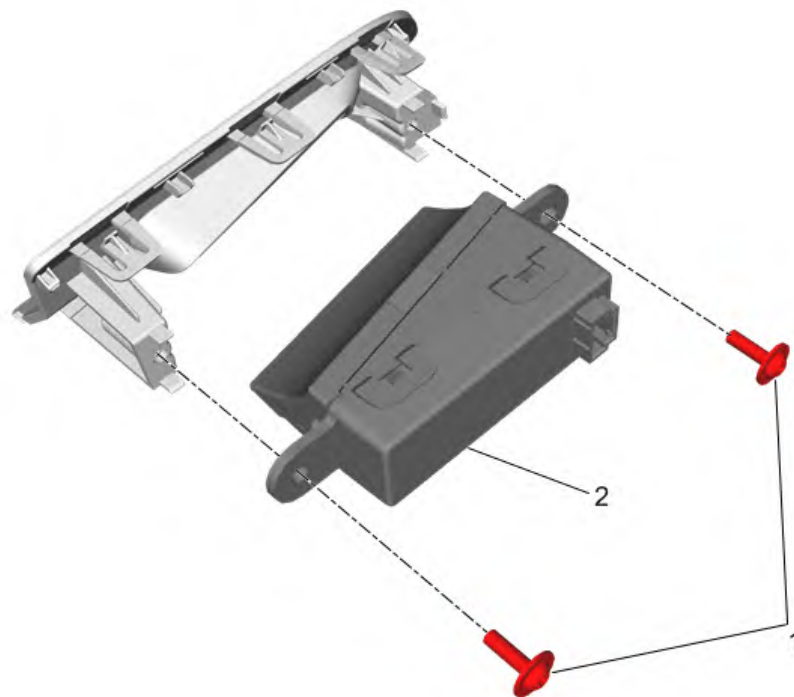


Fig. 13: Forward Collision Alert Display (Trax).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Forward Collision Alert Display Bezel. Refer to Forward Collision Alert Display Bezel Replacement (With UEU, Chevrolet) , Forward Collision Alert Display Bezel Replacement (Without UEU, Chevrolet)	
1	Forward Collision Alert Display Bolt (Qty: 2) CAUTION: Refer to Fastener Caution Tighten 0.8 N.m (7 lb in)
2	Forward Collision Alert Display

PARKING ASSIST ALARM DISABLE SWITCH REPLACEMENT



Fig. 14: Parking Assist Alarm Disable Switch
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Instrument Panel Accessory Bezel. Refer to Instrument Panel Accessory Bezel Replacement (Buick) .	
1	Parking Assist Alarm Disable Switch Procedure Release the retaining tabs.

PARKING ASSIST CONTROL MODULE REPLACEMENT

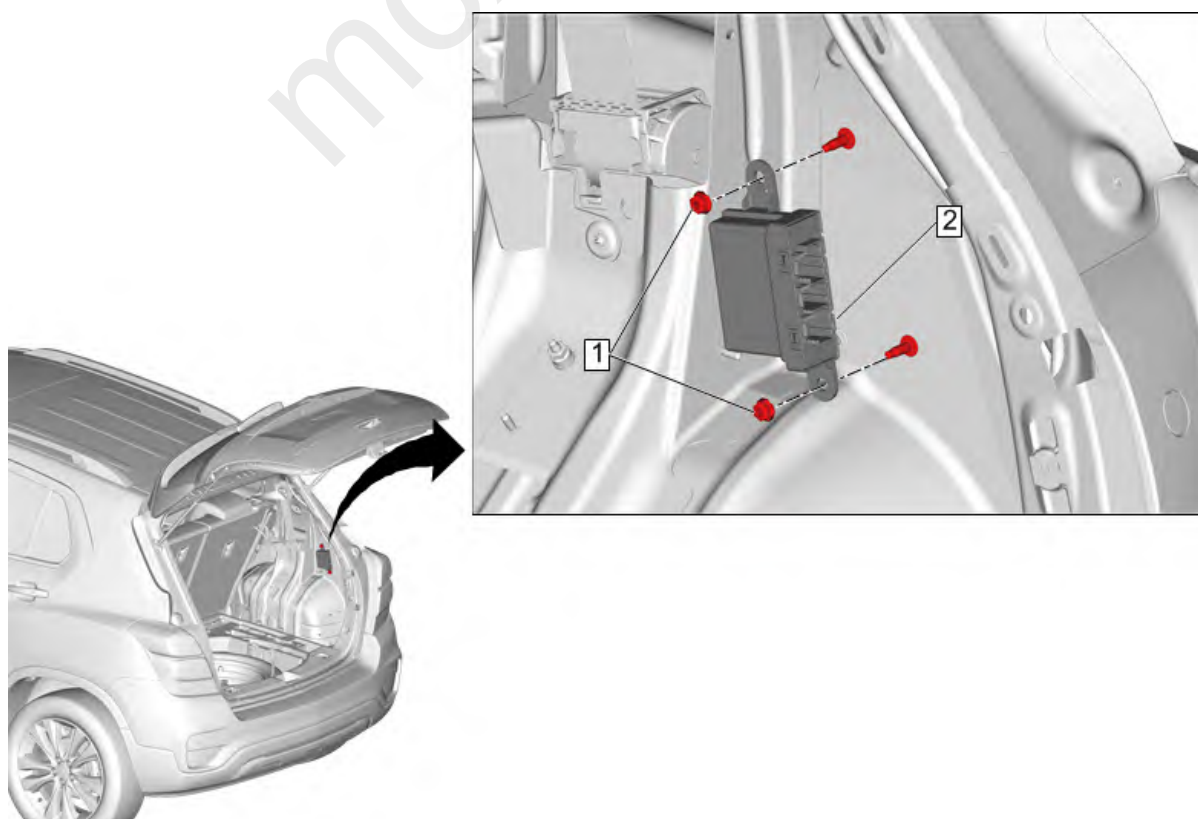


Fig. 15: Parking Assist Control Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Quarter Stowage Pocket Door (Right Side). Refer to Quarter Stowage Pocket Door Replacement (Right Side)	
1	Parking Assist Alarm Control Module Nut (Qty: 2) CAUTION: Refer to Fastener Caution Tighten 5 N.m (44 lb in)
2	Parking Assist Control Module Procedure 1. Disconnect the electrical connectors. 2. Perform the necessary programming and setup procedure: Control Module References

FRONT OBJECT ALARM SENSOR HOUSING REPLACEMENT

1. Remove the front fascia. Refer to [Front Bumper Fascia Replacement \(Chevrolet\)](#) [Front Bumper Fascia Replacement \(Buick\)](#) .

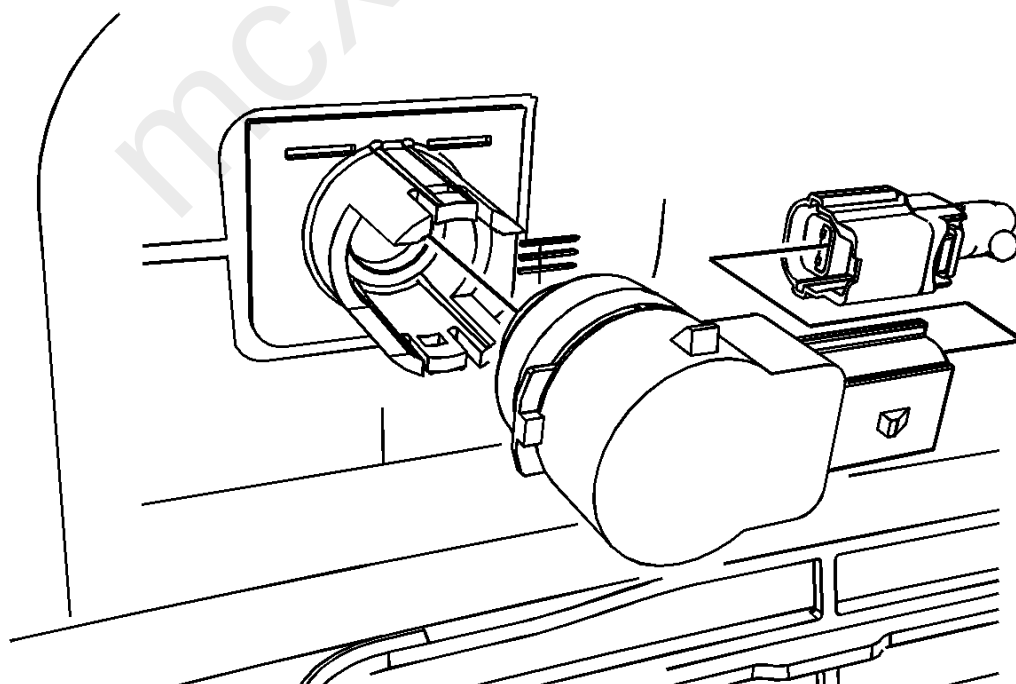


Fig. 16: Front Object Alarm Sensor And Housing
Courtesy of GENERAL MOTORS COMPANY

2. Disconnect the sensor harness.
3. Remove the sensor from the sensor housing.

The sensor housing must be painted if replaced. If reinstalled, painting will not be necessary.

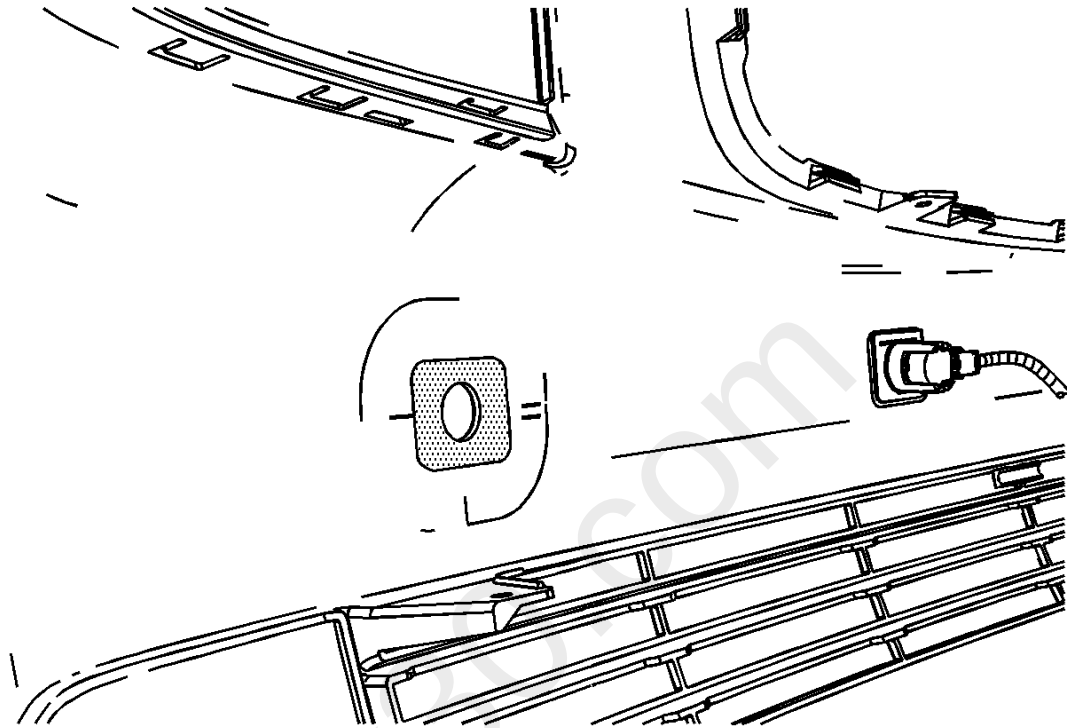


Fig. 17: Sonic Weld Plastic Residue
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do Not grind off alignment tabs.

4. Sand/grind sonic weld plastic residue from the fascia.

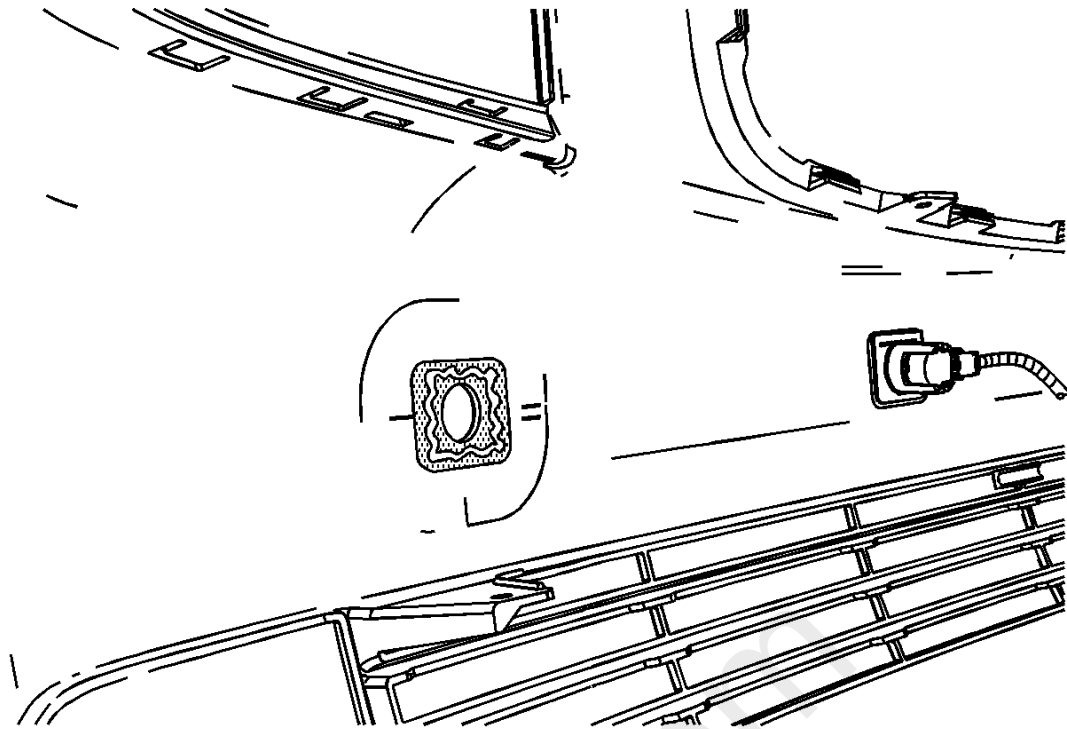


Fig. 18: Structural Adhesive Epoxy On Fascia
Courtesy of GENERAL MOTORS COMPANY

5. Apply structural adhesive epoxy, Lord Fusor™ 127EZ or equivalent, to fascia at mating surface.

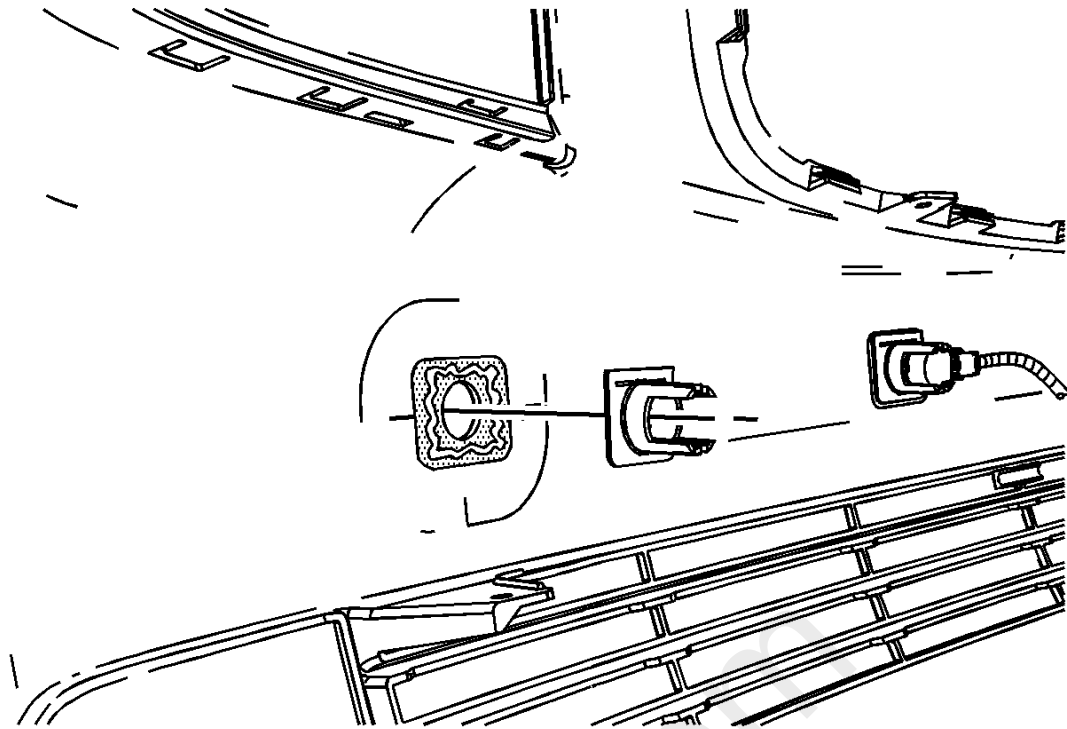


Fig. 19: Sensor Housing And Tabs

Courtesy of GENERAL MOTORS COMPANY

6. Using the alignment tabs, install the sensor housing to the fascia.
7. Allow adhesive to cure according to manufacturer's directions.

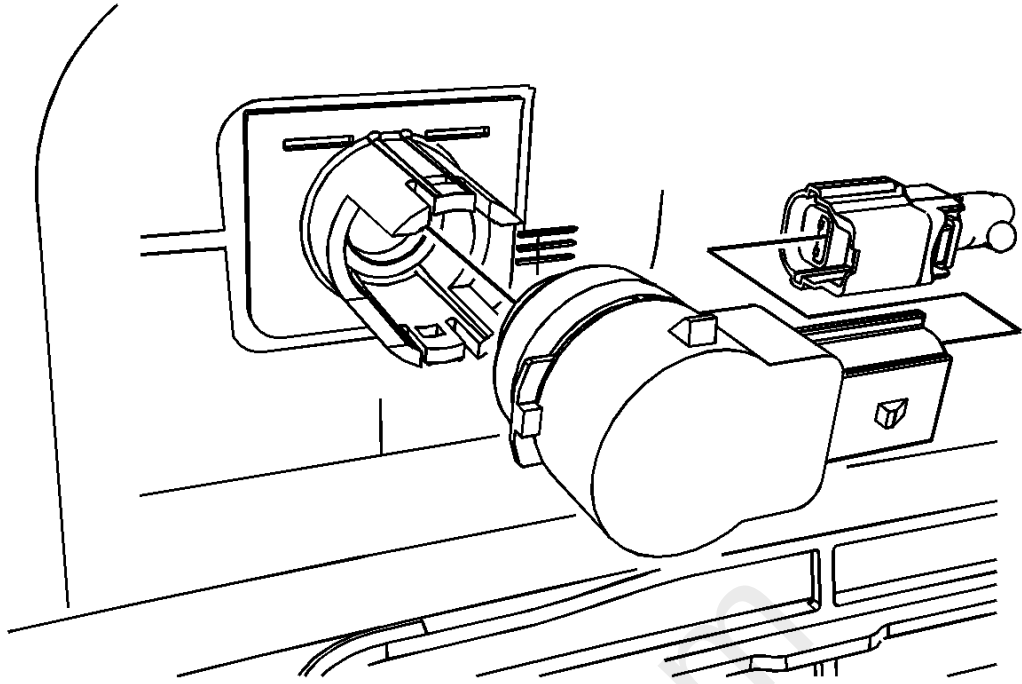


Fig. 20: Front Object Alarm Sensor And Housing

Courtesy of GENERAL MOTORS COMPANY

8. Install the sensor to the sensor housing.
9. Connect the electrical harness.
10. Install the front fascia. Refer to [Front Bumper Fascia Replacement \(Chevrolet\)](#), [Front Bumper Fascia Replacement \(Buick\)](#).

FRONT OBJECT ALARM SENSOR WIRING HARNESS REPLACEMENT

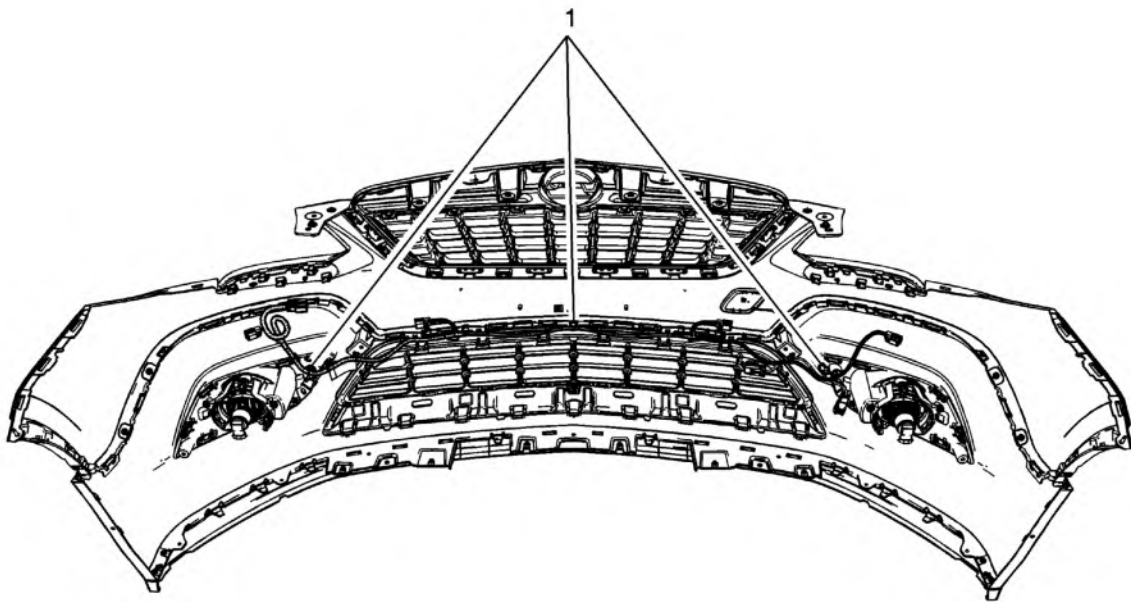


Fig. 21: Front Object Alarm Sensor Wiring Harness
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Remove the front bumper fascia. Refer to Front Bumper Fascia Replacement (Chevrolet) . Front Bumper Fascia Replacement (Buick) .	
1	Front Object Alarm Sensor Wiring Harness Procedure 1. Disconnect the front object alarm sensor wiring harness electrical connectors from the front object sensors. 2. Disconnect the front object alarm sensor wiring harness electrical connectors from the front fascia wiring harness. 3. Using a suitable tool, disconnect the front object alarm sensor wiring harness from the front fascia.

SIDE OBJECT SENSING ALERT MODULE REPLACEMENT

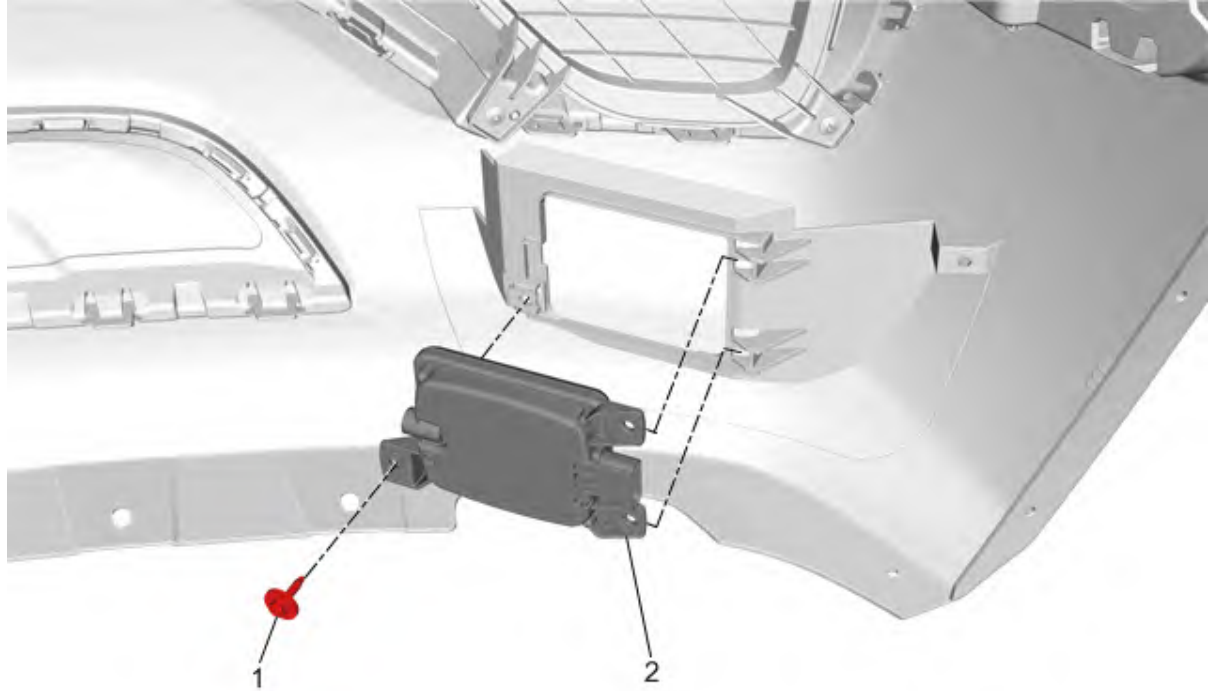


Fig. 22: Side Object Sensing Alert Module
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle	
1	Side Object Sensing Alert Module Bolt CAUTION: Refer to Fastener Caution Tighten 2.5 N.m (22 lb in)
2	Side Object Sensing Alert Module Procedure 1. Disconnect the electrical connector. 2. Perform the necessary programming and setup procedure: Control Module References 3. Lower the vehicle. Refer to Lifting and Jacking the Vehicle

REAR OBJECT SENSOR WIRING HARNESS REPLACEMENT

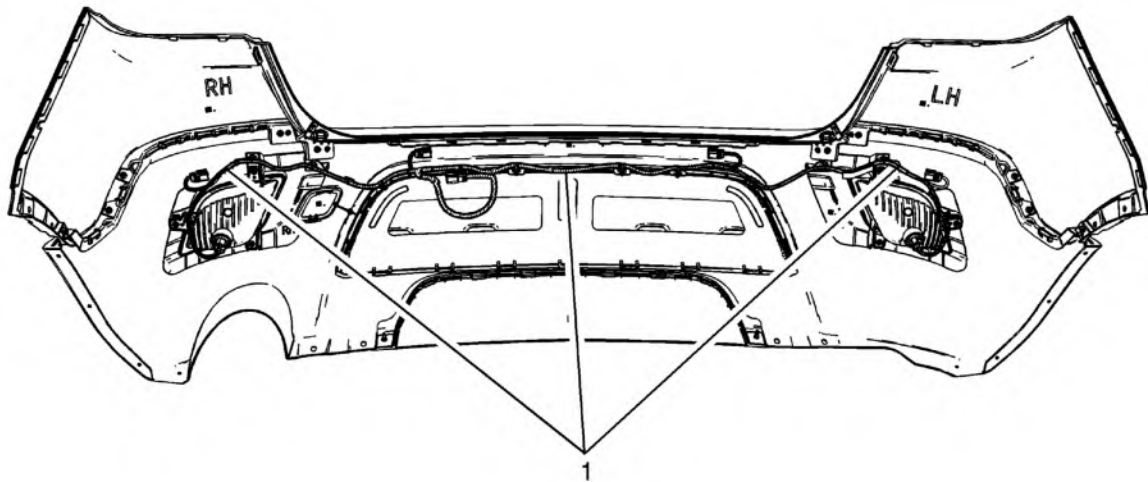


Fig. 23: Rear Object Sensor Wiring Harness
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Remove the rear bumper fascia. Refer to Rear Bumper Fascia Replacement (Chevrolet) , Rear Bumper Fascia Replacement (Buick) .	
1	Rear Object Sensor Wiring Harness Procedure 1. Disconnect the rear object sensor wiring harness electrical connectors from the rear object sensors. 2. Disconnect the rear object sensor wiring harness electrical connectors from the rear lamps. 3. Using a suitable tool, disconnect the rear object sensor wiring harness from the rear fascia.

REAR PARKING ASSIST ALARM SENSOR REPLACEMENT

Removal Procedure

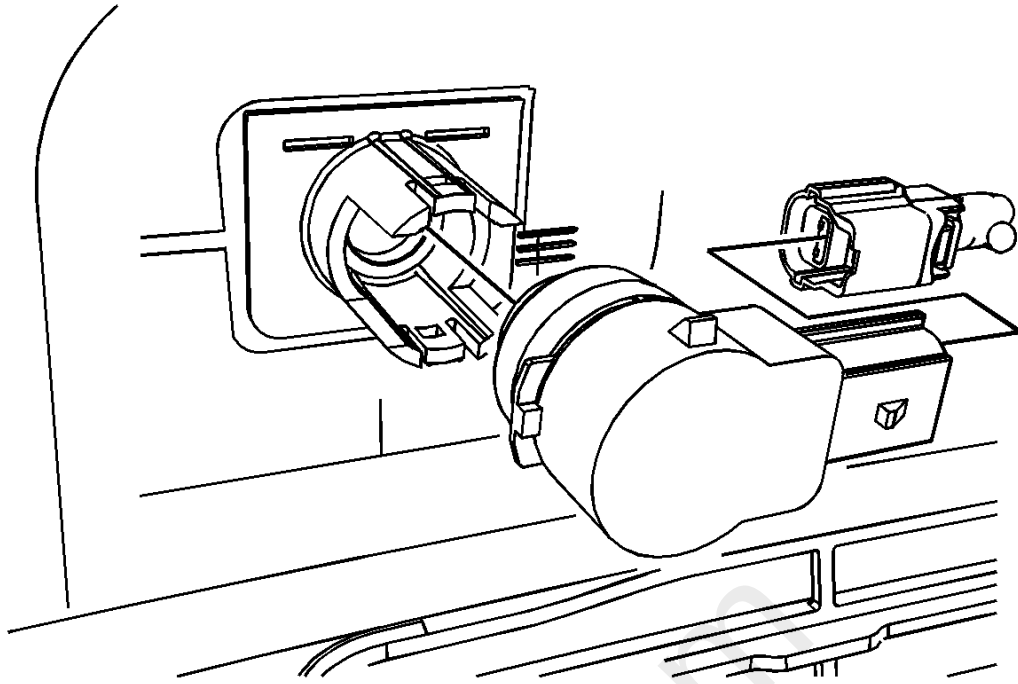


Fig. 24: Rear Object Sensor And Housing

Courtesy of GENERAL MOTORS COMPANY

1. Remove rear bumper fascia. Refer to [Rear Bumper Fascia Replacement \(Chevrolet\)](#) [Rear Bumper Fascia Replacement \(Buick\)](#) .
2. Disconnect electrical from the rear object sensor.

NOTE: The rear object sensor is a one piece design. Do NOT twist the sensor cap to try and remove the painted cap. Replacement sensor requires painting to match fascia/bumper body color.

3. Lift the locking tabs on the housing and remove the rear object sensor.

Installation Procedure

NOTE: Do not refinish previously painted sensors. Excess paint build up will cause the sensor to be inoperative.

1. Paint the rear object sensor.
2. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.

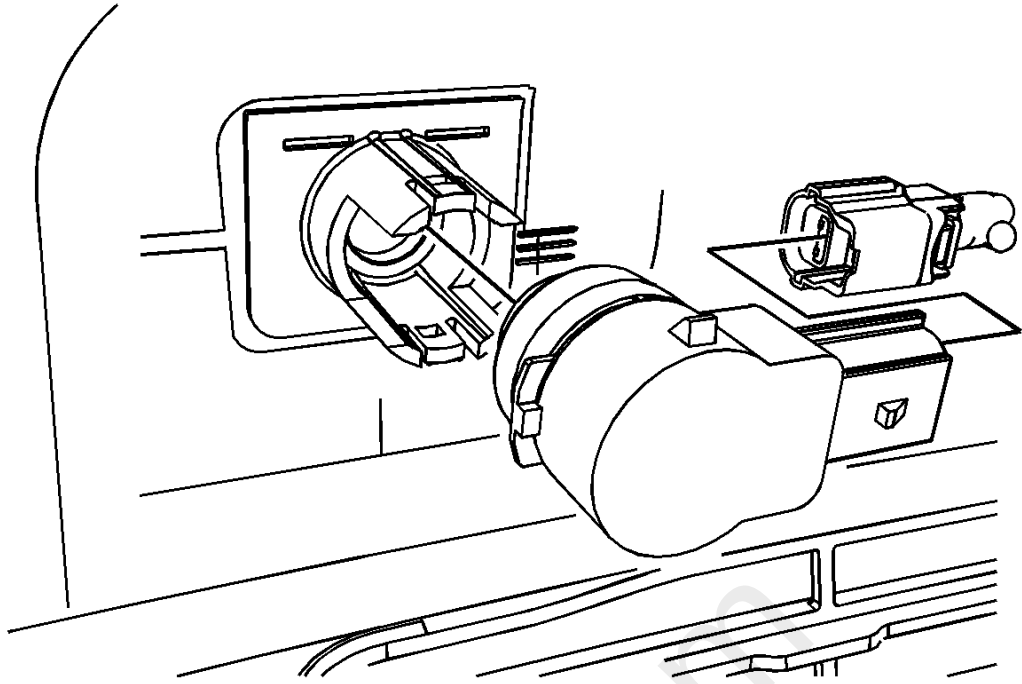


Fig. 25: Rear Object Sensor And Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.

3. Insert the sensor into the housing.
4. Connect the electrical connector to the rear object sensor.
5. Install the rear bumper fascia. Refer to [Rear Bumper Fascia Replacement \(Chevrolet\)](#) [Rear Bumper Fascia Replacement \(Buick\)](#).

FRONT VIEW CAMERA REPLACEMENT

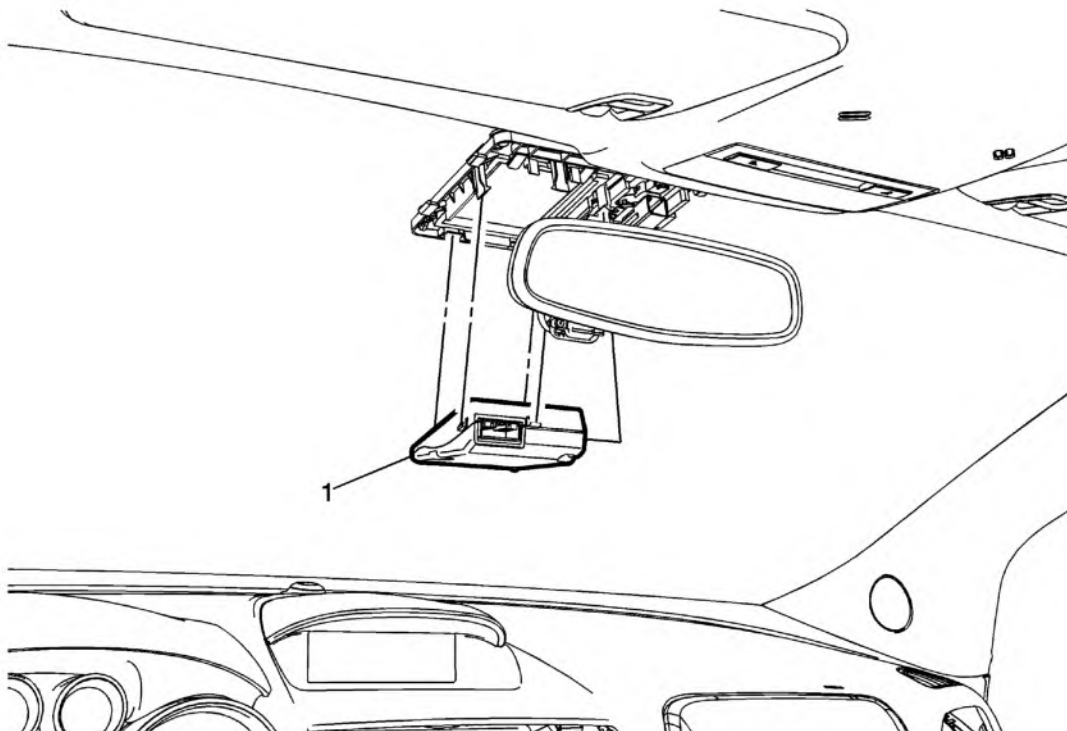


Fig. 26: Front View Camera

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the windshield outside moisture sensor cover. Refer to Windshield Outside Moisture Sensor Cover Replacement (Buick) , Windshield Outside Moisture Sensor Cover Replacement (Chevrolet) .	
1	Front View Camera Procedure 1. Using a suitable plastic tool, insert the tool between the edge of the front view camera retainers, turn the tool to release the retainers and the camera and rotate downward. 2. Disconnect the electrical connector. 3. After replacement of the front view camera, program the front view camera. Refer to Control Module References.

REARVIEW DRIVER INFORMATION CAMERA REPLACEMENT

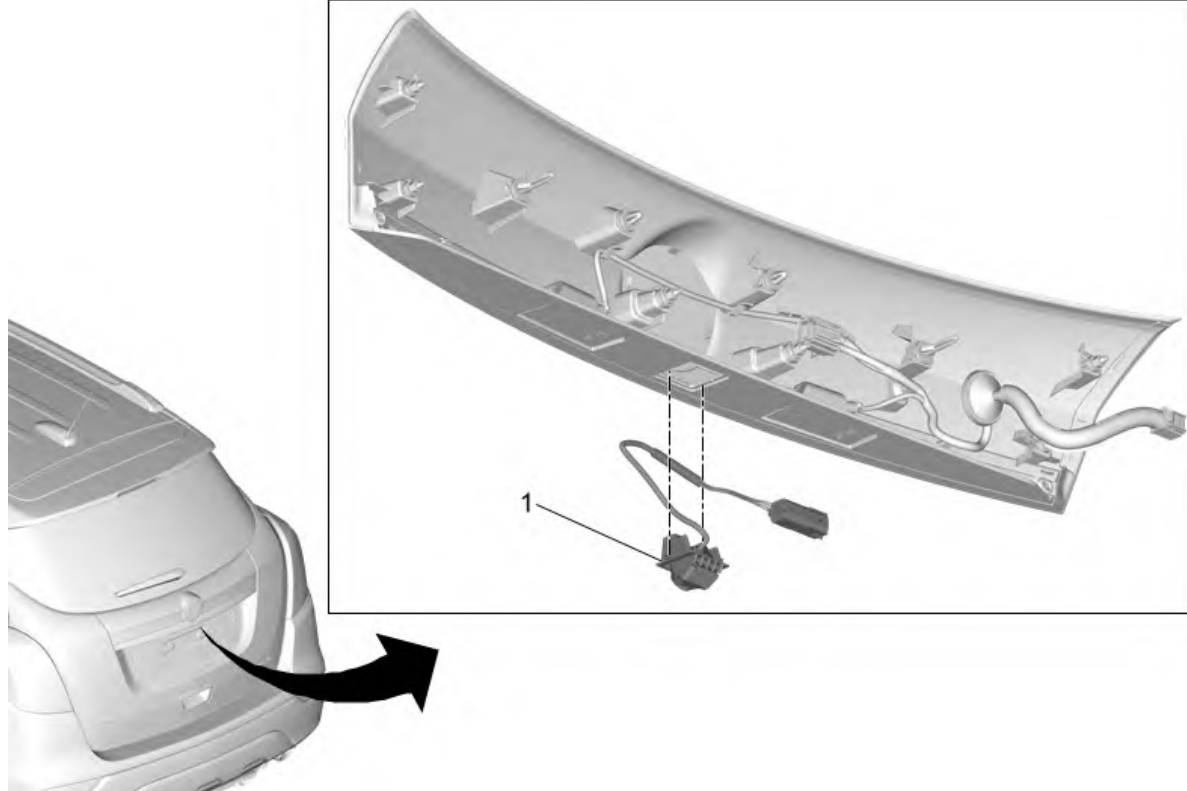


Fig. 27: Rearview Driver Information Camera
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove Liftgate Center Applique. Refer to Liftgate Center Applique Replacement (Chevrolet) , Liftgate Center Applique Replacement (Buick) .	
1	Rearview Driver Information Camera Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs.

FRONT VIEW CAMERA MODULE LEARN

Calibration

For North American SPS users, **Calibration will NOT start automatically** and will need to be initiated with GDS2. For European SPS users, **Calibration will start automatically** and will not need to be initiated with GDS2.

The calibration process for the front view camera system is necessary when a front view camera module is replaced by a new one. This process is required when only replacing the windshield and the front view camera module has been mounted again properly. This process shall be completed within 3-5 minutes when the correct driving conditions are met. If conditions are not met correct, the front view camera module shall continuously run the service point calibration until successfully completed. This process shall work across ignition cycles and shall not be required to be re-initialized at start up. If the Lane Departure Warning Switch is pressed during calibration, the indicator will flash momentarily and then stay out - this is normal operation.

To calibrate the front camera, operate the vehicle in the following conditions until the calibration is complete:

- Clean windshield.
- Avoid lane changes.
- Maintain vehicle speeds between 56-90 km/h (35-56 MPH).

- Ensure the road contains visible references (well defined lane markings, curbs, etc.).

Calibration Procedure (Required for North American SPS users)

1. Apply the parking brake.
2. Place the transmission in Park (if applicable)
3. Install scan tool
4. Navigate to the module diagnostics menu
5. Select Frontview Camera Module
6. Select Configuration/Reset Functions menu Item
7. Select the Frontview Camera Learn procedure and follow the directions displayed on the screen.
8. Drive the vehicle to complete calibration.

Once the procedure is complete, the amber indicator will turn off. Shortly after the green ready to assist light should turn on as long as all conditions are met for normal operation. The system is then ready to assist.

If Slow to Calibrate

One or more of the following conditions may increase the length of time required to complete the self-calibration procedure:

- Heavy traffic
- Stop and go traffic
- Mountain roads
- Curves in roadway
- Poor contrast lane markings
- Botts' Dots type lane markings
- Operating the vehicle speed is greater than 90 km/h (56 MPH)
- Driving through snow or fog, or driving directly into the sun
- Camera not properly installed. Verify it is snapped into tabs and is secure. Refer to [Front View Camera Replacement](#).

No Calibration

Conditions that will prevent completion of the self-calibration procedure:

- Dirty windshield glass or obstruction on windshield
- Operating the vehicle with speed less than 56 km/h (35 MPH)
- No visible lane markings
- Severe weather where lane markings cannot be seen
- Camera not properly installed. Verify it is snapped into tabs and is secure. Refer to [Front View Camera Replacement](#).

DESCRIPTION AND OPERATION

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

The ultrasonic parking assist system is designed to identify and notify the driver of an object in the vehicles path when reversing at speeds of less than 8 km/h (5 MPH). The distance and location of the object is determined by 4 object sensors located in the rear bumper. The parking assist system will notify the driver using an audible beep signal through the radio rear speakers.

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

- Parking assist control module
- Rear object alarm sensors

Parking Assist Control Module

The parking assist control module provides an 8 V reference and a low reference to the four object alarm sensors. The parking assist control module receives individual signals from each of the four 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 CAN-Bus to the radio requesting an audible alert.

Rear Object Alarm Sensors

The object alarm sensors are located in the rear bumper 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 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.

Rear Parking Assist Operation

When the vehicle is first placed into reverse there will be one audible beep through the rear speakers, to indicate that the system is working. If rear speakers are inoperable no audible signals will occur.

When backing up at speed of less than 8 km/h (5 MPH), the system is constantly monitoring for object of interest located behind the vehicle. The rear 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 within 2.5 m (8 ft) there will be a audible beep notification out of both rear speakers based upon the distance to the object. As the vehicle gets closer to an object, the time between the beeps become shorter.

If the vehicle stops in a range zone the beeping will stop after 5 s. When the distance between the object and the vehicle changes, beeping will start again.

If the rear parking assist system detects a malfunction the single audible beep will not chime when put into reverse along with a DTC being stored. The object alarm module will send a serial data message to the instrument panel cluster to display the SERVICE PARK ASSIST message on the driver information center.

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 rear 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 rear parking assist system is manually disabled by the vehicle operator through the audio system personalization menu.
- The park brake is applied or not fully released.
- 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 endgate will disable the system.
- 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.

PARKING ASSIST DESCRIPTION AND OPERATION (WITH FRONT AND REAR PARK ASSIST, UD5)

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 an audible beep signal through the radio.

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

- Advanced parking assist control module
- Front object alarm sensors
- Rear object alarm sensors
- Parking assist switch
- Parking assist switch indicator

Advanced Parking Assist Control Module

The advanced parking assist control module provides a reference voltage and a low reference to the 8 object alarm sensors. The advanced 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 advanced parking assist control module will send a data message via CAN-Bus to the radio requesting an audible alert.

Object Alarm Sensors

The object alarm 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 advanced 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 Switch 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.

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 advanced parking assist control module evaluates the received sensor signals. As soon as an object is within the measuring range, the advanced parking assist control module sends a message via CAN-Bus to the radio in order to give out the acoustic distance 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 alarm 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 alarm 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 advanced 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. Besides that the advanced parking assist control module 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.

Parking Assist System Driver Information Center Messages

SERVICE PARK ASSIST

The driver information center displays SERVICE PARK ASSIST when the advanced 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 advanced 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 advanced 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.

LANE DEPARTURE WARNING DESCRIPTION AND OPERATION

The lane departure warning system is a convenience feature of the front view camera that issues a warning when the system detects that the vehicle has unintentionally crossed a lane marking. The front view camera is located behind the windshield, looking out at the road ahead and detecting any lane markings. When the vehicle unintentionally leaves a detected lane, a visual and audible alert is given to the driver.

The lane departure warning system is made up of the following components:

- Front view camera module
- Lane departure warning switch
- Instrument cluster/Vehicle Direction Display
- Radio

Front View Camera Module

The camera detects visual queues such as lane markings. When it is determined that the vehicle has unintentionally moved outside of the lane, a visual and audible warning is given to the driver. The front view camera module receives an input from the lane departure warning switch and controls the lane departure warning switch indicator output. The front view camera module also communicates via serial data with the instrument cluster and radio to request visual and audible alerts.

Lane Departure Warning Switch

The lane departure warning switch provides an input to the front view camera module to turn the lane departure warning system ON and OFF. The front view camera module provides a signal voltage to the normally open momentary switch. When the switch is pressed, the signal circuit is pulled to ground, indicating to the front view camera module that the system has been requested to turn ON or OFF. The lane departure warning switch also contains the lane departure warning switch indicator, which is controlled by the front view camera module to indicate the ON and OFF status of the lane departure warning system. When the system has been enabled by the lane departure warning switch, the front view camera module applies ground to the switch indicator and illuminates the LED. The location of the lane departure warning switch can vary with different vehicles. For the exact location please refer to the user's manual.

Instrument Cluster

The vehicle direction display contains green and amber lane departure warning indicators. These indicate to the driver the current status of the lane departure warning system and are controlled via serial data by the front view camera module. When the vehicle speed is above 56 km/h (35 MPH) and the system has detected the required lane markings and is ready to assist, the green indicator will be illuminated on the vehicle direction display. If the vehicle has unintentionally left the lane, the amber indicator will flash.

Radio

The radio controls the audible alert for the lane departure warning. If the vehicle has unintentionally left the lane, the radio will command three beeps as an audible alert to the driver.

Lane Departure Warning Operation

System operation can be describe by the following modes:

- Off State: The system has been turned off by the driver, using the lane departure warning switch. The lane departure warning indicator will not be illuminated.
- Not Ready To Assist: The system is enabled and the lane departure warning indicator is illuminated, but not ready to assist when any of the following conditions is true:
 - Vehicle speed is less than 56 km/h (35 MPH). The system is designed to function at speeds greater than 56 km/h (35 MPH).
 - The system cannot detect lane markings. This may be because there are no lane markings, as on a country road or that the lane markings cannot be determined due to snow, rain, or other driving conditions.
 - The windshield area in front of the camera or the camera lens is blocked by fog, dirt, damage to the windshield or other elements that may prevent the camera from detecting lane markings.
- Ready To Assist: The system is enabled and ready to warn of the unintentional lane crossing. The system is ready to assist when the green lane departure warning indicator is illuminated on the vehicle direction display.

Lane Crossing Alerts

- When one of the following conditions are met, the system will not give alerts:
 - The correct turn signal is activated. An activated turn signal is interpreted as an intentional lane crossing.
 - The operator makes an intentional steering maneuver.
 - The operator makes an intentional accelerating maneuver.
 - The operator makes an intentional braking maneuver.
- Lane crossing alert consists of the following:
 - Three chimes are activated through the radio.
 - The amber lane departure warning indicator will flash.

Lane Departure Warning System Driver Information Center Messages

The front view camera module can command the driver information center to display the various messages to alert the driver of a system concern or status information. For detailed information about the possible messages please refer to the user's manual.

LANE KEEP ASSIST DESCRIPTION AND OPERATION

NOTE:

- **The Lane Keep Assist system DOES NOT continuously steer the vehicle**
- **The Lane Keep Assist system replaces Lane Departure Warning System**
- **Lane Departure Warning will have more alerts than Lane Keep Assist (visual, audible, and haptic warning)**

The system assists driver to keep vehicle in-lane by providing a steering push back to the vehicle when an unintended lane departure is detected. See the user's manual for more detailed information on vehicle personalization.

The lane keep assist system is made up of the following components:

- Front view camera module
- Lane Keep Assist switch/control indicator
- Instrument cluster/Vehicle Direction Display
- Radio
- Safety Alert Seat (if equipped)
- Yaw rate sensor
- Electric power steering

Front View Camera Module

The camera detects visual queues such as lane markings. When it is determined that the vehicle has unintentionally moved outside of the lane, visual, and audible or haptic warning is given to the driver. The front view camera module receives an input from the lane keep assist switch and controls the lane keep assist switch indicator output. The front view camera module also communicates via serial data with the instrument cluster, radio, and memory seat module to request visual, and audible or haptic alerts.

Lane Keep Assist Switch

The lane keep assist switch provides an input to the front view camera module to turn the lane keep assist system ON and OFF. The front view camera module provides a signal voltage to the normally open momentary switch. When the switch is pressed, the signal circuit is pulled to ground, indicating to the front view camera module that the system has been requested to turn ON or OFF. The lane keep assist switch also contains the lane keep assist switch indicator, which is controlled by the front view camera module to indicate the ON and OFF status of the lane keep assist system. When the system has been enabled by the lane keep assist switch, the front view camera module applies ground to the switch

indicator and illuminates the LED. The location of the lane keep assist switch can vary with different vehicles. For the exact location please refer to the user's manual.

Instrument Cluster

The vehicle direction display contains green and amber lane keep assist indicators. These indicate to the driver the current status of the lane keep assist system and are controlled via serial data by the front view camera module. When the vehicle speed is above 56 km/h (35 MPH) and the system has detected the required lane markings and is ready to assist, the green indicator will be illuminated on the vehicle direction display. If the vehicle has unintentionally left the lane, the amber indicator will flash.

Radio

The radio controls the audible alert for the lane keep assist. If the vehicle has unintentionally left the lane, the radio will command three beeps as an audible alert to the driver.

Safety Alert Seat (if equipped)

The memory seat module controls the haptic alert provided by the seats. If the vehicle has unintentionally left the lane, and the Electric Power Steering determines the corrective action requires an above threshold amount of effort, the memory seat module will command three pulses to the left or right side of the seat, depending on the lane departure direction.

Yaw Rate Sensor

The steering intervention is based on the forward looking sensor outputs, such as lateral offset of the vehicle, relative yaw angle and time to line crossing. Over that, other vehicle dynamics signals are needed, e.g. velocity, steering angle, yaw rate for the purpose of a driver suppression.

Electric Power Steering

The electric power steering uses a torque sensor to detect driver inputs and relays that information to the frontview camera module. The electric power steering is used to provide steering push back.

Lane Keep Assist Operation

There is two stages of warning/intervention for the driver: The first stage is the steering push back, if the lane keep assist system detects that the vehicle will cross the lane marking despite it is intervening, a second stage warning shall be issued. The second stage warning is a chime or a haptic seat vibration, **if equipped** with haptic seats. If a haptic seat vibration is used as stage 2 warning, the vibration shall take place on the side of the seat, where the lane departure happened.

System operation can be described by the following modes:

- Off State: The system has been turned off by the driver using the lane keep assist switch. The lane keep assist indicator will not be illuminated.
- Not Ready To Assist: The system is enabled and the lane keep assist indicator is illuminated, but not ready to assist when any of the following conditions is true:
 - Vehicle speed is less than 37 MPH (60 km/h). The system is designed to function at speeds greater than 37 MPH (60 km/h).
 - The system cannot detect lane markings. This may be because there are no lane markings, as on a country road or that the lane markings cannot be determined due to snow, rain, or other driving conditions.
 - The windshield area in front of the camera or the camera lens is blocked by fog, dirt, damage to the windshield or other elements that may prevent the camera from detecting lane markings.
- Ready To Assist: The system is enabled and ready to warn of the unintentional lane crossing. The system is ready to assist when the green lane keep assist indicator is illuminated on the vehicle direction display.

Lane Crossing Alerts

- When one of the following conditions are met, the system will not give alerts:
 - The correct turn signal is activated. An activated turn signal is interpreted as an intentional lane crossing.
 - The operator makes an intentional steering maneuver.
 - The operator makes an intentional accelerating maneuver.
 - The operator makes an intentional braking maneuver.
- Lane crossing alert consists of the following:
 - The amber lane keep assist indicator will flash.
 - "push-back" steering torque input (or nudge) from Electric Power Steering to help prevent a lane departure
 - Three chimes are activated through the radio.
 - or **if equipped** , three pulses to the left or right side of the seat.

Lane Keep Assist System Driver Information Center Messages

The front view camera module can command the driver information center to display the various messages to alert the driver of a system concern or status information. For detailed information about the possible messages please refer to the user's manual.

CROSS TRAFFIC ALERT DESCRIPTION AND OPERATION

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 w, 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.

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 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.

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 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 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.

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.

SIDE BLIND ZONE ALERT DESCRIPTION AND OPERATION

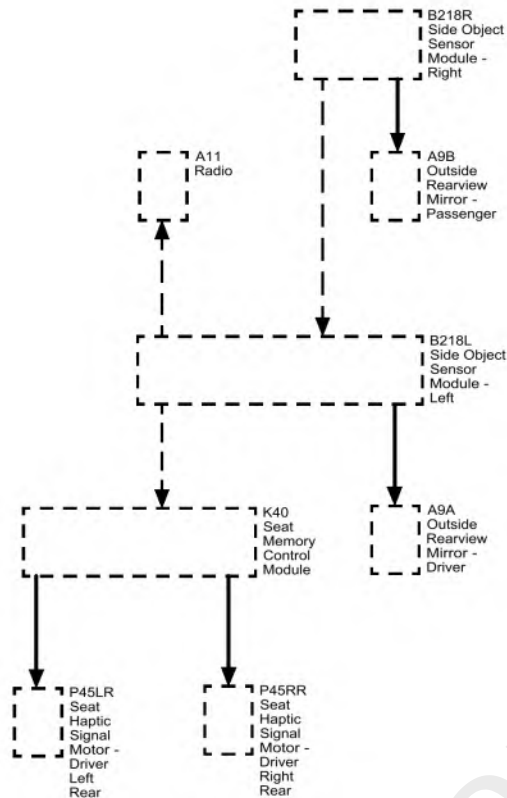


Fig. 28: Side Blind Zone Alert Block Diagram
 Courtesy of GENERAL MOTORS COMPANY

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.

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.

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.

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.

FORWARD COLLISION ALERT DESCRIPTION AND OPERATION

The forward collision alert system is a convenience feature of the frontview camera module that issues a warning to the driver when a potential collision risk exists. The frontview camera module is located behind the windshield, looking toward the roadway ahead and detecting vehicles within a distance of approximately 60 meters (197 ft). The forward collision alert system is always active and operates at speeds above 40 kph (25 mph).

When the frontview camera module detects a vehicle in the path ahead, the green vehicle ahead indicator in the vehicle direction display is illuminated. When following a vehicle ahead too closely, the amber collision alert indicator will illuminate and stay on until the following distance is increased. The green vehicle ahead indicator will then be illuminated again. When approaching another vehicle too rapidly, the collision alert symbol will flash in the vehicle direction display and an audible alert sounds. The forward collision alert sensitivity can be adjusted using the forward collision alert switch in the left steering wheel controls.

Front Automatic Braking (if equipped)

When the system detects a vehicle ahead in your path that is traveling in the same direction that you may be about to crash into, it can provide a boost to braking or automatically brake the vehicle. This can help avoid or lessen the severity of crashes when driving in a forward gear. Depending on the situation, the vehicle may automatically brake moderately or hard. This front automatic braking can only occur if a vehicle is detected.

The system works when driving in a forward gear between 5 mph (8 km/h) and 37 mph (60 km/h). It can detect vehicles up to approximately 197 ft (60 m).

Forward collision does not provide a warning to help avoid a crash unless it detects a vehicle. Forward collision alert may not detect a vehicle ahead if the frontview camera module is blocked by dirt, snow, or ice, or if the windshield is damaged. It may also not detect a vehicle on winding or hilly roads, or in conditions that can limit visibility such as fog, rain, or snow, or if the headlamps or windshield are not cleaned or in proper condition. Ensure the windshield, headlamps, and frontview camera module are clean and in good repair. In some cases the forward collision alert system may provide unnecessary alerts for turning vehicles, vehicles in other lanes, objects that are not vehicles, or shadows. These alerts are normal operation and the vehicle does not need service.

The forward collision alert system is made up of the following components:

- Frontview camera module

- Forward collision alert switch
- Instrument cluster/Vehicle direction display
- Infotainment system

Frontview Camera Module

The frontview camera module detects vehicles in front of the host vehicle. The frontview camera module communicates via serial data to the instrument cluster to illuminate the appropriate indicators in the vehicle direction display. The frontview camera module also communicates via serial data with the driver information center to display messages and the radio to request audible alerts.

Forward Collision Alert Switch

The forward collision alert switch provides an input to the frontview camera module to select between four alert timing sensitivity settings. These setting will change the sensitivity for both the following too closely and forward collision alert indicators. In addition to the sensitivity setting, the alert distance will change based upon vehicle speed. The frontview camera module provides a signal voltage to the normally open switch. When the switch is pressed, the signal circuit is pulled to ground through a resistor, indicating to the frontview camera module that the system has been requested to change the alert timing sensitivity. The first button press shows the current alert timing setting on the driver information center. With every button press, the alert timing sensitivity is changed. The current alert timing setting will be maintained until it is changed. The preset alert timing setting is displayed in the top line of the driver information center. The position of the forward collision alert switch can vary with different vehicles. For the exact position please refer to the owner's manual.

Instrument Cluster

The vehicle direction display contains the indicators for the collision alert system and are controlled by the instrument cluster via serial data messages from the frontview camera module. The green vehicle ahead indicator indicates to the driver that the frontview camera module system has detected a vehicle in the driving path ahead. The amber collision alert indicator will illuminated continuously if the system determines that the vehicle ahead is too close. When approaching another vehicle too rapidly, the red collision alert symbol will flash.

Infotainment System

The infotainment system controls the audible alert for the forward collision alert system and is activated via serial data from the frontview camera module. If the host vehicle is approaching another vehicle too rapidly, the infotainment system will command an audible alert to the driver.

Forward Collision Alert System Driver Information Center Messages

The frontview camera module can command the driver information center to display the various messages to alert the driver of a system concern or status information. For detailed information about the possible messages please refer to the owner's manual.

- FORWARD COLLISION ALERT OFF
- SERVICE FRONT CAMERA

REAR VISION CAMERA DESCRIPTION AND OPERATION

Rear Vision Camera System Operation

The rear vision camera system consists of a video camera/module located at the rear of the vehicle and the infotainment display.

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 infotainment display. 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 infotainment display as an indicator to the customer that a problem exists that requires service.

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