

## Object Detection Description and Operation (with lane departure warning, UFL)

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.

## Object Detection Description and Operation (with forward collision alert, UEU)

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 red 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.

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 red collision alert indicator will illuminate 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



## Object Detection Description and Operation (with rearview camera, UVC)

### 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.

## Object Detection Description and Operation (with front and rear parking assist)

The parking assist system is designed to identify and notify the driver of an object in the vehicle path when moving forward or reversing at speeds of less than 8 km/h (5 MPH). The distance and location of the object is determined by 8 object sensors: 4 located in the rear bumper and 4 located in the front bumper. The parking assist system will notify the driver using audible beeps through the radio or haptic pulses through the driver's seat. The driver can select between audible or haptic alerts in the vehicle personalization menus. See the user's manual for more detailed information on vehicle personalization.

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

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

### Parking Assist Control Module

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

### Object Sensors

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

### Parking Assist Switch

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

### Parking Assist Indicator

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

### Radio

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

### Safety Alert Seat

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

### **Parking Assist Operation**

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

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

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

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

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

### **Parking Assist System Driver Information Center Messages**

#### **SERVICE PARK ASSIST**

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

#### **PARK ASSIST OFF**

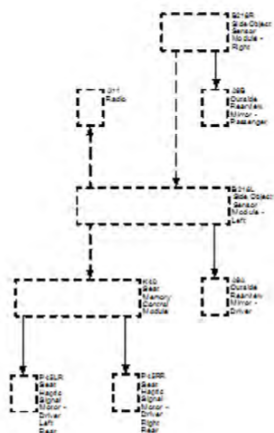
The PARK ASSIST OFF message is displayed in the driver information center when the parking assist system is disabled due to conditions that disable or inhibit the system. The parking assist control module requests the driver information center display PARK ASSIST OFF when it detects that one of the following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

- The parking assist system is manually disabled using the parking assist switch.

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

## Object Detection Description and Operation (with side blind zone alert, UFT)

### Side Blind Zone Alert Block Diagram



### 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.

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## **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 side blind zone system does not detect stationary objects such as guardrails, posts, curbs, walls, berms, bridges, or parked vehicles.

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.



## Object Detection Description and Operation (with rear cross traffic alert, UFG)

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 30m (99 ft) from the rear corner of the car and covers an area from behind the vehicle to 125 degrees towards the front at a height of 0.45m (1.5 ft) to 2M (6.5 ft) above ground. The system operates when vehicle speed is 10 kph (6 mph) or less and is designed to detect objects moving at speeds up to 36 kph (22 mph).

When the vehicle is backing up, the side object sensors receive energy that is reflected from external objects and determine if the objects are objects of interest or not. The system may at times detect pedestrians, shopping carts, or similar moving objects. This is normal and should not be considered as a false alert or problem with the system. The rear cross traffic alert system will estimate vehicle travel trajectory and use the information in conjunction with object travel trajectory information to determine if there is a potential collision between the vehicle and the object of interest. The rear cross traffic alert function will only alert on objects of interest that pose a potential collision with the host vehicle. The system is not designed to

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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.

## Object Detection Description and Operation (with parallel parking assist, UFQ)

**Note:** The parallel parking assist system can steer the vehicle automatically. Be aware that, in some unlikely situations, the vehicle steering wheel and wheels/tires may move without warning. Please be especially aware of situations when vehicle front tires are lifted above the ground on a vehicle hoist as the wheels could move without warning. Please exercise special care if any work is performed with the vehicle running and in gear while elevated on a hoist.

In addition to the 8 ultrasonic sensors used for front and rear park assist, the parallel parking assist system uses two additional sensors located on the front fascia, just ahead of the wheel opening. These sensors face toward the side of the vehicle and are used to aid the driver in positioning the vehicle in a parallel parking maneuver.

### Advanced Parking Assist Components

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

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

### Advanced Parking Assist Control Module

The parking assist control module provides a 12V reference and a low reference to the 8 object alarm sensors. The advanced parking assist control module receives individual signals from each of the 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 serial data message to the radio requesting an audible alert or to the memory seat module for a haptic alert. Refer to the owner's manual for more information on Vehicle Personalization.

### Object Alarm Sensors and Parking Aid Side Sensors

The object alarm and parking aid 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 ring time, it is used to determine the distance to the object. The sensors report this information to the parking assist control module. The 8 object alarm sensors detect object to approximately 2.5m (8 ft). The parking aid side sensors detect objects to approximately 4.5m (15 ft).

### Parking Assist Switch

The parking assist can be enabled and disabled by pressing the parking assist switch. By engaging the reverse gear the parking assist can be activated. By 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 indicator is ON, the parking assist is enabled.

## Parallel Parking Assist Switch

The parallel parking assist can be activated and deactivated by pressing the parallel parking assist switch.

### Parking Assist Operation

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

When an object is within the measuring range of the sensor, the ultrasonic pulse is reflected and is received by the sending or a neighboring sensor. The sensor converts this signal into a voltage signal and sends this signal to the parking assist control module. The parking assist control module evaluates the received sensor signals. As soon as an object is within the measuring range, the parking assist control module sends a serial data message to the instrument cluster to provide a visual display of the approximate location of the object. It will also send a message to the radio in order to give out the acoustic distance signal or to the memory seat module in order to provide a haptic alert through the driver's seat. The driver can select between audio or haptic feedback. Refer to the owner's manual for vehicle customization.

The measuring range of the front and 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 enabled and disabled by pressing the parking assist switch. By engaging the reverse gear the parking assist can be activated. By pressing the parking assist switch the parking assist can be disabled again.

The parking assist control module carries out a self test and monitors the sensors for electrical and mechanical faults. Monitored is the power supply of each sensor and the sensor signals, which need to alter when the vehicle moves. If this is not the case, the sensor is acoustically blocked or faulty. Mud, ice and snow may cause obstruction of the function of the sensors. Besides that the 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 driver information center will display "Service Park Assist".

### Parallel Parking Assist Operation

The parallel parking assist system aids the driver when attempting a parallel parking maneuver. The parking assist control module uses the two parallel parking assist sensors located in the front fascia, along with the four front and four rear park assist sensors, to guide the driver into a parking space.

The parallel parking assist switch is used to initiate the parallel parking assist system when traveling at speeds below 30 km/h (18 mph). While driving along a row of vehicles in which the driver wishes to parallel park, the parallel parking assist switch is pressed. This will enable the parallel parking assist system and the parking assist control module will begin measuring potential parking spots using the parallel parking assist sensor.

When a parking spot of suitable size is found, the parking assist control module will display a stop message on the driver information center. The driver accepts the decision by stopping the vehicle. The system calculates the optimal path into the parking lot and will then guide the vehicle into the chosen spot by taking over the steering control from the driver. The driver only needs to shift gears, brake and accelerate following the instructions given on the driver information center. Once in the spot, the parking assist control module uses the front and rear park assist sensors to center the vehicle in the parking spot.

If the parallel parking assist system is unable to complete a parallel parking maneuver, a message indicating that the maneuver has been aborted will be displayed on the driver information center.

## **Parking Assist System Driver Information Center Messages**

### **SERVICE PARK ASSIST**

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

### **PARK ASSIST OFF**

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

- The parking assist system is manually disabled using the park assist switch.
- An object is attached to the vehicle which is interfering with the park assist system field of view. Example items are a trailer, bicycle rack, trailer hitch receiver, tow bar, aftermarket front license plate frame, or a bent front license plate.
- The parking assist sensors are covered by snow, mud, dirt or ice.
- The vehicle bumper is damaged.
- Excessive paint thickness on a replacement parking assist sensor.
- The parking assist sensors are disrupted by vibrations, like those caused by a large nearby vehicle or from heavy equipment such as a jackhammer.

## DTC B094B or B094C

### Diagnostic Instructions

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

### DTC Descriptor

#### **DTC B094B 00**

Left Side Object Detection Control Module – Malfunction

#### **DTC B094B 08**

Left Side Object Detection Control Module – Performance – Signal Invalid

#### **DTC B094B 45**

Left Side Object Detection Control Module – Variant Not Programmed

#### **DTC B094B 54**

Left Side Object Detection Control Module – High Temperature

#### **DTC B094B 58**

Left Side Object Detection Control Module – Performance

#### **DTC B094C 00**

Right Side Object Detection Control Module – Malfunction

#### **DTC B094C 08**

Right Side Object Detection Control Module – Performance – Signal Invalid

#### **DTC B094C 45**

Right Side Object Detection Control Module – Variant Not Programmed

#### **DTC B094C 54**

Right Side Object Detection Control Module – High Temperature

#### **DTC B094C 58**

Right Side Object Detection Control Module – Performance

### Circuit/System Description

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

### Conditions for Running the DTC

Ignition ON.

### Conditions for Setting the DTC

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The control module has detected a malfunction.

#### **Action Taken When the DTC Sets**

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

#### **Conditions for Clearing the DTC**

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

#### **Diagnostic Aids**

If DTC B094B 58 or B094C 58 is set, check for anything that can interfere with the radar signal. Verify area in front of radar is clean of mud, ice, snow, etc. Also verify the fascia panels in front of the radar are damage-free and not obstructed by any add-on accessories such as emblems, etc.

#### **Reference Information**

##### **Schematic Reference**

[Object Detection Schematics](#)

##### **Connector End View Reference**

[Component Connector End Views](#)

##### **Description and Operation**

[Object Detection Description and Operation](#)

##### **Electrical Information Reference**

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

##### **Scan Tool Reference**

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

#### **Circuit/System Verification**

1. Ignition ON.
2. Verify that B094B 45 or B094C 45 is not set.  
⇒ **If DTC is set**
  - 2.1. Program the appropriate B218 Side Object Sensor Module.
  - 2.2. Verify the DTC does not set.  
⇒ If the DTC sets, replace the appropriate B218 Side Object Sensor Module.  
⇓ If the DTC does not set
  - 2.3. All OK.  
⇓ **If DTC is not set**
3. Verify that B094B 00, B094C 00, B094B 08, B094C 08, B094B 54 or B094C 54 is not set.  
⇒ **If DTC is set**  
Replace the appropriate B218 Side Object Sensor Module.  
⇓ **If the DTC is not set**

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

⇒ **If DTC is set**

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

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

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

⇓ **If DTC is not set**

5. All OK.

#### **Repair Instructions**

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

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



## DTC B094D or B094E

### Diagnostic Instructions

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

### DTC Descriptors

#### DTC B094D

Left Side Object Detection Indicator Circuit

#### DTC B094E

Right Side Object Detection Indicator Circuit

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

### Diagnostic Fault Information

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

### Circuit/System Description

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

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

### Conditions for Running the DTC

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

### [Conditions for Setting the DTC](#)

#### **B094D 02**

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

#### **B094D 01**

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

#### **B094E 02**

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

#### **B094E 01**

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

### [Action Taken When the DTC Sets](#)

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

### [Conditions for Clearing the DTC](#)

The condition for setting the DTC is no longer present.

### [Reference Information](#)

#### **Schematic Reference**

[Object Detection Schematics](#)

#### **Connector End View Reference**

[Component Connector End Views](#)

#### **Description and Operation**

[Object Detection Description and Operation](#)

#### **Electrical Information Reference**

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

#### **Scan Tool Reference**

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

### [Circuit/System Verification](#)

1. Ignition OFF, ignition ON.
2. Verify the side blind zone alert system indicators located in the outside rearview mirrors briefly turn ON and then OFF during the system self test when ignition is turned ON.  
⇒ **If the side blind zone alert system indicators do not briefly turn ON and OFF**  
Refer to Circuit/System Testing  
⇓ **If both side blind zone alert indicators briefly turn ON and OFF**
3. All OK.

### [Circuit/System Testing](#)

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector for the appropriate A9 Outside Rearview Mirror. It may take up to 2 min for all vehicle systems to power down.
  - X510 – Driver Door Harness to Outside Rearview Mirror
  - X610 – Passenger Door Harness to Outside Rearview Mirror
2. Test for less than 10  $\Omega$  between the ground circuit terminal 5 and ground.
 

⇒ **If 10  $\Omega$  or greater**

  - 2.1. Ignition OFF.
  - 2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.
    - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
    - ⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

⇒ **If less than 10  $\Omega$**
3. Ignition ON, connect a test lamp between the control circuit terminal 18 and the ground circuit terminal 5.
4. Verify the test lamp turns ON and OFF when commanding the Object Detection Alert Indicators On and Off with a scan tool.
 

⇒ **If the test lamp is always OFF**

  - 4.1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object Sensor Module.
  - 4.2. 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
  - 4.3. Test for less than 2  $\Omega$  in the control circuit end to end.
    - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
    - ⇒ If less than 2  $\Omega$ , replace the B218 Side Object Sensor Module.

⇒ **If the test lamp is always ON**

  - 4.1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.
  - 4.2. 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 B218 Side Object Sensor Module.

⇓ **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.

- [Outside Rearview Mirror Glass Replacement](#)
- [Control Module References](#) for side object sensor module replacement, programming and setup

## **DTC B0954, B0955, B0956, or B0957**

### **Diagnostic Instructions**

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

### **DTC Descriptors**

#### **DTC B0954 01**

Parking Assist Front Sensor Left Corner Circuit Short to Battery

#### **DTC B0954 06**

Parking Assist Front Sensor Left Corner Circuit Low Voltage/Open

#### **DTC B0954 08**

Parking Assist Front Sensor Left Corner Circuit Performance – Signal Invalid

#### **DTC B0954 21**

Parking Assist Front Sensor Left Corner Circuit Incorrect Period

#### **DTC B0954 22**

Parking Assist Front Sensor Left Corner Circuit Too Short Low – Time

#### **DTC B0954 3A**

Parking Assist Front Sensor Left Corner Circuit Incorrect Component Installed

#### **DTC B0955 01**

Parking Assist Front Sensor Left Middle Circuit Short to Battery

#### **DTC B0955 06**

Parking Assist Front Sensor Left Middle Circuit Low Voltage/Open

#### **DTC B0955 08**

Parking Assist Front Sensor Left Middle Circuit Performance – Signal Invalid

#### **DTC B0955 21**

Parking Assist Front Sensor Left Middle Circuit Incorrect Period

#### **DTC B0955 22**

Parking Assist Front Sensor Left Middle Circuit Too Short Low – Time

#### **DTC B0955 3A**

Parking Assist Front Sensor Left Middle Circuit Incorrect Component Installed

#### **DTC B0956 01**

Parking Assist Front Sensor Right Middle Circuit Short to Battery

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**DTC B0956 06**

Parking Assist Front Sensor Right Middle Circuit Low Voltage/Open

**DTC B0956 08**

Parking Assist Front Sensor Right Middle Circuit Performance – Signal Invalid

**DTC B0956 21**

Parking Assist Front Sensor Right Middle Circuit Incorrect Period

**DTC B0956 22**

Parking Assist Front Sensor Right Middle Circuit Too Short Low – Time

**DTC B0956 3A**

Parking Assist Front Sensor Right Middle Circuit Incorrect Component Installed

**DTC B0957 01**

Parking Assist Front Sensor Right Corner Circuit Short to Battery

**DTC B0957 06**

Parking Assist Front Sensor Right Corner Circuit Low Voltage/Open

**DTC B0957 08**

Parking Assist Front Sensor Right Corner Circuit Performance – Signal Invalid

**DTC B0957 21**

Parking Assist Front Sensor Right Corner Circuit Incorrect Period

**DTC B0957 22**

Parking Assist Front Sensor Right Corner Circuit Too Short Low – Time

**DTC B0957 3A**

Parking Assist Front Sensor Right Corner Circuit Incorrect Component Installed

**Diagnostic Fault Information**

| Circuit                                | Short to Ground | Open/High Resistance                                                                                             | Short to Voltage                                                                                                 | Signal Performance    |
|----------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------|
| 8 V Reference                          | B1405 02        | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 03 | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 07 | —                     |
| Left Front Object Sensor Signal        | B0954 06        | B0954 06                                                                                                         | B0954 01                                                                                                         | B0954 08,<br>B0954 21 |
| Left Middle Front Object Sensor Signal | B0955 06        | B0955 06                                                                                                         | B0955 01                                                                                                         | B0955 08,<br>B0955 21 |
|                                        |                 |                                                                                                                  |                                                                                                                  |                       |

| Circuit                                 | Short to Ground | Open/High Resistance                                                                                | Short to Voltage | Signal Performance    |
|-----------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------|------------------|-----------------------|
| Right Middle Front Object Sensor Signal | B0956 06        | B0956 06                                                                                            | B0956 01         | B0956 08,<br>B0956 21 |
| Right Front Object Sensor Signal        | B0957 06        | B0957 06                                                                                            | B0957 01         | B0957 08,<br>B0957 21 |
| Low Reference                           | —               | B0954 01,<br>B0955 01,<br>B0956 01,<br>B0957 01,<br>B0958 01,<br>B0959 01,<br>B0960 01,<br>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 8 V reference circuit and provides ground via the 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 signal circuit to calculate the distance and position of an object.

#### Conditions for Running the DTC

- Ignition ON
- The park assist is activated. The activation takes place through putting in the reverse gear or through operating the park assist switch.

#### Conditions for Setting the DTC

##### **B0954 01, B0955 01, B0956 01, or B0957 01**

The front and rear parking assist control module has detected the voltage at the sensor circuit is greater than 11.5 V or the object sensor is not grounded.

##### **B0954 06, B0955 06, B0956 06, or B0957 06**

The front and rear parking assist control module has detected the voltage at the sensor circuit is less than 0.5 V.

##### **B0954 08, B0955 08, B0956 08, or B0957 08**

The front and rear parking assist control module has received an invalid signal.

##### **B0954 21, B0954 22, B0955 21, B0955 22, B0956 21, B0956 22, B0957 21, or B0957 22**

The object sensor 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 front and rear parking assist control module determines the wrong sensor type is installed.

#### 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](#)

#### **Connector End View Reference**

[Component Connector End Views](#)

#### **Description and Operation**

[Object Detection Description and Operation](#)

#### **Electrical Information Reference**

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

#### **Scan Tool Reference**

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

### **Circuit/System Verification**

1. Ignition ON.
2. Verify that DTC B1405 is not set.
  - ⇒ **If the DTC is set**  
Refer to [DTC B1405](#)
  - ⇓ **If the DTC is not set**
3. Verify that DTC B0954 01, B0955 01, B0956 01, B0957 01, B0954 21, B0955 21, B0956 21, B0957 21, B0954 22, B0955 22, B0956 22 or B0957 22 is not set.
  - ⇒ **If the DTC is set**
    - 3.1. Verify the B78 Front Object Sensors are not contaminated with snow, mud, dirt, slush, or ice.
      - ⇒ If contaminated, clean sensor.
      - ⇓ If there is no contamination
    - 3.2. 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 B78 Front Object Sensor with the correct sensor type.
  - ⇓ **If the DTC is not set**
5. Ignition ON, transmission in REVERSE.
6. Verify the scan tool Parking Assist System Status parameter displays Enabled.
  - ⇒ **If the Parking Assist System displays Disabled**  
Refer to Circuit/System Testing.
  - ⇓ **If the Parking Assist System displays Enabled**
7. All OK.

**Circuit/System Testing**

1. Ignition OFF, scan tool disconnected, 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  $10\ \Omega$  between the low reference circuit terminal 3 and ground.
  - ⇒ **If  $10\ \Omega$  or greater**
  - 2.1. Ignition OFF, disconnect the harness connector X3 at the K41 Front and Rear Parking Assist Control Module.
  - 2.2. Test for less than  $2\ \Omega$  in the low reference circuit end to end.
    - ⇒ If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.
    - ⇒ If less than  $2\ \Omega$  replace the K41 Front and Rear Parking Assist Control Module.
- ⇓ **If less than  $10\ \Omega$**
3. Ignition ON.
4. Test for 7.5–9.5 V between the 8 V reference circuit terminal 1 and ground.
  - ⇒ **If less than 7.5 V**
  - 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module.
  - 4.2. 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 infinite resistance
  - 4.3. Test for less than  $2\ \Omega$  in the 8 V reference circuit end to end.
    - ⇒ If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.
    - ⇒ If less than  $2\ \Omega$ , replace the K41 Front and Rear Parking Assist Control Module.
  - ⇒ **If greater than 9.5 V**
  - 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
  - 4.2. Test for less than 1 V between the 8 V reference circuit and ground.
    - ⇒ If 1 V or greater, repair the short to voltage on the circuit.
    - ⇒ If less than 1 V, replace the K41 Front and Rear Parking Assist Control Module.
- ⇓ **If between 7.5–9.5 V**
5. Ignition OFF, remove appropriate B78 Front Object Sensor and switch locations with another properly operating sensor. Connect harness connector at both sensors. Ignition ON.
6. Verify the DTC is set for the new location in which the malfunctioning sensor is installed.
  - ⇒ **If DTC set for the new location**  
Replace the malfunctioning B78 Front Object Sensor.
  - ⇒ **If DTC set for the original location**
  - 6.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
  - 6.2. Test for less than 1 V between the signal circuit terminal 2 and ground.
    - ⇒ If 1 V or greater, repair the short to voltage on the circuit.
  - ⇓ If less than 1 V
  - 6.3. Ignition OFF.
  - 6.4. 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
  - 6.5. Test for less than  $2\ \Omega$  in the circuit end to end.
    - ⇒ If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.



⇒ If less than 2  $\Omega$ , replace the K41 Front and Rear Parking Assist Control Module.

↓ **If no DTC set**

7. All OK.

### **Repair Instructions**

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

- [Front Object Alarm Sensor Replacement](#)
- [Rear Parking Assist Alarm Sensor Replacement](#)
- [Control Module References](#) for front and rear parking assist control module replacement, programming and setup

## **DTC B0958, B0959, B0960, or B0961**

### **Diagnostic Instructions**

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

### **DTC Descriptors**

#### **DTC B0958 01**

Parking Assist Rear Sensor Left Corner Circuit Short to Battery

#### **DTC B0958 06**

Parking Assist Rear Sensor Left Corner Circuit Low Voltage/Open

#### **DTC B0958 08**

Parking Assist Rear Sensor Left Corner Circuit Performance – Signal Invalid

#### **DTC B0958 21**

Parking Assist Rear Sensor Left Corner Circuit Incorrect Period

#### **DTC B0958 3A**

Parking Assist Rear Sensor Left Corner Circuit Incorrect Component Installed

#### **DTC B0959 01**

Parking Assist Rear Sensor Left Middle Circuit Short to Battery

#### **DTC B0959 06**

Parking Assist Rear Sensor Left Middle Circuit Low Voltage/Open

#### **DTC B0959 08**

Parking Assist Rear Sensor Left Middle Circuit Performance – Signal Invalid

#### **DTC B0959 21**

Parking Assist Rear Sensor Left Middle Circuit Incorrect Period

#### **DTC B0959 3A**

Parking Assist Rear Sensor Left Middle Circuit Incorrect Component Installed

#### **DTC B0960 01**

Parking Assist Rear Sensor Right Middle Circuit Short to Battery

#### **DTC B0960 06**

Parking Assist Rear Sensor Right Middle Circuit Low Voltage/Open

#### **DTC B0960 08**

Parking Assist Rear Sensor Right Middle Circuit Performance – Signal Invalid

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**DTC B0960 21**

Parking Assist Rear Sensor Right Middle Circuit Incorrect Period

**DTC B0960 3A**

Parking Assist Rear Sensor Right Middle Circuit Incorrect Component Installed

**DTC B0961 01**

Parking Assist Rear Sensor Right Corner Circuit Short to Battery

**DTC B0961 06**

Parking Assist Rear Sensor Right Corner Circuit Low Voltage/Open

**DTC B0961 08**

Parking Assist Rear Sensor Right Corner Circuit Performance – Signal Invalid

**DTC B0961 21**

Parking Assist Rear Sensor Right Corner Circuit Incorrect Period

**DTC B0961 3A**

Parking Assist Rear Sensor Right Corner Circuit Incorrect Component Installed

**Diagnostic Fault Information**

| Circuit                                | Short to Ground | Open/High Resistance                                                                                             | Short to Voltage                                                                                                 | Signal Performance    |
|----------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------|
| 8 V Reference                          | B1405 02        | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 03 | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 07 | —                     |
| Left Rear Object Sensor Signal         | B0958 06        | B0958 06                                                                                                         | B0958 01                                                                                                         | B0958 08,<br>B0958 21 |
| Left Middle Rear Object Sensor Signal  | B0959 06        | B0959 06                                                                                                         | B0959 01                                                                                                         | B0959 08,<br>B0959 21 |
| Right Middle Rear Object Sensor Signal | B0960 06        | B0960 06                                                                                                         | B0960 01                                                                                                         | B0960 08,<br>B0960 21 |
| Right Rear Object Sensor Signal        | B0961 06        | B0961 06                                                                                                         | B0961 01                                                                                                         | B0961 08,<br>B0961 21 |
| Low Reference                          | —               | B0954 01,<br>B0955 01,<br>B0956 01,<br>B0957 01,<br>B0958 01,<br>B0959 01,<br>B0960 01,<br>B0961 01              | —                                                                                                                | —                     |

| Circuit | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---------|-----------------|----------------------|------------------|--------------------|
|---------|-----------------|----------------------|------------------|--------------------|

### 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 8 V reference circuit and provides ground via the 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 signal circuit to calculate the distance and position of an object.

### Conditions for Running the DTC

- Ignition ON
- The parking assist is activated. The activation takes place through putting in the reverse gear or through operating the park assist switch.

### Conditions for Setting the DTC

#### **B0958 01, B0959 01, B0960 01, or B0961 01**

The front and rear parking assist control module has detected the voltage at the sensor circuit is greater than 11.5 V or the object sensor is not grounded.

#### **B0958 06, B0959 06, B0960 06, or B0961 06**

The front and rear parking assist control module has detected the voltage at the sensor circuit less than 0.5 V.

#### **B0958 08, B0959 08, B0960 08, or B0961 08**

The front and rear parking assist control module has received an invalid signal.

#### **B0958 21, B0959 21, B0960 21, or B0961 21**

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

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

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

### 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](#)

#### **Connector End View Reference**

[Component Connector End Views](#)

#### **Description and Operation**

## [Object Detection Description and Operation](#)

### Electrical Information Reference

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

### Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON.
2. Verify that DTC B1405 is not set.
  - ⇒ **If the DTC is set**  
Refer to [DTC B1405](#)
  - ⇓ **If the DTC is not set**
3. Verify that DTC B0958 01, B0959 01, B0960 01, B0961 01, B0958 21, B0959 21, B0960 21 or B0961 21 is not set.
  - ⇒ **If the DTC is set**  
3.1. Verify the B78 Rear Object Sensors are not contaminated with snow, mud, dirt, slush, or ice.  
⇒ If contaminated, clean sensor.  
⇓ If there is no contamination
  - 3.2. 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 B78 Rear Object Sensor with the correct sensor type.
  - ⇓ **If the DTC is not set**
5. Ignition ON, transmission in REVERSE.
6. Verify the scan tool Parking Assist System Status parameter displays Enabled.
  - ⇒ **If the Parking Assist System displays Disabled**  
Refer to Circuit/System Testing.
  - ⇓ **If the Parking Assist System displays Enabled**
7. All OK.

### [Circuit/System Testing](#)

1. Ignition OFF, scan tool disconnected, disconnect the harness at the appropriate B78 Rear Object Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the low reference circuit terminal 3 and ground.
  - ⇒ **If 10  $\Omega$  or greater**  
2.1. Ignition OFF, disconnect the harness connector X2 at the K41 Front and Rear Parking Assist Control Module.  
2.2. Test for less than 2  $\Omega$  in the low reference circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$  replace the K41 Front and Rear Parking Assist Control Module.
  - ⇓ **If less than 10  $\Omega$**

3. Ignition ON.
4. Test for 7.5–9.5 V between the 8 V reference circuit terminal 1 and ground.
  - ⇒ **If less than 7.5 V**
    - 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module.
    - 4.2. 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 infinite resistance
    - 4.3. Test for less than 2  $\Omega$  in the 8 V reference circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , replace the K41 Front and Rear Parking Assist Control Module.
  - ⇒ **If greater than 9.5 V**
    - 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
    - 4.2. Test for less than 1 V between the 8 V reference circuit and ground.
      - ⇒ If 1 V or greater, repair the short to voltage on the circuit.
      - ⇒ If less than 1 V, replace the K41 Front and Rear Parking Assist Control Module.
- ⇓ **If between 7.5–9.5 V**
5. Ignition OFF, remove the appropriate B78 Rear Object Sensor and switch locations with another properly operating sensor. Connect harness connector at both sensors. Ignition ON.
6. Verify the DTC is set for the new location in which the malfunctioning sensor is installed.
  - ⇒ **If DTC set for the new location**  
Replace the malfunctioning B78 Rear Object Sensor.
  - ⇒ **If DTC set for the original location**
    - 6.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
    - 6.2. Test for less than 1 V between the signal circuit terminal 2 and ground.
      - ⇒ If 1 V or greater, repair the short to voltage on the circuit.
      - ⇓ If less than 1 V
    - 6.3. Ignition OFF.
    - 6.4. 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
    - 6.5. Test for less than 2  $\Omega$  in the circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , replace the K41 Front and Rear Parking Assist Control Module.
- ⇓ **If no DTC set**
7. All OK.

### Repair Instructions

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

- [Rear Parking Assist Alarm Sensor Replacement](#)
- [Control Module References](#) for front and rear parking assist control module replacement, programming and setup

## DTC B0967 or B0968

### Diagnostic Instructions

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

### 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<br>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, driving at speeds of less than 8 km/h (5 MPH) 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 activated.

### Conditions for Running the DTC

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- Ignition ON
- The parking assist is activated.

#### Conditions for Setting the DTC

##### **B0967 02**

The front and rear parking assist control module has detected a short to ground.

##### **B0968 01**

The front and rear parking assist control module has detected a short to battery.

##### **B0968 06**

The front and rear 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](#)

##### **Connector End View Reference**

[Component Connector End Views](#)

##### **Description and Operation**

[Object Detection Description and Operation](#)

##### **Electrical Information Reference**

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

##### **Scan Tool Reference**

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

#### 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  $\Omega$  between the ground circuit terminal 6 and ground.
  - ⇒ **If 10  $\Omega$  or greater**
    - 2.1. Ignition OFF.
    - 2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - ⇓ **If less than 10  $\Omega$**
3. Ignition ON.
4. Verify the scan tool Park Assist Switch parameter is Inactive.
  - ⇒ **If not Inactive**
    - 4.1. Ignition OFF, disconnect the harness connector X1 at the K41 Front and Rear Parking Assist Control Module.
    - 4.2. 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 K41 Front and Rear Parking Assist Control Module.
  - ⇓ **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 8 and ground.
6. Verify the scan tool Park Assist Switch parameter is Active.
  - ⇒ **If not Active**
    - 6.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
    - 6.2. 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
    - 6.3. Test for less than 2  $\Omega$  in the signal circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , replace the K41 Front and Rear 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 min 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 4 and ground.

⇒ **If the voltage is under 11 V and the circuit fuse is good**

- 2.1. Ignition OFF.
- 2.2. Test for less than 2  $\Omega$  in the circuit end to end.
  - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - ⇒ If less than 2  $\Omega$ , 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**

- 2.1. Ignition OFF.
- 2.2. 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 K41 Front and Rear Parking Assist Control Module.

⇓ **If the test voltage 11 V or greater**

3. Connect a test lamp between B+ and the control circuit terminal 2.
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**

- 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
- 4.2. 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 1V
- 4.3. Ignition OFF.
- 4.4. Test for less than 2  $\Omega$  in the control circuit end to end.
  - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - ⇒ If less than 2  $\Omega$  replace the K41 Front and Rear Parking Assist Control Module.

⇒ **If the test lamp is always ON**

- 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module.
- 4.2. 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 K41 Front and Rear Parking Assist Control Module.

⇓ **If the test lamp turns ON and OFF**

5. Test or replace the S48A Multifunction Switch – Instrument Panel.

### Repair Instructions

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

- [Accessory Switch Replacement](#)
- [Control Module References](#) for front and rear parking assist control module replacement, programming and setup.

## DTC B096B

### Diagnostic Instructions

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

### DTC Descriptor

#### DTC B096B 02

Parking Assist Switch Parallel Parking Circuit Short to Ground

### Diagnostic Fault Information

| Circuit                                       | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-----------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Parallel Park Assist Switch Signal            | B096B 02        | 1                    | —                | —                  |
| Parallel Parking Assist Switch Ground         | —               | 1                    | —                | —                  |
| 1. Parallel Parking Assist Switch Malfunction |                 |                      |                  |                    |

### Circuit/System Description

The parallel parking assist can be activated/deactivated by pressing the parallel parking assist switch.

### Conditions for Running the DTC

- Ignition ON
- The parallel parking assist is activated. The activation takes place through pressing the parallel parking assist switch.

### Conditions for Setting the DTC

The advanced parking assist control module has detected a short to ground.

### Action Taken When the DTC Sets

- The parallel parking assist is disabled.
- A message is displayed in the driver information center that parking assist is not available.

### Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

### Reference Information

#### Schematic Reference

[Object Detection Schematics](#)

#### Connector End View Reference

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[Component Connector End Views](#)**Description and Operation**[Object Detection Description and Operation](#)**Electrical Information Reference**

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

**Scan Tool Reference**

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

**[Circuit/System Verification](#)**

1. Ignition ON.
2. Activate and deactivate the parallel park assist switch and verify the scan tool Advanced Park Assist Switch parameter changes between Active and Inactive.  
⇒ **If the parameter does not change between Active and Inactive**  
Refer to Circuit/System Testing.
- ⇓ **If the parameter change between Active and Inactive**
3. All OK.

**[Circuit/System Testing](#)**

1. Ignition OFF.
2. Disconnect the X 1 harness connector at the K41 Parking Assist Control Module.
3. Test for infinite resistance between the input signal circuit terminal 10 and ground.  
⇒ **If less than infinite resistance**
  - 3.1. Ignition OFF.
  - 3.2. 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, replace the S48E Multifunction Switch Module – Center Console.
- ⇓ **If infinite resistance**
4. Replace the K41 Parking Assist Control Module.

**[Repair Instructions](#)**

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

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

## DTC B096C or B096D

### Diagnostic Instructions

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

### DTC Descriptors

#### DTC B096C

Parking Assist Side Sensor Left Front Circuit

#### DTC B096D

Parking Assist Side Sensor Right Front 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    |
|---------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 12V Reference                   | B1405 02        | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B096C 06,<br>B096D 06,<br>B1405 03 | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B096C 06,<br>B096D 06,<br>B1405 07 | —                     |
| Left Side Object Sensor Signal  | B096C 06        | B096C 06                                                                                                                                   | B096C 01                                                                                                                                   | B096C 08,<br>B096C 21 |
| Right Side Object Sensor Signal | B096D 06        | B096D 06                                                                                                                                   | B096D 01                                                                                                                                   | B096D 08,<br>B096D 21 |
| Low Reference                   | —               | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B096C 06,<br>B096D 06              | —                                                                                                                                          | —                     |

### Circuit/System Description

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

#### **Conditions for Running the DTC**

- Ignition ON
- The parallel parking assist is activated. The activation takes place through operating the parallel parking assist switch.

#### **Conditions for Setting the DTC**

##### **B096C 01 or B096D 01**

The parking assist control module has detected the voltage at the sensor circuit is too high.

##### **B096C 06 or B096D 06**

The parking assist control module has detected the voltage at the sensor circuit is too low.

##### **B096C 08 or B096D 08**

The parking assist control module has received an invalid signal.

##### **B096C 21 or B096D 21**

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

##### **B096C 3A or B096D 3A**

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

#### **Action Taken When the DTC Sets**

- The parallel parking assist is disabled.
- An indicator in the driver information center shows the parking assistance is not available.

#### **Conditions for Clearing the DTC**

The condition for setting the DTC is no longer present.

#### **Reference Information**

##### **Schematic Reference**

[Object Detection Schematics](#)

##### **Connector End View Reference**

[Component Connector End Views](#)

##### **Description and Operation**

[Object Detection Description and Operation](#)

##### **Electrical Information Reference**

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

## Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON.
2. Verify that DTC B1405 is not present.  
⇒ **If the DTC is set**  
Refer to [DTC B1405](#)  
⇓ **If the DTC does not set**
3. Verify that DTC B096C 01 or B096D 01 is not present.  
⇒ **If the DTC is set**  
Check the appropriate sensor for contamination with mud, ice or snow. If no contamination is diagnosed, refer to Circuit/System Testing.  
⇓ **If the DTC does not set**
4. Verify that DTC B096C 3A or B096D 3A is not present.  
⇒ **If the DTC is set**  
Replace the appropriate sensor with a sensor by correct sensor type.  
⇓ **If the DTC does not set**
5. Verify that DTC B096C 21 or B096D 21 is not present.  
⇒ **If the DTC is set**  
Check the appropriate sensor for contamination with mud, ice or snow. If no contamination is diagnosed, replace the appropriate sensor.  
⇓ **If the DTC does not set**
6. All OK.

### [Circuit/System Testing](#)

1. Ignition OFF for 30 s, disconnect the harness connector at the appropriate B166 Advance Parking Assist Side Object Sensor.
2. Test for less than 10  $\Omega$  between the low reference circuit terminal 3 and ground.  
⇒ **If 10  $\Omega$  or greater**
  - 2.1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module.
  - 2.2. Test for less than 2  $\Omega$  in the low reference circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$ , replace the K41 Parking Assist Control Module.
- ⇓ **If less than 10  $\Omega$**
3. Ignition ON, engine running.
4. Test for 11.5–13.5 V between the 12 V reference circuit terminal 1 and ground.  
⇒ **If less than 11.5 V**
  - 4.1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module.
  - 4.2. 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
  - 4.3. Test for less than 2  $\Omega$  in the 12 V reference circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$ , replace the K41 Parking Assist Control Module.

⇒ **If greater than 13.5 V**

- 4.1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module, ignition ON.
- 4.2. Test for less than 1 V between the 12 V reference circuit and ground.
  - ⇒ If 1 V or greater, repair the short to voltage on the circuit.
  - ⇒ If less than 1 V, replace the K41 Parking Assist Control Module.

↓ **If between 11.5–13.5 V**

5. Test for 11.5–13.5 V between the signal circuit terminal 2 and ground.

⇒ **If less than 11.5 V**

- 5.1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module.
- 5.2. 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
- 5.3. Test for less than 2  $\Omega$  in the signal circuit end to end.
  - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - ⇒ If less than 2  $\Omega$ , replace the K41 Parking Assist Control Module.

⇒ **If greater than 13.5 V**

- 5.1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module, ignition ON.
- 5.2. 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 K41 Parking Assist Control Module

↓ **If between 11.5–13.5 V**

6. Test or replace the appropriate B166 Advance Parking Assist Side Object Sensor.

### **Repair Instructions**

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

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



## DTC B0987

### Diagnostic Instructions

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

### DTC Descriptor

#### DTC B0987 01

Vehicle Direction Camera Indicator Circuit Short to Battery

#### DTC B0987 06

Vehicle Direction Camera Indicator Circuit Low Voltage/Open

### Diagnostic Fault Information

| Circuit                                          | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|--------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Lane Departure Warning Switch Indicator Ignition | B0987 06        | B0987 06             | —                | —                  |
| Lane Departure Warning Switch Indicator Control  | B0987 06        | B0987 06             | B0987 01         | —                  |

### Circuit/System Description

The lane departure warning is enabled and disabled through a switch located in the left steering wheel controls switch. When enabled, the frontview camera module will illuminate the indicator located in the switch.

### Conditions for Running the DTC

Ignition ON.

### Conditions for Setting the DTC

The frontview camera module has detected a short to battery or open/high resistance in the control circuit.

### Action Taken When the DTC Sets

- Lane departure warning is disabled.
- SERVICE FRONT CAMERA is 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](#)

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**Connector End View Reference**[Component Connector End Views](#)**Description and Operation**[Object Detection Description and Operation](#)**Electrical Information Reference**

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

**Scan Tool Reference**[Control Module References](#) for scan tool information**[Circuit/System Verification](#)**

1. Ignition ON.
2. Verify that 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 while 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, disconnect the harness connector at the S70L Steering Wheel Controls Switch – Left, ignition ON.
  - Note:** Verify interior lighting dimming is turned all the way up.
2. Test for 6.2–12.0 V between the dimming control circuit terminal 4 and ground.
  - ⇒ **If less than 6.2 V**
    - 2.1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
    - 2.2. 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
    - 2.3. Test for less than 2  $\Omega$  in the control circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , refer to [Interior Backlighting Malfunction](#).
  - ⇒ **If greater than 12.0 V**
    - 2.1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
    - 2.2. 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 6.2–12.0 V**

3. Connect a test lamp between the control circuit terminal 5 and B+.
4. Verify the test lamp turns ON and OFF when commanding the Lane Departure Warning Indicator parameter ON and OFF with a scan tool.
  - ⇒ **If the test lamp is always OFF**
    - 4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
    - 4.2. 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
    - 4.3. Ignition OFF.
    - 4.4. Test for less than 2  $\Omega$  in the control circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , replace the K109 Frontview Camera Module.
  - ⇒ **If the test lamp is always ON**
    - 4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module.
    - 4.2. 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 K109 Frontview Camera Module.
  - ⇓ **If the test lamp turns ON and OFF**
5. Test or replace the S70L Steering Wheel Controls Switch – Left.

### **Repair Instructions**

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

- [Cruise Control Switch Replacement](#) – Steering Wheel Controls Switch – Left replacement.
- [Control Module References](#) for Frontview Camera Module replacement, programming and setup.

## DTC B1011

### Diagnostic Instructions

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

### 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](#)

### **Connector End View Reference**

[Component Connector End Views](#)

### **Description and Operation**

[Object Detection Description and Operation](#)

### **Electrical Information Reference**

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

### **Scan Tool Reference**

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

## **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**

**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.

3. 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.

[Control Module References](#) for frontview camera module programming and setup

[2014 Holden VF Sedan](#) | [VF/WN - Sedan, Ute, Sportwagon, Caprice, Lumina, HSV Service Manual 5617662](#) | [Safety and Security](#) | [Object Detection and Pedestrian Protection](#) | [Diagnostic Information and Procedures](#) |

**Document ID: 2275772**

## DTC B1015

### Diagnostic Instructions

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

### 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 advanced parking assist control module and the frontview camera module receive the vehicle identification number (VIN) from the body control module (BCM). The modules 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 parking assist system or the lane departure warning system is disabled.
- The driver information center may display a system service message.

### Conditions for Clearing the DTC

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

### Reference Information

#### Schematic Reference

[Object Detection Schematics](#)

#### Connector End View Reference

[Component Connector End Views](#)

#### Description and Operation

[Object Detection Description and Operation](#)

#### Electrical Information Reference

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

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**Scan Tool Reference**

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

**[Circuit/System Verification](#)**

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

**[Repair Instructions](#)**

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

[Control Module References](#) for the advanced parking assist control module or frontview camera module replacement, programming, and setup.



## DTC B1405 (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.
- [Diagnostic Procedure Instructions](#) provides 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,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 03 | B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 07 | —                     |
| Left Rear Object Sensor Signal         | B0958 06        | B0958 06                                                     | B0958 01                                                     | B0958 08,<br>B0958 21 |
| Left Middle Rear Object Sensor Signal  | B0959 06        | B0959 06                                                     | B0959 01                                                     | B0959 08,<br>B0959 21 |
| Right Middle Rear Object Sensor Signal | B0960 06        | B0960 06                                                     | B0960 01                                                     | B0960 08,<br>B0960 21 |
| Right Rear Object Sensor Signal        | B0961 06        | B0961 06                                                     | B0961 01                                                     | B0961 08,<br>B0961 21 |
| Low Reference                          | —               | B0958 01,<br>B0959 01,<br>B0960 01,<br>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](#)

##### **Connector End View Reference**

[Component Connector End Views](#)

##### **Description and Operation**

[Object Detection Description and Operation](#)

##### **Electrical Information Reference**

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

##### **Scan Tool Reference**

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

#### Circuit/System Verification

1. Ignition ON, engine running, transmission in R.
2. Verify the scan tool Park Assist Sensor Reference Voltage parameter is between 7.2–9.2 V.  
⇒ **If Park Assist Sensor Reference Voltage is not between 7.2–9.2 V**

Refer to Circuit/System Testing

↓ **If Park Assist Sensor Reference Voltage is between 7.2–9.2 V**

3. All OK.

#### **Circuit/System Testing**

1. Ignition OFF, disconnect the X2 harness connector at the K41R Rear Parking Assist Control Module, ignition ON.

2. Test for less than 1 V between the 8 V reference circuit terminal 4 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 infinite resistance between the 8 V reference circuit terminal 4 and ground.

⇒ **If less than infinite resistance**

Repair the short to ground on the circuit.

↓ **If infinite resistance**

5. Replace the K41R Rear Parking Assist Control Module.

#### **Repair Instructions**

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

[Control Module References](#) for rear parking assist control module replacement, programming and setup.

## DTC B1405 (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.
- [Diagnostic Procedure Instructions](#) provides 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,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 03 | B0954 06,<br>B0955 06,<br>B0956 06,<br>B0957 06,<br>B0958 06,<br>B0959 06,<br>B0960 06,<br>B0961 06,<br>B1405 07 | —                     |
| Left Front Object Sensor Signal             | B0954 06        | B0954 06                                                                                                         | B0954 01                                                                                                         | B0954 08,<br>B0954 21 |
| Left Middle Front Object Sensor Signal      | B0955 06        | B0955 06                                                                                                         | B0955 01                                                                                                         | B0955 08,<br>B0955 21 |
| Right Middle Front Object Sensor Signal     | B0956 06        | B0956 06                                                                                                         | B0956 01                                                                                                         | B0956 08,<br>B0956 21 |
| Right Front Object Sensor Signal            | B0957 06        | B0957 06                                                                                                         | B0957 01                                                                                                         | B0957 08,<br>B0957 21 |
| Left Rear Object Sensor Signal              | B0958 06        | B0958 06                                                                                                         | B0958 01                                                                                                         | B0958 08,<br>B0958 21 |
| Left Middle Rear Object Sensor Signal       | B0959 06        | B0959 06                                                                                                         | B0959 01                                                                                                         | B0959 08,<br>B0959 21 |
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| Circuit                                | Short to Ground | Open/High Resistance                                                                                | Short to Voltage | Signal Performance    |
|----------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------|------------------|-----------------------|
| Right Middle Rear Object Sensor Signal | B0960 06        | B0960 06                                                                                            | B0960 01         | B0960 08,<br>B0960 21 |
| Right Rear Object Sensor Signal        | B0961 06        | B0961 06                                                                                            | B0961 01         | B0961 08,<br>B0961 21 |
| Low Reference                          | —               | B0954 01,<br>B0955 01,<br>B0956 01,<br>B0957 01,<br>B0958 01,<br>B0959 01,<br>B0960 01,<br>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 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 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 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 parking assist control module has detected the object sensor supply voltage circuit is shorted to ground.

##### **B1405 03**

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

##### **B1405 07**

The 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 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](#)

## Connector End View Reference

[Component Connector End Views](#)

## Description and Operation

[Object Detection Description and Operation](#)

## Electrical Information Reference

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

## Scan Tool Reference

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

## Circuit/System Verification

1. Ignition ON, engine running, transmission in R.
2. Verify the scan tool Park Assist Sensor Reference Voltage parameter is between 7.2–9.2 V.  
⇒ **If Park Assist Sensor Reference Voltage is not between 7.2–9.2 V**  
Refer to Circuit/System Testing  
⇓ **If Park Assist Sensor Reference Voltage is between 7.2–9.2V**
3. All OK.

## Circuit/System Testing

1. Ignition OFF, disconnect X2 and X3 harness connectors at the K41 Front and Rear Parking Assist Control Module, ignition ON.
2. Test for less than 1 V between the 8 V reference circuit terminals listed below and ground.
  - Terminal 4 X2
  - Terminal 1 X3⇒ **If 1 V or greater**  
Repair the short to voltage on the circuit.  
⇓ **If less than 1 V**
3. Ignition OFF.
4. Test for infinite resistance between 8V reference circuit terminals listed below and ground.
  - Terminal 4 X2
  - Terminal 1 X3⇒ **If less than infinite resistance**  
Repair the short to ground on the circuit.  
⇓ **If infinite resistance**
5. Replace the K41 Front and Rear Parking Assist Control Module.

## Repair Instructions

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

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

## DTC B356A

### Diagnostic Instructions

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

### DTC Descriptors

#### DTC B356A 02

Vehicle Direction Warning Switch Circuit Short to Ground

### Diagnostic Fault Information

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

### Circuit/System Description

The Vehicle Direction Warning Switch DTC detects a short to ground on the circuit that contains the lane departure warning and forward collision setting switches. 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 left steering wheel controls switch. The setting is shown in the driver information center.

### Conditions for Running the DTC

Ignition ON

### Conditions for Setting the DTC

The frontview camera module has detected a short to ground 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 for setting the DTC is no longer present.

### Reference Information

#### Schematic Reference

#### [Object Detection Schematics](#)

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## Connector End View Reference

### [Component Connector End Views](#)

## Description and Operation

### [Object Detection Description and Operation](#)

## Electrical Information Reference

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

## Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON.
2. Verify the scan tool Lane Departure Warning Switch Status parameter while pressing and releasing the lane departure warning switch. The parameter should change between Open and Closed.  
⇒ **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, remove the ignition key, open the driver door, disconnect the scan tool, all vehicle systems OFF, this may take up to 2 min. Disconnect the harness connector at the S70L Steering Wheel Controls Switch – Left.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 7 and ground.  
⇒ **If 10  $\Omega$  or greater**  
2.1. Test for less than 2  $\Omega$  in the ground circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.  
⇓ **If less than 10  $\Omega$**
3. Ignition ON.
4. Verify the scan tool Lane Departure Warning Switch Status parameter is Open.  
⇒ **If not Open**  
4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module.  
4.2. Test for infinite resistance between the signal circuit terminal 2 at the S70L Steering Wheel Controls Switch – Left 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. Reconnect the harness at S70L Steering Wheel Controls Switch – Left. Ignition ON.
6. Verify the scan tool Lane Departure Warning Switch Status parameter while pressing and releasing the vehicle direction warning switch. The parameter should change between Open and Closed.

⇒ **If the parameter does not change**

Test or replace the S70L Steering Wheel Controls Switch – Left.

↓ **If the parameter changes**

7. All OK.

**Component Test****Static Test**

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  $\Omega$  between the control circuit terminal 2 and ground circuit terminal 7 while pressing forward collision alert switch.

⇒ **If not between 1.0k – 1.5k  $\Omega$** 

Replace the S70L Steering Wheel Controls Switch – Left.

↓ **If between 1.0k – 1.5k  $\Omega$** 

4. Test for 3.8k – 5.8k  $\Omega$  between the control circuit terminal 2 and ground circuit terminal 7 while pressing lane departure warning switch.

⇒ **If not between 3.8k – 5.8k  $\Omega$** 

Replace the S70L Steering Wheel Controls Switch – Left.

↓ **If between 3.8k – 5.8k  $\Omega$** 

5. All OK.

**Repair Instructions**

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

- [Cruise Control Switch Replacement](#) – Steering Wheel Controls Switch – Left replacement.
- [Control Module References](#) for Frontview Camera 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 List in order to verify that all of the following are true:
  - There are no DTCs set.
  - The control modules can communicate via the serial data link.

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

2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Object Detection 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.
- Make sure the parking assist sensors located on the vehicle front and rear bumper are clear. Remove any snow, mud or ice that is blocking the sensors.

### 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](#)

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

### Diagnostic Fault Information

| Circuit                                                                                                  | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|----------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Switch Signal                                                                                            | B356A 02        | 1                    | 1                | —                  |
| Switch Ground                                                                                            | —               | 1                    | 1                | —                  |
| B+                                                                                                       | 2               | 2                    | —                | —                  |
| 1. Forward Collision Alert timing sensitivity not adjustable.<br>2. Forward Collision System Inoperative |                 |                      |                  |                    |

### Circuit/System Description

The forward collision alert system is controlled by the front view camera module mounted on the windshield. The forward collision alert system is always active and operates at speeds above 40 km/h (25 mph). When the system detects a vehicle in the path ahead, the green vehicle ahead alert indicator in the vehicle direction display is illuminated. When approaching another vehicle too rapidly, the collision alert symbol will flash in the display located in the center of the instrument panel and the radio will simultaneously give an audible alert sound. The red collision alert display will stay continuously illuminated if the vehicle ahead remains much too close. These actions are requested by the front view camera module via serial data to the instrument cluster. The instrument cluster provides the ground path to turn on the appropriate LEDs. The forward collision alert switch is part of the left steering wheel controls and is used to adjust the timing sensitivity of the front collision alert system.

### Diagnostic Aids

Certain factors will affect the operation of the forward collision alert system. Forward collision alert does not warn the driver of any objects that are not detected as a vehicle, like e.g. pedestrians, animals, signs, guard rails, bridges, construction barrels or other stationary or slow moving objects. In some cases the camera may detect a vehicle that is not in the path ahead, or the system may occasionally provide unrealistic alerts. This could respond to a turning vehicle ahead, guard rails, traffic signs, or other stationary objects. This is normal operation, the vehicle does not need service. When the system is operating properly, the green vehicle ahead alert indicator will illuminate on the vehicle direction display when the system detects a vehicle in the path ahead. This indicates that all of the required operating conditions are met. The green vehicle ahead alert indicator will not appear when the system is having difficulty seeing other vehicles on the road or if the view of the front view camera is blocked with mud, dirt, snow, ice, or slush, if the windshield is damaged, or when weather limits visibility, such as while driving in fog, rain, or snow conditions. This is normal operation, the vehicle does not need service.

Additionally, the Front View Camera Disable History can give useful hints about what affected the operation of the lane departure warning system. For the Front View Camera Disable History refer to [DTC B1011](#).

## Reference Information

### Schematic Reference

[Object Detection Schematics](#)

### Connector End View Reference

[Component Connector End Views](#)

### Description and Operation

[Object Detection Description and Operation](#)

### Electrical Information Reference

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

### Scan Tool Reference

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

## Circuit/System Verification

**Note:** Refer to Diagnostic Aids before performing Circuit/System Verification.

1. Ignition ON.
2. Verify the scan tool Forward Collision Alert Function Status parameter is Off, Disabled, Not Ready To Assist or Ready To Assist.  
⇒ **If the parameter is Malfunction**  
Refer to Circuit/System Testing – Frontview Camera Module Malfunction  
↓ **If the parameter is not Malfunction**
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 cycle between far, medium, near, and off.  
⇒ **If the display does not change**  
Refer to Circuit/System Testing – Forward Collision Alert Switch Malfunction.  
↓ **If the display changes**
4. Turn Ignition Off and then On.
5. Verify the Collision Alert Indicators illuminate briefly during the bulb check.  
⇒ **If the indicators do not illuminate**  
Refer to Circuit/System Testing – Forward Collision Alert Indicator Malfunction  
↓ **If the indicators illuminate**
6. Verify the K109 Frontview Camera Module has good visibility to the road ahead.  
⇒ **If visibility is poor**  
Clean windshield.  
↓ **If visibility is good**
7. All OK.

## Circuit/System Testing

**Note:** You must perform the Circuit/System Verification before proceeding with Circuit/System Testing.

### Frontview Camera Module Malfunction

1. Ignition ON.
2. Verify no DTCs are set.
  - ⇒ **If DTCs are set**  
Diagnose and repair DTCs. Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).
  - ↓ **If no DTCs are set**
3. 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 K109 Frontview Camera Module.
4. Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.
  - ⇒ **If 10  $\Omega$  or greater**
    - 4.1. Ignition OFF.
    - 4.2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - ↓ **If less than 10  $\Omega$**
5. Verify a test lamp illuminates between the B+ circuit terminal 3 and ground.
  - ⇒ **If the test lamp does not illuminate and the circuit fuse is good**
    - 5.1. Ignition OFF.
    - 5.2. Test for less than 2  $\Omega$  in the B+ circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , 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**
    - 5.1. Ignition OFF.
    - 5.2. 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 K109 Frontview Camera Module.
  - ↓ **If the test lamp illuminates**
6. Ignition ON.
7. Test for less than 1 V between the signal circuit terminal 10 and ground.
  - ⇒ **If 1 V or greater**
    - 7.1. Disconnect the harness connector at S70L Steering Wheel Controls Switch – Left.
    - 7.2. Test for less than 1V Between the signal circuit terminal 10 and ground.
      - ⇒ If 1V or greater, repair the short to voltage on the signal circuit.
  - ↓ **If less than 1 V**
8. Ignition OFF.
9. Test for infinite resistance between the signal circuit terminal 10 and ground with the forward collision alert switch not pressed.
  - ⇒ **If less than infinite resistance**
    - 9.1. Disconnect the harness connector at the S70L Steering Wheel Controls Switch – Left.
    - 9.2. 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 test or replace the S70L Steering Wheel Controls Switch – Left.

↓ **If infinite resistance**

10. Test for 1.2k–1.4k  $\Omega$  between the signal circuit terminal 10 and ground with the forward collision alert switch pressed.

⇒ **If not between 1.2k–1.4k  $\Omega$**

- 10.1. Disconnect the harness connector at the S70L Steering Wheel Controls Switch – Left  
10.2. Test for less than 2  $\Omega$  in the signal circuit from end to end.

⇒ **If greater than 2  $\Omega$**

Repair the open/high resistance in the circuit.

↓ **If 2  $\Omega$  or less**

↓ **If between 1.2k–1.4k  $\Omega$**

11. Connect the harness connector of the S70L Steering Wheel Controls Switch – Left and K109 Frontview Camera Module.  
12. Verify the scan tool Forward Collision Alert Function Status parameter is Off, Disabled, Not Ready To Assist or Ready To Assist.

⇒ **If parameter is Malfunction**

Replace K109 Frontview Camera Module.

↓ **If parameter is not Malfunction**

13. All OK.

**Forward Collision Alert Switch 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 S70L Steering Wheel Controls Switch – Left.

2. Test for less than 5  $\Omega$  between the ground circuit terminal 7 and ground.

⇒ **If 5  $\Omega$  or greater**

- 2.1. Ignition OFF.  
2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

↓ **If less than 5  $\Omega$**

3. Ignition ON.  
4. Verify the scan tool Lane Departure Warning Switch Status parameter is Open.

⇒ **If not Open**

- 4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module.  
4.2. Test for infinite resistance between the signal circuit terminal 2 and ground.  
⇒ If less than infinite resistance, repair the short to ground on the circuit.  
⇒ If infinite resistance, replace the K109 Vehicle Camera Module.

↓ **If Open**

5. Connect the harness connector at the S70L Steering Wheel Controls Switch – Left, ignition ON.  
6. Verify the driver information center displays and adjusts forward collision alert setting while repeatedly pressing and releasing the forward collision switch. The setting should cycle between far, medium, near, and off.

⇒ **If the display does not change**

Test or replace the S70L Steering Wheel Controls Switch – Left.

↓ **If the display changes**

7. All OK.

## Component Test

### Switch Static Test

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  $\Omega$  between the control circuit terminal 2 and ground circuit terminal 7 while pressing forward collision alert switch.  
⇒ **If not between 1.0k – 1.5k  $\Omega$**   
Replace the S70L Steering Wheel Controls Switch – Left.  
↓ **If between 1.0k – 1.5k  $\Omega$**
4. Test for 3.8k – 5.8k  $\Omega$  between the control circuit terminal 2 and ground circuit terminal 7 while pressing lane departure warning switch.  
⇒ **If not between 3.8k – 5.8k  $\Omega$**   
Replace the S70L Steering Wheel Controls Switch – Left.  
↓ **If between 3.8k – 5.8k  $\Omega$**
5. All OK.

## Repair Instructions

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

- [Cruise Control Switch Replacement](#)
- [Control Module References](#) for frontview camera 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.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

### Circuit/System Description

The front and rear parking assist control module supplies a reference voltage to the parking assist switch. When the switch is pressed, the signal circuit is grounded. The front and rear parking assist control module can control the park assist indicator by grounding the control circuit to illuminate the LED which indicates that the system is active.

The front and rear parking assist control module supplies an 8V reference voltage and a low reference to the object sensors. The sensors will return a signal based on the reflections from objects within range of the sensors.

When an object is detected, the front and rear parking assist control module will send serial data to the radio to provide an audible alert.

### Diagnostic Aids

For Symptom Byte 21 the module only run diagnostic when the vehicle is driven greater than 40 km/h (25 MPH). Therefore, even with clean sensor with no obstruction (i.e. snow or ice melted off) drive the vehicle greater than 40 km/h (25 MPH).

The following is a list of reasons this failure type byte 21 might have set:

- One or more of the sensors may be blocked by snow, mud, ice, or other debris. This might happen after going through a car wash in cold weather.
- Silicone insulator surrounding sensor maybe missing, cut, or twisted.
- Improperly installed sensor, sensor maybe be crooked due to a tight wire harness.
- One or more of the sensors may be scratched or the paint maybe chipped.
- Excessive paint thickness on a sensor may cause an excessive sensor ring time. When replacing or refinishing a sensor, do not apply an excessive amount of paint or clear coat.

### Reference Information

#### Schematic Reference

[Object Detection Schematics](#)

#### Connector End View Reference

[Component Connector End Views](#)

#### Description and Operation

[Object Detection Description and Operation](#)

#### Electrical Information Reference

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

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- [Wiring Repairs](#)

## Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON.
2. Verify the park assist system is enabled through the parking assist switch.  
⇒ **If the park assist system is manually disabled, enable the system.**  
Refer to the vehicle owners manual for instructions on enabling the system.  
↓ **If the park assist system does not manually change**
3. Verify the scan tool Park Assist Switch parameter while pressing and releasing the parking assist switch. The parameter should change between Active and Inactive.  
⇒ **If the parameter does not change between Active and Inactive**  
Refer to Parking Assist Switch Circuit Malfunction.  
↓ **If the parameter changes between Active and Inactive**
4. Command the Park Assist Switch LED output control On and Off with the scan tool. The parking assist switch indicator should turn On and Off when changing between the commanded states.  
⇒ **If the indicator does not turn ON and OFF**  
Refer to Parking Assist Switch Indicator Circuit Malfunction.  
↓ **If the indicator does turn ON and OFF**
5. Transmission in reverse, verify the Engine Control Module (ECM) scan tool Reverse Position Switch parameter is Active.  
⇒ **If the parameter is not Active**  
Refer to [Backup Lamps Malfunction](#).  
↓ **If the parameter is Active**
6. Transmission in REVERSE, verify the scan tool Park Assist System Status parameter displays Enable.  
⇒ **If the parameter is not Enabled**  
Refer to Diagnostic Aids to determine the cause of the inhibit.  
↓ **If the parameter is Enabled**
7. All OK.

### [Circuit/System Testing](#)

#### Parking Assist Switch Circuit Malfunction

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch – Instrument Panel.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 1 and ground.  
⇒ **If 10  $\Omega$  or greater**
  - 2.1. Ignition OFF.
  - 2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.  
⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.  
⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
- ↓ **If less than 10  $\Omega$**
3. Ignition ON.
4. Verify the scan tool Parking Assist Switch Status parameter is inactive.  
⇒ **If not Inactive**

- 4.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module.
- 4.2. Test for infinite resistance between the control circuit terminal 5 and ground.
  - ⇒ If less than infinite resistance, repair the short to ground on the circuit.
  - ⇒ If infinite resistance, replace the K41 Front and Rear Parking Assist Control Module.
- ↓ **If Inactive**
5. Test for less than 1 V between the control circuit terminal 5 and ground.
  - ⇒ **If 1 V or greater**  
Repair the short to voltage on the circuit.
  - ↓ **If less than 1 V**
6. Connect a test lamp between the control circuit terminal 5 and the ground circuit terminal 1.
7. Verify that a test lamp turns On and Off when Commanding the Parking Assist Switch On and Off with a scan tool.
  - ⇒ **If the test lamp is always OFF**
    - 7.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module
    - 7.2. 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
    - 7.3. Test for less than 2  $\Omega$  in the control circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , replace the K41 Front and Rear Parking Assist Control Module.
  - ⇒ **If the test lamp is always ON**
    - 7.1. Ignition OFF, disconnect the harness connector at the K41 Front and Rear Parking Assist Control Module, ignition ON.
    - 7.2. 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 K41 Front and Rear Parking Assist Control Module
  - ↓ **If the test lamp turns ON and OFF**
8. All OK.

#### Parking Assist Switch Indicator Circuit Malfunction

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch – Instrument Panel, Ignition ON.
2. Test for greater than 11 V between the terminal 3 and ground.
  - ⇒ **If less than 11 V**  
Test the voltage circuit for a short to ground or an open/high resistance.
  - ↓ **If greater than 11 V**
3. Command the Park Assist Switch LED output control ON with the scan tool. Test for greater than 11 V between the ignition circuit terminal 3 and the signal circuit terminal 5.
  - ⇒ **If less than 11 V**  
Test the signal circuit for an open/high resistance.
  - ↓ **If greater than 11 V**
4. Command the Park Assist Switch Indicator Off with the scan tool.
5. Test for less than 1 V between the terminal 6 and ground.
  - ⇒ **If 1 V or greater**  
Test the signal circuit for a short to voltage.

6. If all circuits test normal, replace the S48A Multifunction Switch – Instrument Panel.

### **Repair Instructions**

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

- [Accessory Switch Replacement](#)
- [Control Module References](#) for front and rear parking assist control module replacement, programming, and setup

## Rear Vision Camera System Malfunction

### Diagnostic Instructions

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

### Diagnostic Fault Information

| Circuit                                                                                                    | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|------------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Ignition                                                                                                   | 1               | 1                    | —                | —                  |
| Backup Signal                                                                                              | 1               | 1                    | 2                | —                  |
| Camera Module signal +                                                                                     | 1               | 1                    | 1                | —                  |
| Camera Module signal -                                                                                     | 3               | 1                    | 1                | —                  |
| Ground                                                                                                     | —               | 1                    | —                | —                  |
| Shield                                                                                                     | 3               | 3                    | 3                | —                  |
| 1. Rear Vision Camera Malfunction<br>2. Rear Vision Camera image always displayed<br>3. Poor Quality Image |                 |                      |                  |                    |

### Circuit/System Description

When the transmission is placed into REVERSE, a 12 V signal is sent to the B87 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 K9 Body 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.

### 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.

### Reference Information

#### Schematic Reference

[Object Detection Schematics](#)

#### Connector End View Reference

[Component Connector End Views](#)

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## Description and Operation

### [Object Detection Description and Operation](#)

## Electrical Information Reference

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

## Scan Tool Reference

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

### [Circuit/System Verification](#)

1. Ignition ON.
2. Verify that DTC B2545 is not set.
  - ⇒ **If the DTC is set**  
Refer to [DTC B2545](#).
  - ⇓ **If the DTC is not set**
3. Verify the rearview camera has no debris on the lens and that the bezel and bezel seal are not damaged.
  - ⇒ **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**
4. Ignition ON, transmission in R.
5. Verify the backup lamps are illuminated.
  - ⇒ **If the backup lamps are not illuminated**  
Refer to [Backup Lamps Malfunction](#).
  - ⇓ **If the backup lamps are illuminated**
6. Engine running, transmission in R.
7. Verify a clear rear vision image is displayed.
  - ⇒ **If a clear image is not displayed**  
Refer to Circuit/System Testing.
  - ⇓ **If a clear image is displayed**
8. All OK.

### [Circuit/System Testing](#)

**Note:** Circuit/System Verification must be performed before 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  $\Omega$  between the ground circuit terminal 5 and ground.
  - ⇒ **If 10  $\Omega$  or greater**
    - 2.1. Ignition OFF.
    - 2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - ⇓ **If less than 10  $\Omega$**
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**
    - 4.1. Ignition OFF.
    - 4.2. Test for less than  $2\ \Omega$  in the ignition circuit end to end.
      - ⇒ If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than  $2\ \Omega$ , verify the fuse is OK 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**
    - 4.1. Ignition OFF.
    - 4.2. 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, park brake applied, transmission in R.
6. Test for greater than 11 V between the control circuit terminal 3 and ground.
  - ⇒ **If less than 11 V**
    - 6.1. Ignition OFF, disconnect the X7 harness connector at the K9 Body Control Module.
    - 6.2. 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
    - 6.3. Test for less than  $2\ \Omega$  in the control circuit end to end.
      - ⇒ If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than  $2\ \Omega$ , replace the K9 Body Control Module.
  - ⇓ **If greater than 11 V**
7. Ignition OFF, disconnect the X7 harness connector at the K9 Body Control Module, ignition ON.
8. Test for less than 1 V between the signal circuit terminal listed below and ground:
  - B87 Rearview Camera signal (+) circuit terminal 1
  - B87 Rearview Camera signal (–) circuit terminal 4
  - ⇒ **If 1 V or greater**  
Repair the short to voltage on the circuit.
  - ⇓ **If less than 1 V**
9. Test for infinite resistance between the signal circuit terminal listed below and ground:
  - B87 Rearview Camera signal (+) circuit terminal 1
  - B87 Rearview Camera signal (–) circuit terminal 4
  - ⇒ **If less than infinite resistance**  
Repair the short to ground on the circuit.
  - ⇓ **If infinite resistance**
10. Test for less than  $2\ \Omega$  in the signal (+) circuit end to end.
  - ⇒ **If  $2\ \Omega$  or greater**  
Repair the open/high resistance in the circuit.
  - ⇓ **If less than  $2\ \Omega$**
11. Test for less than  $2\ \Omega$  in the signal (–) circuit end to end.
  - ⇒ **If  $2\ \Omega$  or greater**  
Test the signal circuit for an open/high resistance.
  - ⇓ **If less than  $2\ \Omega$**

12. Replace the B87 Rearview Camera.
13. Engine running, transmission in R.
14. Verify a clear rear vision image is displayed.
  - ⇒ **If a clear rear vision image is not displayed**  
Test or replace the K9 Body Control Module.
  - ⇓ **If a clear rear vision image is displayed**
15. All OK.

#### Repair Instructions

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

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

## Side Blind Spot Alert System Malfunction

### Diagnostic Instructions

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

### Diagnostic Fault Information

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

### Circuit/System Description



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

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

### **Diagnostic Aids**

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

### **Reference Information**

#### **Schematic Reference**

[Object Detection Schematics](#)

#### **Connector End View Reference**

[Component Connector End Views](#)

#### **Description and Operation**

## [Object Detection Description and Operation](#)

### Electrical Information Reference

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

### Scan Tool Reference

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

### [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. 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**
    - 5.1. 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  $\Omega$  between ground circuit terminal 8 and ground.
  - ⇒ **If 10  $\Omega$  or greater**
    - 2.1. Ignition OFF.
    - 2.2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - ⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - ⇓ **If less than 10  $\Omega$**
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**
    - 3.1. Ignition Off.

3.2. Test for less than  $2\ \Omega$  in the B+ circuit end to end.

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

⇒ If less than  $2\ \Omega$ , 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**

3.1. Ignition OFF.

3.2. 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. Disconnect the It may take up to 2 minutes for all vehicle systems to power down.

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

⇒ **If  $2\ \Omega$  or greater**

Repair the open/high resistance in the circuit.

↓ **If less than  $2\ \Omega$**

6. Replace B218L Side Object Sensor Module — Left.

### Right Side Object Sensor Malfunction

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

2. Test for less than  $10\ \Omega$  between the following ground circuit terminals and ground.

◦ Terminal 3

◦ Terminal 8

⇒ **If  $10\ \Omega$  or greater**

2.1. Ignition OFF.

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

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

⇒ If less than  $2\ \Omega$ , repair the open/high resistance in the ground connection.

↓ **If less than  $10\ \Omega$**

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**

3.1. Ignition Off.

3.2. Test for less than  $2\ \Omega$  in the B+ circuit end to end.

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

⇒ If less than  $2\ \Omega$ , 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**

3.1. Ignition OFF.

3.2. 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 min for all vehicle systems to power down.

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

⇒ **If  $2\ \Omega$  or greater**

Repair the open/high resistance in the circuit.

↓ **If less than 2  $\Omega$**

6. Replace B218R Side Object Sensor Module — Right.

### Side Object Indicator Malfunction

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

- X510 – Driver Door Harness to Outside Rearview Mirror
- X610 – Passenger Door Harness to Outside Rearview Mirror

2. Test for less than 10  $\Omega$  between the ground circuit terminal 5 and ground.

⇒ **If 10  $\Omega$  or greater**

2.1. Ignition OFF.

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

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

⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

⇒ **If less than 10  $\Omega$**

3. Ignition ON, connect a test lamp between the control circuit terminal 18 and the ground circuit terminal 5.

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

⇒ **If the test lamp is always OFF**

4.1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object Sensor Module.

4.2. 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

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

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

⇒ If less than 2  $\Omega$ , replace the B218 Side Object Sensor Module.

⇒ **If the test lamp is always ON**

4.1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.

4.2. 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 B218 Side Object Sensor Module.

↓ **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.

- [Outside Rearview Mirror Glass Replacement](#)
- [Control Module References](#) for side object sensor module replacement, programming and setup.

## Side Object Sensor Malfunction

### Diagnostic Instructions

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

### Circuit/System Description

The side blind zone alert system uses side object sensors located behind the rear fascia at each of the vehicles rear corners. Visual indicators located in the right and left outside rearview mirrors alert the driver to the presence of objects of interest within the corresponding blind spots, or zones, on each side of the vehicle. The system is controlled by the Vehicle Personalization settings located in the radio.

Each sensor receives battery power, ground, as well as serial data communications. The left and right sensors are identical, however an additional ground circuit is required to configure the sensor for operation on the right side. Communication is via a serial data and each sensor shares the serial data circuit in parallel, allowing continuation of communication between the sensors. The scan tool is able to communicate with each sensor independently. The side object sensors control corresponding mirror icons by sending power to the individual LED indicators.

### Diagnostic Aids

- The side object sensors are capable of detecting when they are blocked by mud, snow, or ice build up on the rear fascia. When a sensor is blocked, the driver information center will display SIDE BLIND ZONE SYSTEM UNAVAILABLE . The side blind zone alert system transitions back to the normal operating state when the blockage is removed. Bumper sticks, labels, and heavy rain storms may also cause this condition.
- The side blind zone alert 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 alert 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.
- The side blind zone alert system is disabled if any of the following occurs:
  - There is a loss of serial data communication or a side blind zone alert system DTC is set.
  - The side blind zone alert system is manually disabled by the driver through the radio.
- 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.

### Reference Information

#### Schematic Reference

[Object Detection Schematics](#)

#### Connector End View Reference

[Component Connector End Views](#)

#### Description and Operation

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[Object Detection Description and Operation](#)**Electrical Information Reference**

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

**Scan Tool Reference**

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

**[Circuit/System Verification](#)**

1. Ignition ON, verify the scan tool can communicate with left side object sensor.
  - ⇒ If the scan tool can not communicate with the left side object sensor, refer to Left Side Object Sensor Malfunction
2. Verify the scan tool can communicate with right side object sensor.
  - ⇒ If the scan tool can not communicate with the right side object sensor, refer to Right Side Object Sensor Malfunction
3. Ignition ON, verify that the 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 indicators do not briefly illuminate during the system self test, the side blind zone alert system has been disabled. Refer to Diagnostic Aids.
  - ⇒ If only one indicator does not briefly illuminate during the self test, refer to Side Object Indicator Malfunction.

**[Circuit/System Testing](#)****Left Side Object Sensor Malfunction**

1. Ignition OFF, disconnect the harness connector at the B94L Side Object Sensor – Left.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 4 and ground.
  - ⇒ If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 7 and ground.
  - ⇒ If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. If all circuits test normal, replace the B94L Side Object Sensor – Left.

**Right Side Object Sensor Malfunction**

1. Ignition OFF, disconnect the harness connector at the B94R Side Object Sensor – Right.
2. Test for less than 5  $\Omega$  between the ground circuit terminals listed below and ground:
  - Terminal 4
  - Terminal 3
  - ⇒ If greater than the specified value, test the appropriate ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 7 and ground.
  - ⇒ If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. Ignition OFF, disconnect the harness connector at the B94L Side Object Sensor – Left.
5. Ignition ON, test for less than 0.3 V between the serial data circuit terminal 5 and ground.
  - ⇒ If greater than the specified value, test the serial data circuit for a short to voltage.

6. Test for infinite resistance between the serial data circuit terminal 5 and ground.  
⇒ If not the specified value, test the serial data circuit for a short to ground.
7. Test for less than 5  $\Omega$  between the serial data circuit terminal 5 at the B94L Side Object Sensor – Left harness connector and the serial data circuit terminal 5 at the B94R Side Object Sensor – Right harness connector.  
⇒ If greater than the specified value, test the serial data circuit for an open/high resistance.
8. If all circuits test normal, replace the B94R Side Object Sensor – Right.

#### **Side Object Indicator Malfunction**

1. Ignition OFF, disconnect the harness connector at the appropriate A9 Outside Rearview Mirror.
2. Test for less than 5  $\Omega$  between the ground circuit terminal 4 and ground.  
⇒ If greater than the specified value, test the ground circuit for an open/high resistance.
3. Connect a test lamp between the control circuit terminal 11 and the ground circuit terminal 4.
4. Ignition ON, verify the test lamp briefly illuminates during the system self test.  
⇒ If the test lamp does not illuminate, test the control circuit for a short to ground or an open/high resistance. If the circuits test normal, replace the appropriate side object sensor.  
⇒ If the test lamp remains illuminated at all time, test the control circuit for a short to voltage. If the circuits test normal, replace the appropriate side object sensor.
5. If all circuits test normal, replace the appropriate A9 Outside Rearview Mirror.

#### **Repair Instructions**

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

- [Outside Rearview Mirror Replacement](#)
- [Control Module References](#) for the driver door module, front passenger door module, side object sensor 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.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

### Diagnostic Fault Information

| Circuit                                                                                                             | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|---------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Lane Departure Warning Switch Ground Circuit                                                                        | —               | 2                    | —                | —                  |
| Lane Departure Warning Switch Signal Circuit                                                                        | B356A 02        | 2                    | 2                | —                  |
| Lane Departure Warning Switch Indicator Control Circuit                                                             | —               | B0987 06             | B0987 01         | —                  |
| Lane Departure Warning Switch Indicator Power Circuit                                                               | —               | 1                    | 1                | —                  |
| 1. Lane Departure Warning Inoperative.<br>2. Lane Departure Warning Switch Illumination cannot be turned ON or OFF. |                 |                      |                  |                    |

### Circuit/System Description

The lane departure warning system is enabled and disabled through the lane departure switch. When enabled, the lane departure warning indicator will illuminate. The switch and indicator are connected to the Frontview Camera Module. The Frontview Camera module supplies a reference voltage to the lane departure switch. When the switch is pressed, the signal circuit is grounded. When enabled, the Frontview Camera Module will illuminate the indicator located in the switch when lane departure warning system is enabled.

When the system is operating and can detect the lane markings, the Frontview Camera Module will request via serial data communications that the instrument cluster illuminates the green lane departure ready-to-assist indicator. If the Frontview Camera Module detects that the vehicle unintentionally crosses a lane marking without the turn signal being used, the module will request the vehicle direction display to flash the amber lane departure warning indicator. An audible warning will also sound three times when the amber lane departure warning indicator in the vehicle direction display is flashing.

### Diagnostic Aids

Certain factors will affect the operation of the lane departure warning system. When the system is operating properly, the green lane departure warning indicator will illuminate on the instrument cluster. This indicates that all of the required operating conditions to permit lane departure warning have been met. The green lane departure warning indicator will not appear when the system is having difficulty seeing the lines on the road or if the view of the front view camera is blocked with mud, dirt, snow, ice, or slush, if the windshield is damaged, or when weather limits visibility, such as while driving in fog, rain, or snow conditions. This is normal operation, the vehicle does not need service. Additionally, lane departure warnings

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may occasionally occur in a properly operating vehicle due to tar marks, shadows, cracks in the road, or other road imperfections. This is normal system operation and the vehicle does not require service. The driver information center may also display Lane Departure System Unavailable due to the temporary conditions listed above.

Additionally, the Front View Camera Disable History can give useful hints about what affected the operation of the lane departure warning system. For the Front View Camera Disable History, refer to [DTC B1011](#).

## Reference Information

### Schematic Reference

[Object Detection Schematics](#)

### Connector End View Reference

[Component Connector End Views](#)

### Description and Operation

[Object Detection Description and Operation](#)

### Electrical Information Reference

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

### Scan Tool Reference

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

## Circuit/System Verification

**Note:** Refer to Diagnostic Aids before performing Circuit/System Verification.

1. Ignition ON.
2. Verify that DTC B356A is not set.  
⇒ **If the DTC is set**  
Refer to [DTC B356A](#).  
⇓ **If the DTC is not set**
3. Verify that DTC B0987 is not set.  
⇒ **If the DTC is set**  
Refer to [DTC B0987](#).  
⇓ **If the DTC is not set**
4. Verify the scan tool Frontview Camera System Status parameter is Normal.  
⇒ **If the parameter is Undefined or Malfunction**  
Refer to Diagnostic Aids.  
⇓ **If the parameter is Normal**
5. 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 between Open and Closed**  
Refer to Lane Departure Warning Switch Malfunction in Circuit/System Testing.  
⇓ **If the parameter changes between Open and Closed**
6. Verify the scan tool Lane Departure Warning Switch indicator turns on and off while pressing and releasing the lane departure warning switch.

⇒ **If the indicator does not turn on and off**

Refer to Lane Departure Warning Switch Indicator Malfunction in Circuit/System Testing.

⇓ **If the indicator turns on and off**

7. Verify the area of the K109 Frontview Camera Module for contamination.

⇒ **If it needs to be cleaned**

Clean the windshield.

⇓ **If it does not need to be cleaned**

8. All OK.

## **Circuit/System Testing**

### **Lane Departure Warning Switch Malfunction**

1. Ignition OFF, disconnect the harness connector at the S70L Steering Wheel Controls Switch – Left. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 5  $\Omega$  between the S70L Steering Wheel Controls Switch – Left ground circuit terminal 7 and ground.

⇒ **If 5  $\Omega$  or greater**

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

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

⇒ If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.

⇓ **If less than 5  $\Omega$**

3. Ignition ON.

4. Verify the scan tool Lane Departure Warning Switch Status parameter is Open.

⇒ **If not Open**

4.1. Ignition OFF. Disconnect the K109 Frontview Camera Module.

4.2. Test for infinite resistance between the S70L Steering Wheel Controls Switch – Left signal circuit terminal 2 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 signal circuit terminal 2 and the ground circuit terminal 7.

6. Verify DTC B356A 02 sets.

⇒ **If DTC does not set**

6.1. Ignition OFF, remove the jumper wire, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.

6.2. 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

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

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

⇒ If less than 2  $\Omega$ , replace the K109 Frontview Camera Module.

⇓ **If DTC sets**

7. Test or replace the S70L Steering Wheel Controls Switch – Left.

### **Lane Departure Warning Switch Indicator Malfunction**

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

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

2. Test for 6.2–12.0 V between the dimming control circuit terminal 4 and ground.

⇒ **If less than 6.2 V**

- 2.1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
- 2.2. 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
- 2.3. Test for less than 2  $\Omega$  in the control circuit end to end.
  - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - ⇒ If less than 2  $\Omega$ , refer to [Interior Backlighting Malfunction](#).

⇒ **If greater than 12.0 V**

- 2.1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
- 2.2. 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 6.2–12.0 V**

3. Connect a test lamp between the control circuit terminal 5 and the control voltage circuit terminal 4.
4. Verify the test lamp turns ON and OFF when commanding the Lane Departure Warning Indicator parameter ON and OFF with a scan tool.

⇒ **If the test lamp is always OFF**

- 4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module, ignition ON.
- 4.2. 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
- 4.3. Ignition OFF.
- 4.4. Test for less than 2  $\Omega$  in the control circuit end to end.
  - ⇒ If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - ⇒ If less than 2  $\Omega$ , replace the S70L Steering Wheel Controls Switch – Left.

⇒ **If the test lamp is always ON**

- 4.1. Ignition OFF, disconnect the harness connector at the K109 Frontview Camera Module.
- 4.2. 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 K109 Frontview Camera Module.

⇓ **If the test lamp turns ON and OFF**

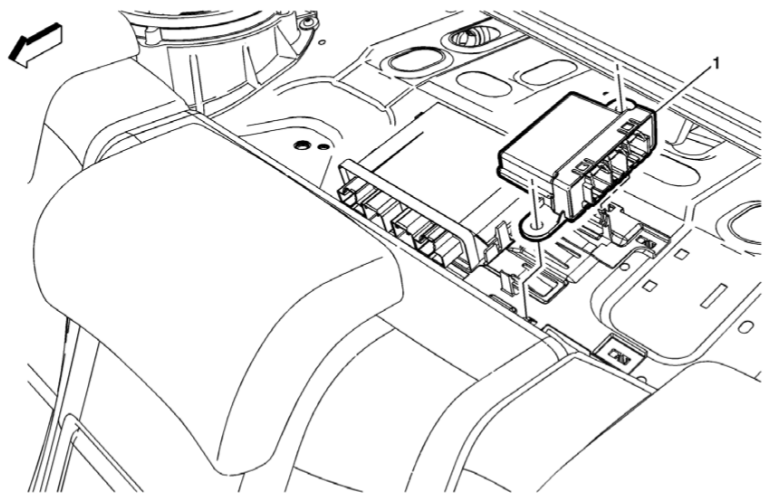
5. Test or replace the S70L Steering Wheel Controls Switch – Left.

## Repair Instructions

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

- [Cruise Control Switch Replacement](#) – Steering Wheel Controls Switch – Left replacement.
- [Control Module References](#) for Frontview Camera Module replacement, programming and setup.

## Rear Object Alarm Control Module Replacement (Sedan)

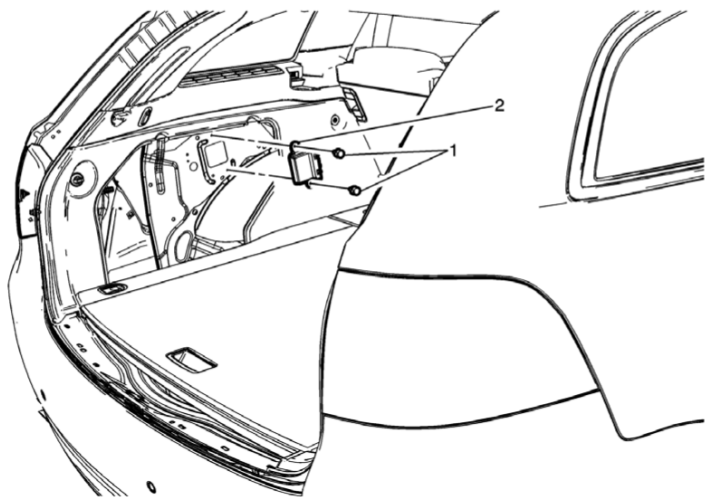


### Rear Object Alarm Control Module Replacement

| Callout                                                                                                                          | Component Name                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear window trim panel. Refer to <a href="#">Rear Window Panel Trim Replacement</a> . |                                                                                                                                                                                                                                                                                                                          |
| 1                                                                                                                                | <b>Rear Object Alarm Control Module</b><br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the electrical connectors.</li><li>2. Release module from retaining tabs on bracket.</li><li>3. For programming and set up information, refer to <a href="#">Control Module References</a>.</li></ol> |

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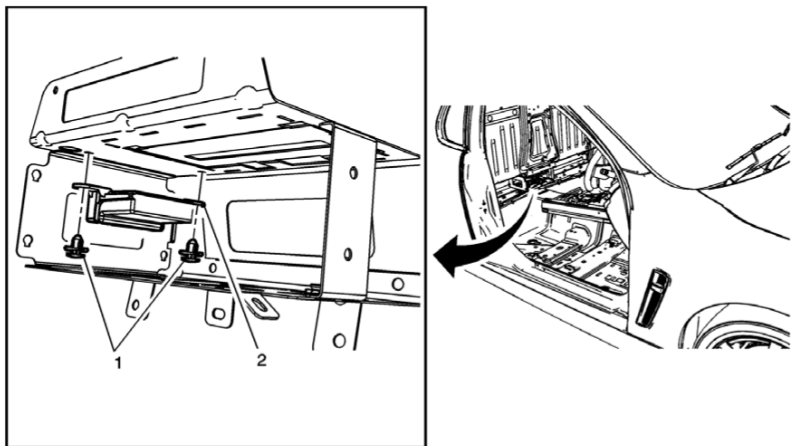
## Rear Object Alarm Control Module Replacement (Sportwagon)



Rear Object Alarm Control Module Replacement

| Callout                                                                                                                                                                    | Component Name                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the quarter inner trim finish panel – left side. Refer to <a href="#">Quarter Inner Trim Finish Panel Replacement - Left Side</a> . |                                                                                                                                                                                                     |
| 1                                                                                                                                                                          | Rear Object Alarm Control Module Push Pins (Qty: 2)                                                                                                                                                 |
| 2                                                                                                                                                                          | Rear Object Alarm Control Module<br><b>Procedure</b><br>1. Disconnect the electrical connectors.<br>2. For programming and set up information, refer to <a href="#">Control Module References</a> . |

## Rear Object Alarm Control Module Replacement (Ute)



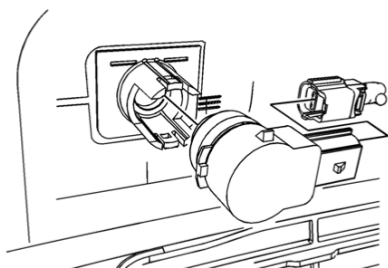
### Rear Object Alarm Control Module Replacement

| Callout                                                                                                                          | Component Name                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear window trim panel. Refer to <a href="#">Rear Window Panel Trim Replacement</a> . |                                                                                                                                                                                                                                                                       |
| 1                                                                                                                                | Rear Object Alarm Control Module Push Pins (Qty: 2)                                                                                                                                                                                                                   |
| 2                                                                                                                                | Rear Object Alarm Control Module<br><b>Procedure</b><br>1. Disconnect the electrical connectors.<br>2. Remove the module from the radio speaker amplifier bracket.<br>3. For programming and set up information, refer to <a href="#">Control Module References</a> . |

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## Advance Parking Assist Alarm Sensor Replacement

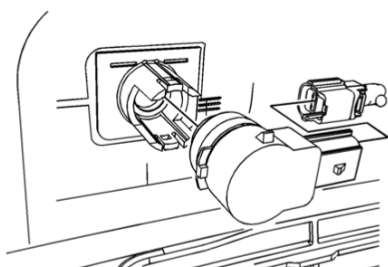
### Removal Procedure



1. Remove front bumper fascia. Refer to [Front Bumper Fascia Replacement](#).
2. Disconnect electrical from the front object alarm sensor.
3. Lift the locking tabs on the housing and remove the front object alarm sensor.

### Installation Procedure

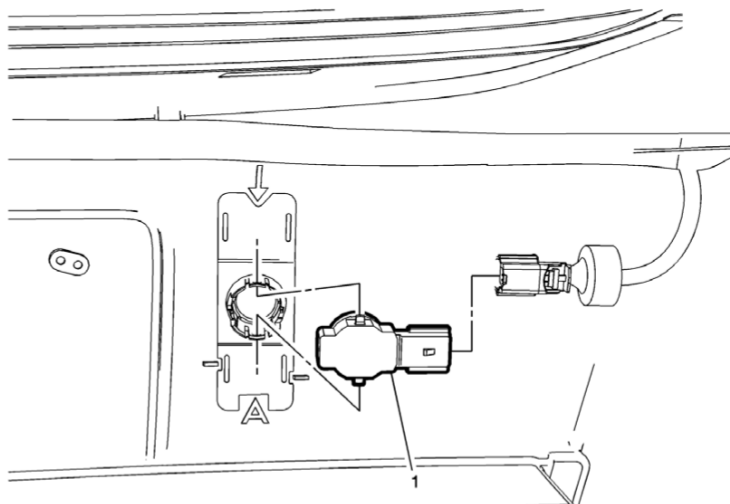
**Note:** Do not refinish previously painted sensors. Excess paint build up will cause the sensor to be inoperative



1. Insert the sensor into the housing.
2. Connect the electrical connector to the front object alarm sensor.
3. Install the front bumper fascia. Refer to [Front Bumper Fascia Replacement](#).

## Front Object Alarm Sensor Replacement

### Removal Procedure



1. Remove front bumper fascia. Refer to [Front Bumper Fascia Replacement](#).
2. Disconnect electrical from the front object alarm sensor.

**Note:** The front object alarm sensor is a one piece design. Do NOT twist the sensor cap to try and remove the painted cap.

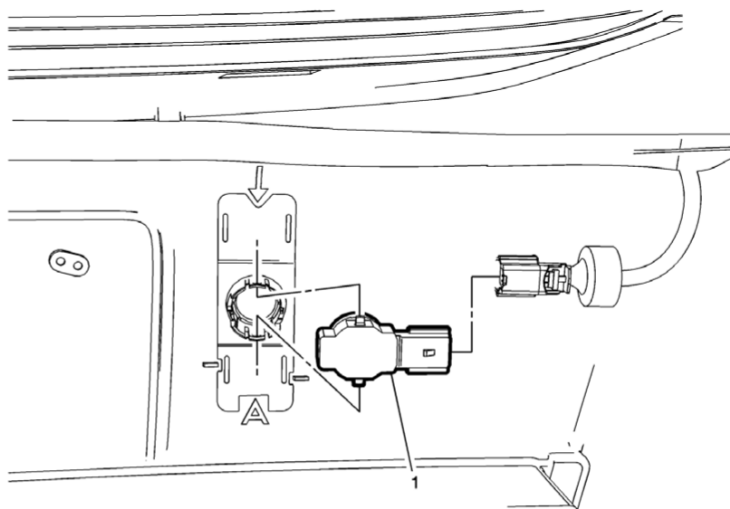
3. Lift the locking tabs on the housing and remove the front object alarm sensor.

### Installation Procedure

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

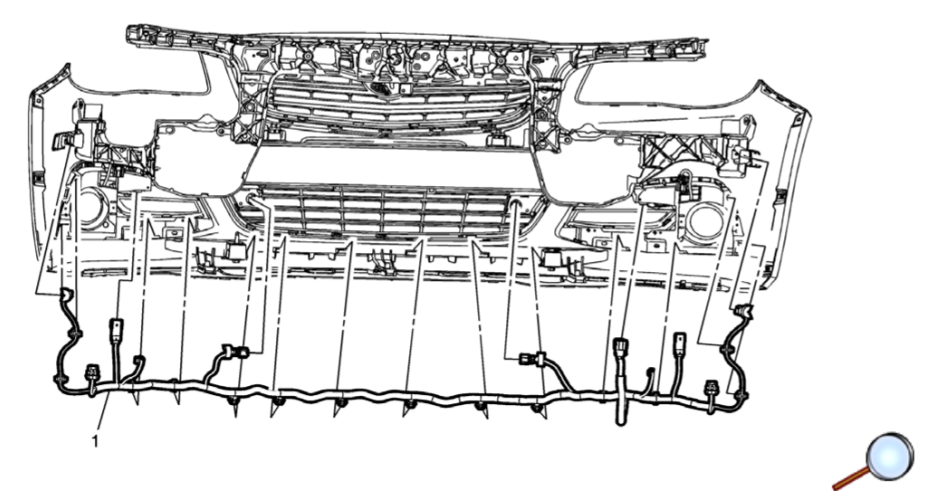
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1. Insert the sensor into the housing.
2. Connect the electrical connector to the rear object sensor.
3. Install the front bumper fascia. Refer to [Front Bumper Fascia Replacement](#).

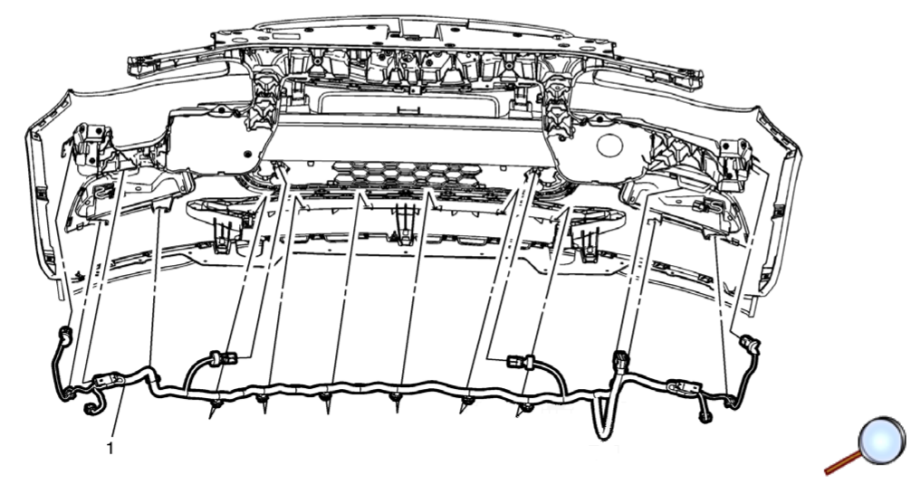
# Front Object Alarm Sensor Wiring Harness Replacement (Short Wheelbase)



Front Object Alarm Sensor Wiring Harness Replacement

| Callout                                                                                                                     | Component Name                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                   |
| 1                                                                                                                           | Front Object Alarm Sensor Wiring Harness<br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the front object alarm sensor wiring harness electrical connectors from the front object sensors.</li><li>2. Using a suitable tool, disconnect the retainers of the front object alarm sensor wiring harness from the front fascia.</li></ol> |

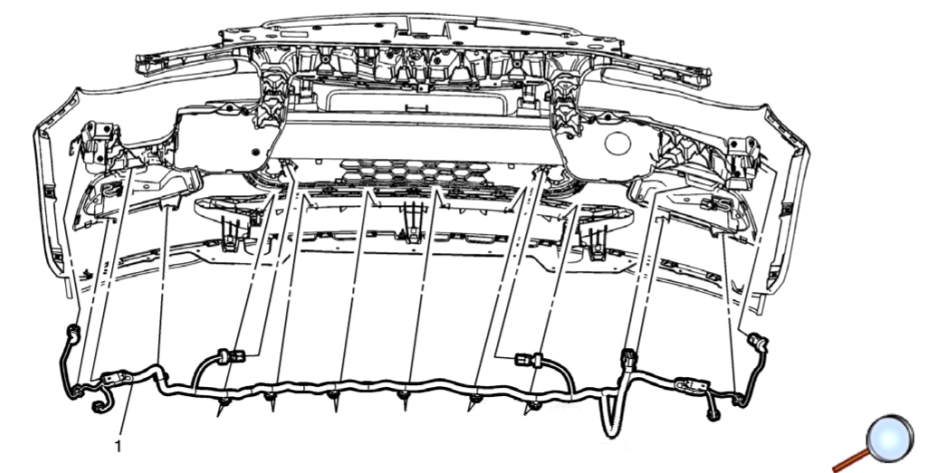
Front Object Alarm Sensor Wiring Harness Replacement  
(Short Wheelbase Evoke)



Front Object Alarm Sensor Wiring Harness Replacement

| Callout                                                                                                                     | Component Name                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                  |
| 1                                                                                                                           | Front Object Alarm Sensor Wiring Harness<br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the front object alarm sensor wiring harness electrical connectors from the front object sensors.</li><li>2. Using a suitable tool, disconnect the front object alarm sensor wiring harness from the front fascia.</li></ol> |

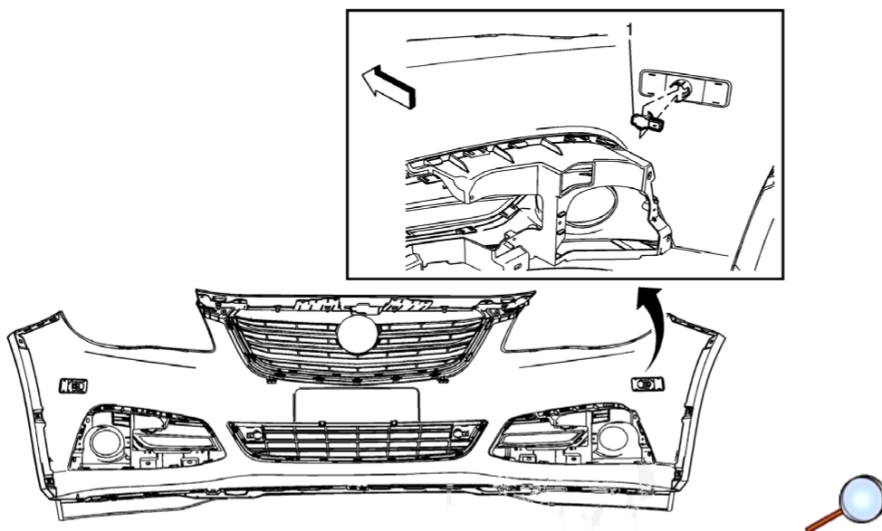
# Front Object Alarm Sensor Wiring Harness Replacement (Long Wheelbase)



Front Object Alarm Sensor Wiring Harness Replacement

| Callout                                                                                                                     | Component Name                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                         |
| 1                                                                                                                           | <b>Front Object Alarm Sensor Wiring Harness</b><br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the front object alarm sensor wiring harness electrical connectors from the front object sensors.</li><li>2. Using a suitable tool, disconnect the front object alarm sensor wiring harness from the front fascia.</li></ol> |

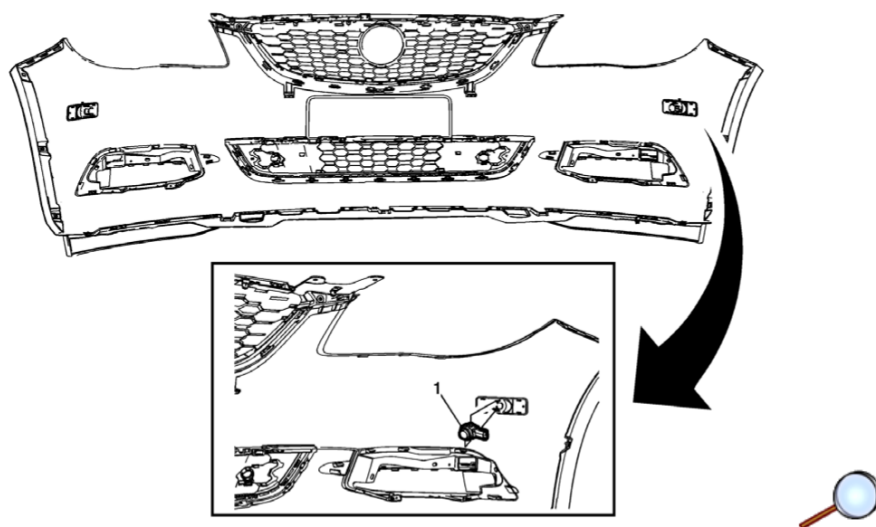
## Side Object Sensor Replacement (Short Wheelbase)



Side Object Sensor Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1                                                                                                                         | <p>Side Object Sensor Front</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the side object sensor electrical connector.</li><li>2. Release the locking tabs on the side object sensor .</li><li>3. The side 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.</li><li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

## Side Object Sensor Replacement (Sportwagon, Ute)

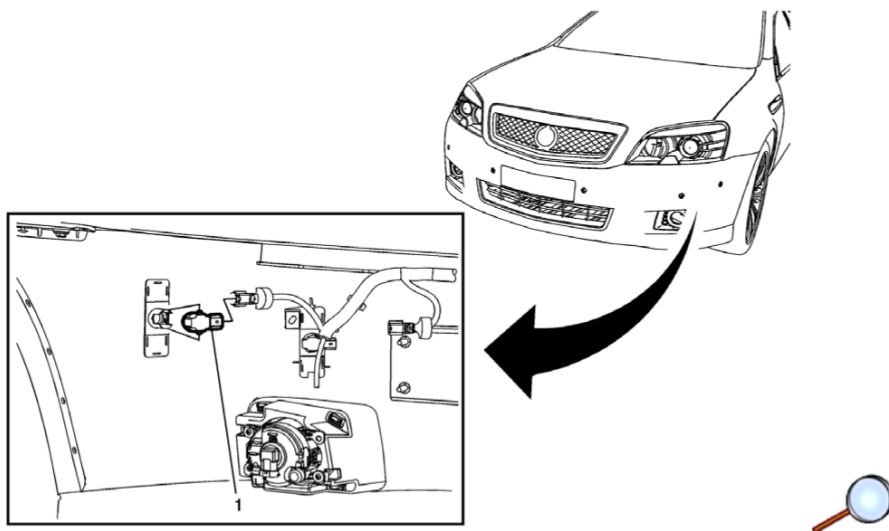


Side Object Sensor Replacement

| Callout                                                                                                                     | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to . <a href="#">Front Bumper Fascia Replacement</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1                                                                                                                           | <p>Side Object Sensor Front</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the side object sensor electrical connector.</li><li>2. Release the locking tabs on the side object sensor .</li><li>3. The side 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.</li><li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

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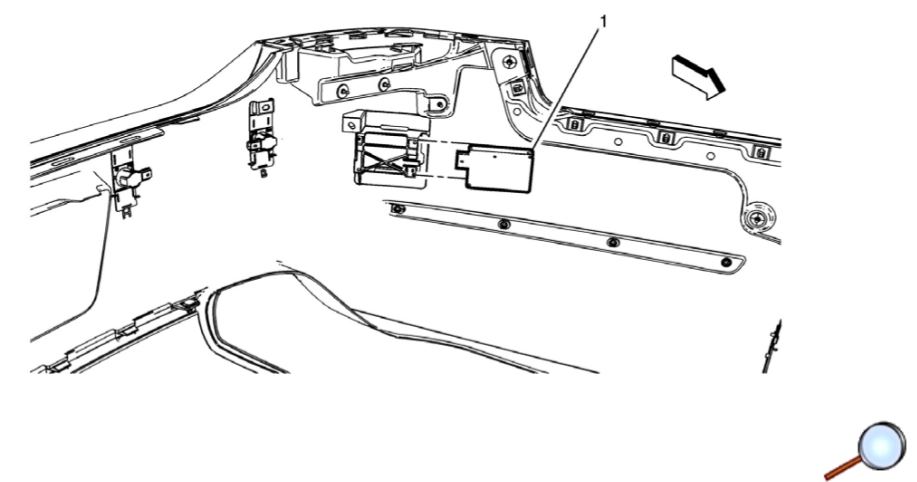
## Side Object Sensor Replacement (Long Wheelbase)



Side Object Sensor Replacement

| Callout                                                                                                                     | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front bumper fascia. Refer to . <a href="#">Front Bumper Fascia Replacement</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1                                                                                                                           | <p>Side Object Sensor Front</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the side object sensor electrical connector.</li><li>2. Release the locking tabs on the side object sensor .</li><li>3. The side 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.</li><li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

Side Object Sensing Alert Module Replacement

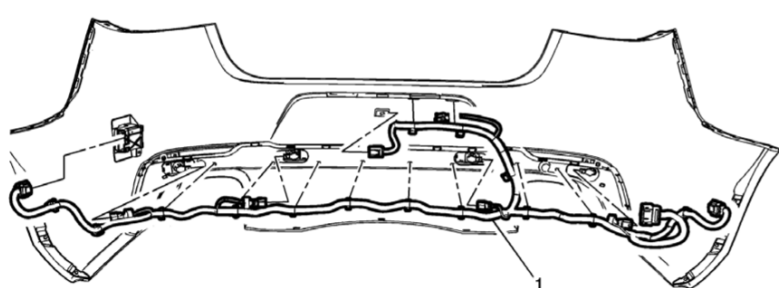


Side Object Sensing Alert Module Replacement

| Callout                                                                                                                  | Component Name                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                              |
| 1                                                                                                                        | Side Object Sensor Module<br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the electrical connector.</li><li>2. Slide the module out of the retaining bracket.</li><li>3. For programming and set up, refer to <a href="#">Control Module References</a></li></ol> |



# Rear Object Sensor Wiring Harness Replacement (Short Wheelbase)

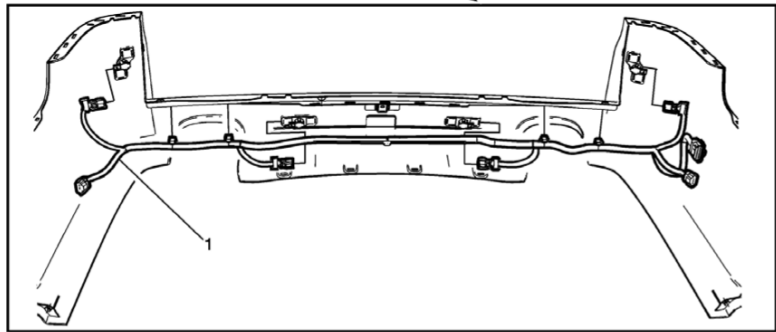
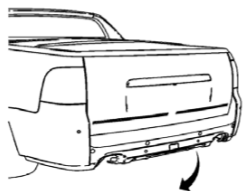


## Rear Object Sensor Wiring Harness Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1                                                                                                                         | <p>Rear Object Sensor Wiring Harness</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Place the bumper fascia face down on a clean protected surface.</li><li>2. Disconnect all electrical connections from the rear object alarm sensor wiring harness.</li><li>3. Using a suitable tool, disconnect the rear object alarm sensor wiring harness from the rear fascia.</li></ol> |

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## Rear Object Sensor Wiring Harness Replacement (Ute)

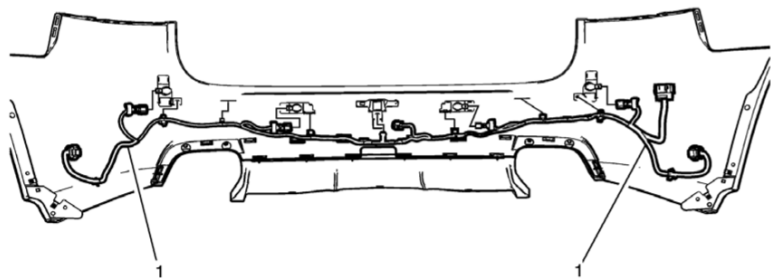


Rear Object Sensor Wiring Harness Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1                                                                                                                         | <p>Rear Object Sensor Wiring Harness</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Place the bumper fascia face down on a clean protected surface.</li><li>2. Disconnect all electrical connections from the rear object alarm sensor wiring harness.</li><li>3. Using a suitable tool, disconnect the rear object alarm sensor wiring harness from the rear fascia.</li></ol> |

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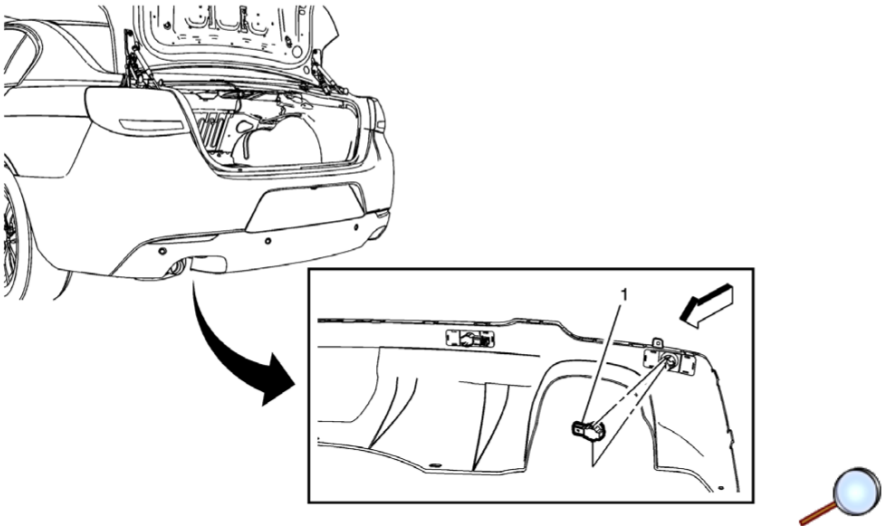
# Rear Object Sensor Wiring Harness Replacement (Sportwagon)



## Rear Object Sensor Wiring Harness Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1                                                                                                                         | <b>Rear Object Sensor Wiring Harness</b><br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Place the bumper fascia face down on a clean protected surface.</li><li>2. Disconnect all electrical connections from the rear object alarm sensor wiring harness.</li><li>3. Using a suitable tool, disconnect the rear object alarm sensor wiring harness from the rear fascia.</li></ol> |

# Rear Parking Assist Alarm Sensor Replacement (Short Wheelbase)

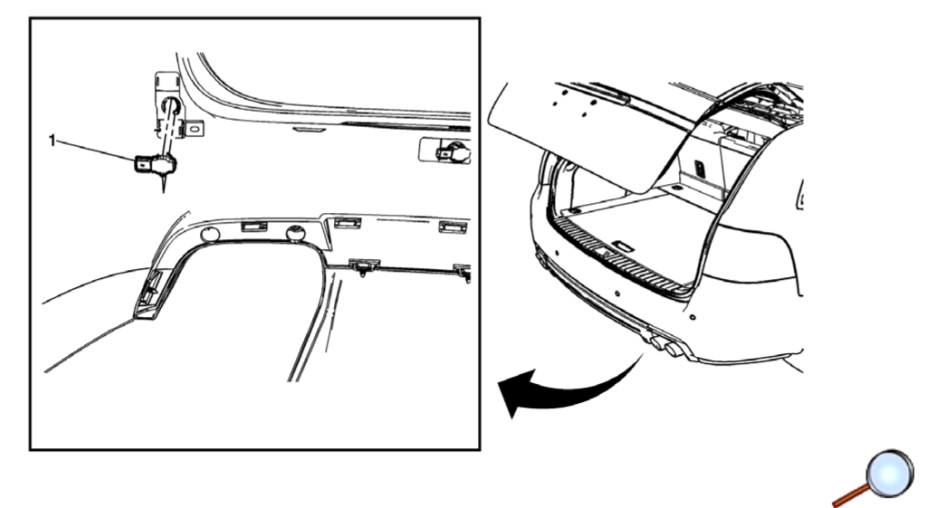


Rear Parking Assist Alarm Sensor Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1                                                                                                                         | <p>Rear Parking Assist Alarm Sensor</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the rear parking assist alarm sensor electrical connector.</li><li>2. Release the locking tabs on the rear parking assist alarm sensor .</li><li>3. The rear object sensor is a one piece design. Do NOT twist the sensor cap to try and remove the painted cap.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

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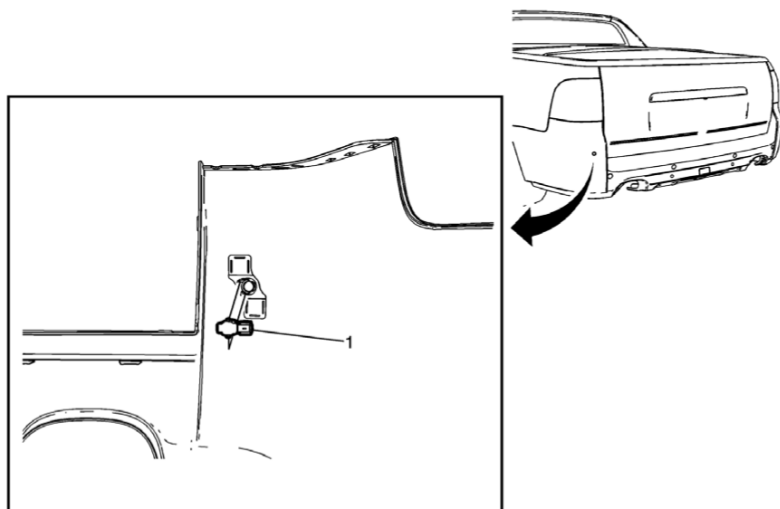
# Rear Parking Assist Alarm Sensor Replacement (Sportwagon)



Rear Parking Assist Alarm Sensor Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1                                                                                                                         | <p>Rear Parking Assist Alarm Sensor</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the rear parking assist alarm sensor electrical connector.</li><li>2. Release the locking tabs on the rear parking assist alarm sensor .</li><li>3. 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.</li><li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

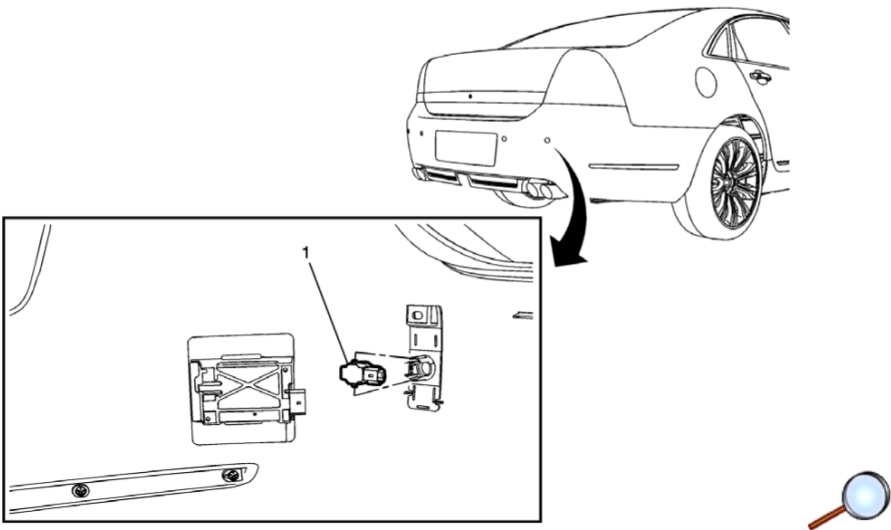
## Rear Parking Assist Alarm Sensor Replacement (Ute)



### Rear Parking Assist Alarm Sensor Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1                                                                                                                         | <p>Rear Parking Assist Alarm Sensor</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Disconnect the rear parking assist alarm sensor electrical connector.</li><li>2. Release the locking tabs on the rear parking assist alarm sensor .</li><li>3. 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.</li><li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li></ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

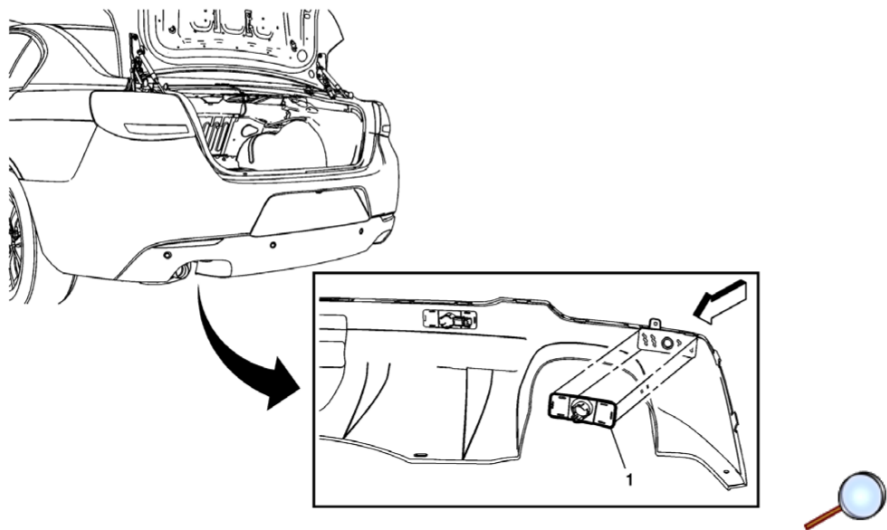
Rear Parking Assist Alarm Sensor Replacement (Long Wheelbase)



Rear Parking Assist Alarm Sensor Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1                                                                                                                         | Rear Parking Assist Alarm Sensor<br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. Disconnect the rear parking assist alarm sensor electrical connector.</li> <li>2. Release the locking tabs on the rear parking assist alarm sensor .</li> <li>3. 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.</li> <li>4. Ensure the paint does not exceed 6 mils. Use a paint thickness gauge suitable for non-ferrous metals.</li> </ol> <p><b>Note:</b> Ensure the silicone decoupling ring is installed on the sensor to avoid sensor failure.</p> |

# Rear Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Sedan)

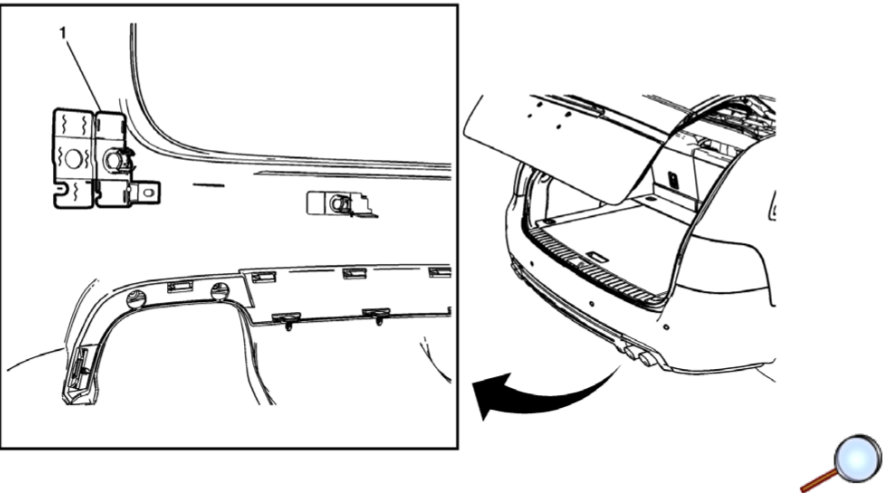


Rear Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                               | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>1. Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> .<br>2. Remove the rear parking assist alarm sensor. Refer to <a href="#">Rear Parking Assist Alarm Sensor Replacement</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1                                                                                                                                                                                                                                                     | <p>Rear Parking Assist Alarm Sensor Bracket</p> <p><b>Procedure</b></p> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.</li><li>2. Clean Surface with Prepsol and wipe down with a clean rag.</li><li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li><li>4. Apply structural adhesive epoxy, Loctite 435, to fascia at mating surface.</li><li>5. Using the alignment tabs, or scribe line (where applicable), install the sensor bracket to the fascia.</li><li>6. Apply pressure on the bracket for approximately. 20 seconds.</li><li>7. Allow adhesive to cure for 24 hours before moving fascia.</li></ol> |



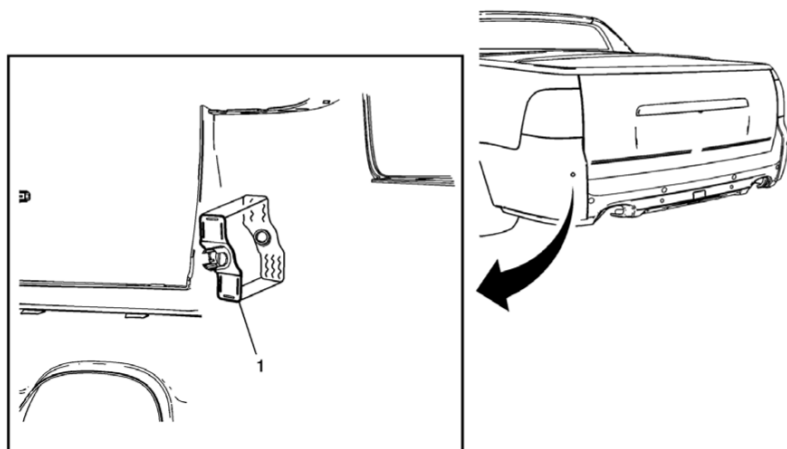
# Rear Parking Assist Alarm Sensor Bracket Replacement (Sportwagon)



Rear Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                               | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>1. Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> .<br>2. Remove the rear parking assist alarm sensor. Refer to <a href="#">Rear Parking Assist Alarm Sensor Replacement</a> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1                                                                                                                                                                                                                                                     | <p>Rear Parking Assist Alarm Sensor Bracket</p> <p><b>Procedure</b></p> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.</li><li>2. Clean Surface with Prepsol and wipe down with a clean rag.</li><li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li><li>4. Apply structural adhesive epoxy, Loctite 435, to fascia at mating surface.</li><li>5. Using the alignment tabs, or scribe line (where applicable) install the sensor bracket to the fascia.</li><li>6. Apply pressure on the bracket for approximately 20 seconds.</li><li>7. Allow adhesive to cure for 24 hours before moving fascia.</li></ol> |

## Rear Parking Assist Alarm Sensor Bracket Replacement (Ute)

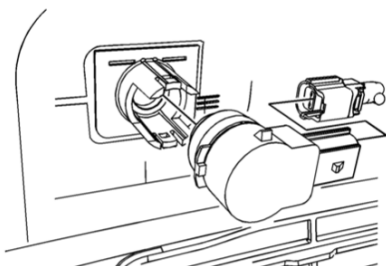


### Rear Parking Assist Alarm Sensor Bracket Replacement

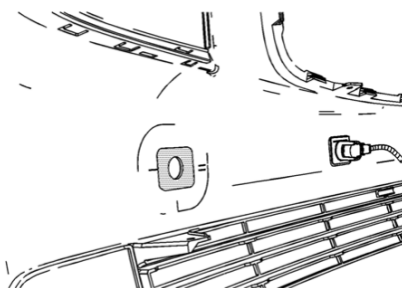
| Callout                                                                                                                                                                                                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a>.</li> <li>2. Remove the rear parking assist alarm sensor. Refer to <a href="#">Rear Parking Assist Alarm Sensor Replacement</a></li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1                                                                                                                                                                                                                                                                                                         | Rear Parking Assist Alarm Sensor Bracket<br><b>Procedure</b> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"> <li>1. Sand/grind sonic weld plastic residue from the fascia.</li> <li>2. Clean Surface with Prepsol and wipe down with a clean rag.</li> <li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li> <li>4. Apply structural adhesive epoxy, Loctite 435, to fascia at the mating surface.</li> <li>5. Using the alignment tabs, or scribe line (where applicable), install the sensor bracket to the fascia.</li> <li>6. Please apply pressure on the bracket for approximately 20 seconds.</li> <li>7. Allow adhesive to cure for 24 hours before moving the fascia.</li> </ol> |

## Rear Parking Assist Alarm Sensor Bracket Replacement

1. Remove the rear fascia. Refer to [Rear Bumper Fascia Replacement](#).



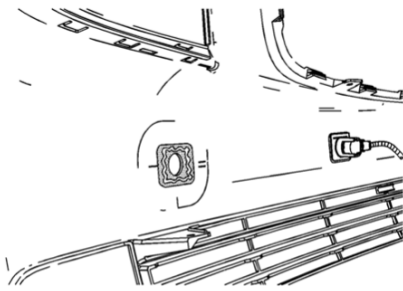
2. Disconnect the sensor harness.
3. Remove the sensor from the sensor bracket.  
The sensor bracket must be painted if replaced. If reinstalled, painting will not be necessary.



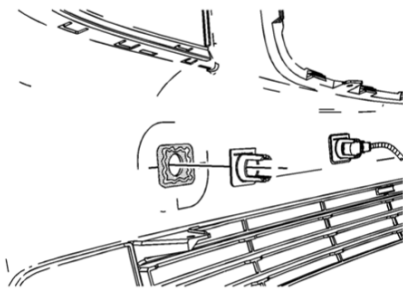
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**Note:** Do Not grind off alignment tabs.

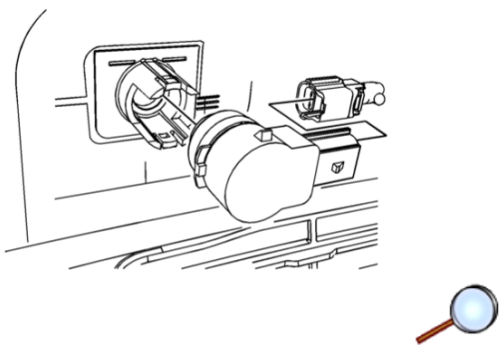
4. Sand/grind sonic weld plastic residue from the fascia.



5. Clean surface with Presol and wipe down with a clean towel.
6. Spray on Loctite 770, (Polyolefin primer around the surface), ensure full coverage of area to be glued.
7. Apply structural adhesive epoxy, Loctite 435, to fascia at mating surface.

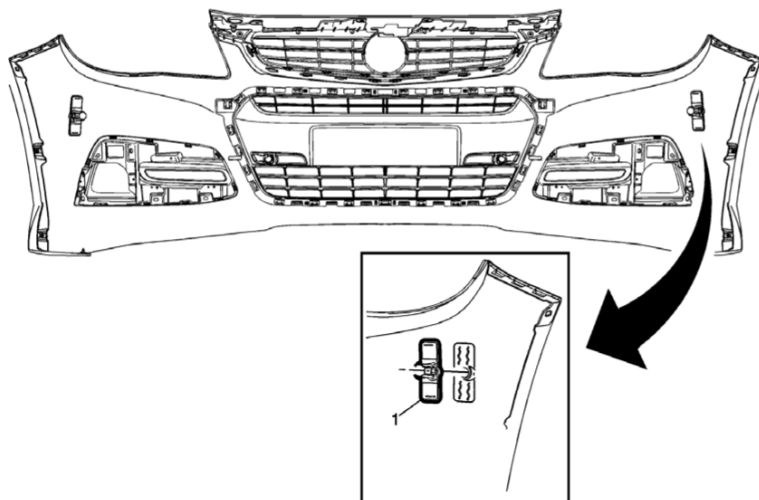


8. Using the alignment tabs or scribe line (where applicable), install the sensor bracket to the fascia.
9. Apply pressure on bracket for approximately 20 seconds.
10. Allow adhesive to cure for 24 hours before moving fascia.



11. Install the sensor to the sensor bracket.
12. Connect the electrical harness.
13. Install the rear fascia. Refer to [Rear Bumper Fascia Replacement](#).

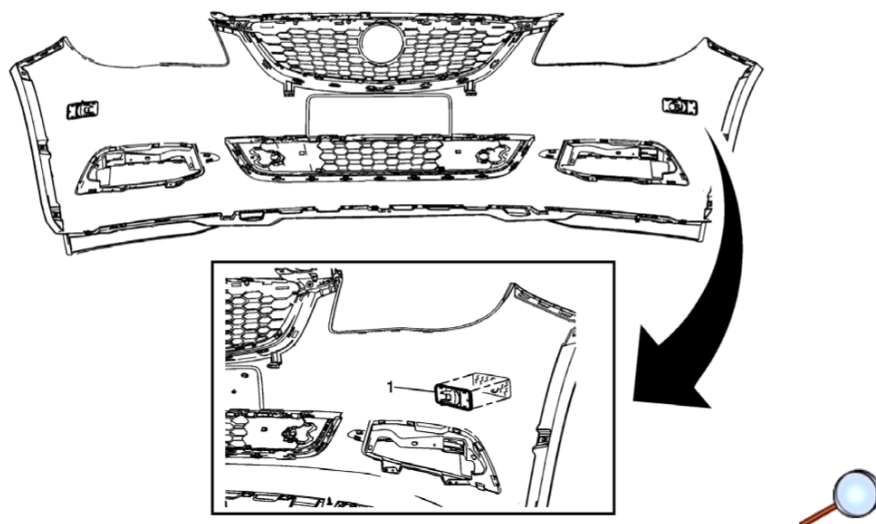
## Front Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Fascia)



Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                                                                | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a>.</li> <li>2. Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a>.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1                                                                                                                                                                                                                                                                                                      | Front Parking Assist Alarm Sensor Bracket<br><b>Procedure</b> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"> <li>1. Sand/grind sonic weld plastic residue from the fascia.</li> <li>2. Clean Surface with Prepsol and wipe down with a clean towel.</li> <li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li> <li>4. Apply structural adhesive epoxy, Loctite 435, to fascia at mating the surface.</li> <li>5. Using the alignment tabs or scribe line (where applicable), install the sensor bracket to the fascia.</li> <li>6. Apply pressure on the bracket for approximately 20 seconds.</li> <li>7. Allow adhesive to cure for 24 hours before moving the fascia.</li> </ol> |

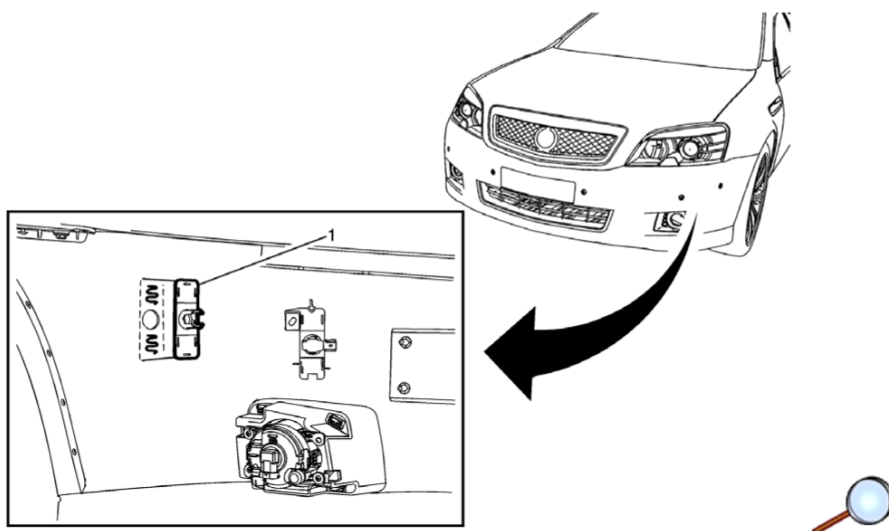
## Front Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Evoke)



Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                                                                | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a>.</li> <li>2. Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a>.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1                                                                                                                                                                                                                                                                                                      | Front Parking Assist Alarm Sensor Bracket<br><b>Procedure</b> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"> <li>1. Sand/grind sonic weld plastic residue from the fascia.</li> <li>2. Clean Surface with Prepsol and wipe down with a clean towel.</li> <li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li> <li>4. Apply structural adhesive epoxy, Loctite 435 to the fascia at the mating surface.</li> <li>5. Using the alignment tabs or scribe line (where applicable) install the sensor bracket to the fascia.</li> <li>6. Apply pressure on the bracket for approximately 20 seconds.</li> <li>7. Allow adhesive to cure for 24 hours before moving the fascia.</li> </ol> |

## Front Parking Assist Alarm Sensor Bracket Replacement (Long Wheelbase)

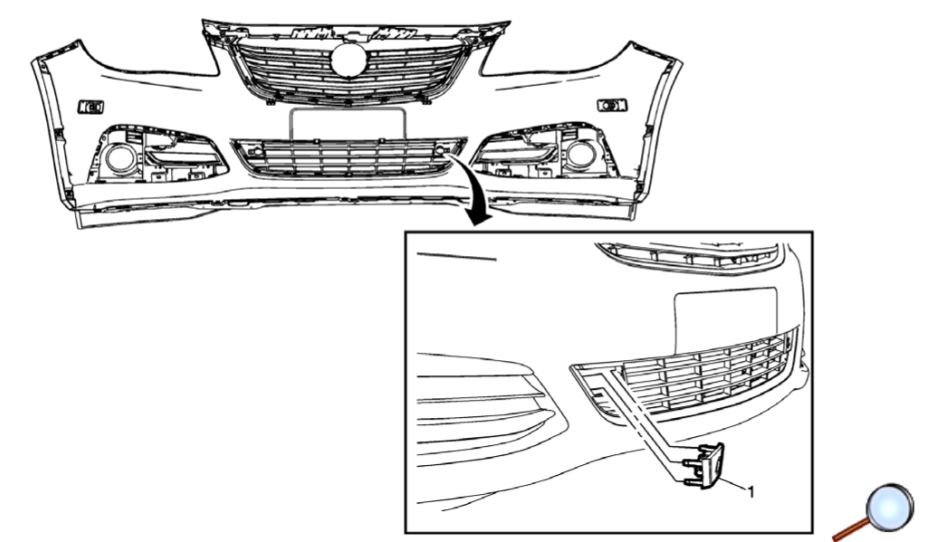


Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                                                             | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"><li>1. Remove the front bumper fascia. Refer to <a href="#">Front Bumper Fascia Replacement</a>.</li><li>2. Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a>.</li></ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1                                                                                                                                                                                                                                                                                                   | <p>Front Parking Assist Alarm Sensor Bracket</p> <p><b>Procedure</b></p> <p><b>Note:</b> Do Not grind off alignment tabs.</p> <ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.</li><li>2. Clean Surface with Prepsol and wipe down with a clean towel.</li><li>3. Spray on Loctite 770, (Polyolefin primer around surface), ensure full coverage of area to be glued.</li><li>4. Apply structural adhesive epoxy, Loctite 435, to the fascia at the mating surface.</li><li>5. Using the alignment tabs or scribe line (where applicable), install the sensor bracket to the fascia.</li><li>6. Apply pressure on the bracket for approximately 20 seconds.</li><li>7. Allow adhesive to cure for 24 hours before moving the fascia.</li></ol> |



# Front Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Lower Grille)

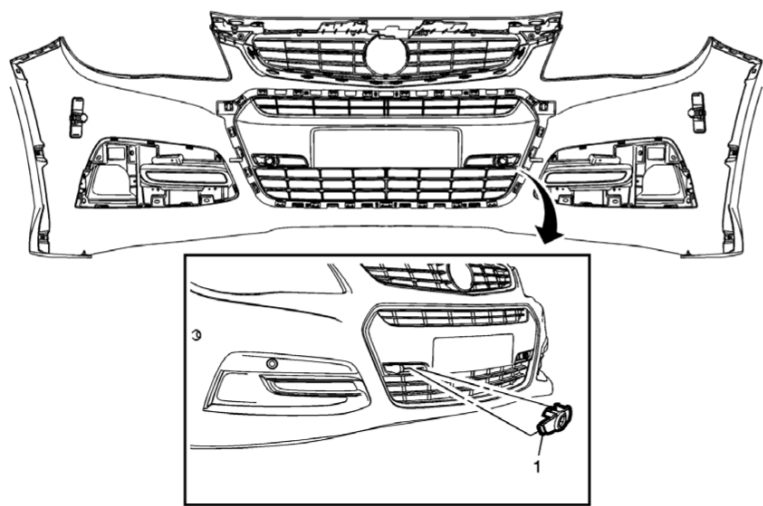


Front Parking Assist Alarm Sensor Bracket Replacement

| Callout | Component Name                                                                                                                                                                                                        |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Front Parking Assist Alarm Sensor Bracket Grill<br><b>Procedure</b><br>1. Using a trim tool, release the four retainer tabs.<br>2. Disconnect the electrical connector.<br>3. Remove the front parking assist sensor. |

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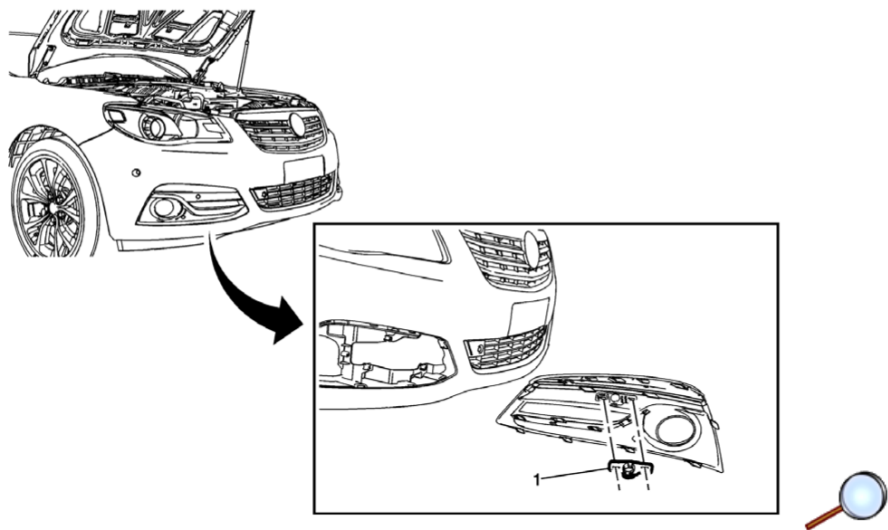
# Front Parking Assist Alarm Sensor Bracket Replacement (Ute, Sportwagon, Grille)



Front Parking Assist Alarm Sensor Bracket Replacement

| Callout | Component Name                                                                                                                                                                                                                                                                                                                                   |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Front Parking Assist Alarm Sensor Bracket Grill</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"><li>1. Using a trim tool, release the retainer tab on the right side and pivot the bracket out away from the grill</li><li>2. Disconnect the electrical connector.</li><li>3. Remove the front parking assist sensor.</li></ol> |

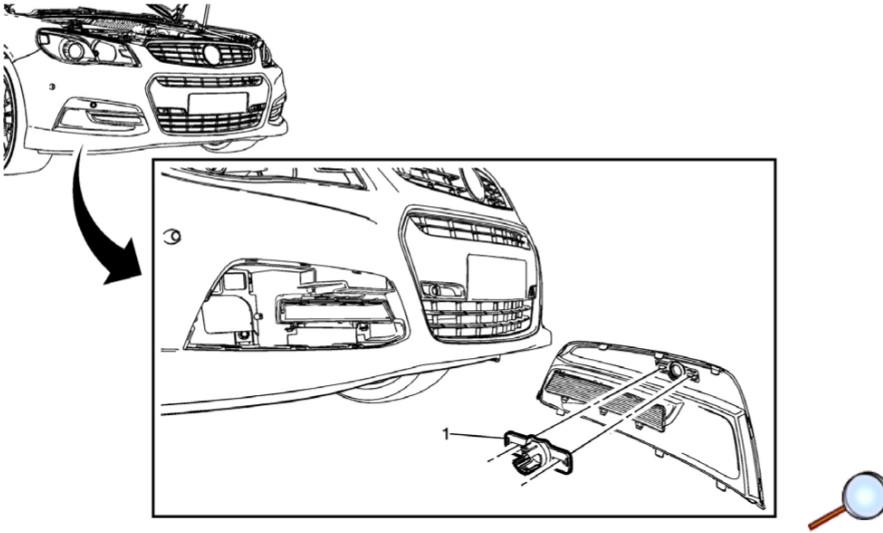
# Front Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Fog Lamp Cover)



## Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                         | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front fog lamp opening cover. Refer to <a href="#">Front Fog Lamp Opening Cover Replacement</a> .<br>Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1                                                                                                                                                                                                                                                               | Front Parking Assist Alarm Sensor Bracket<br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.<br/><b>Note:</b> Do Not grind off alignment tabs.</li><li>2. Apply structural adhesive epoxy, Lord Fusor™ 127EZ or local equivalent, to fascia at mating surface.</li><li>3. Using the alignment tabs, install the sensor bracket to the fascia.</li><li>4. Allow adhesive to cure according to manufacturer's directions.</li></ol> |

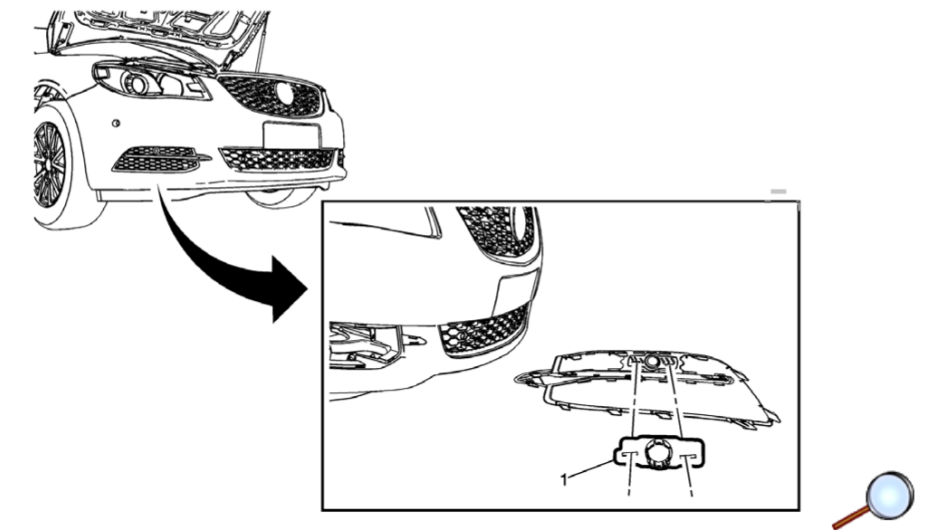
## Front Parking Assist Alarm Sensor Bracket Replacement (Ute, Sportwagon, Fog Lamp Cover)



Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                         | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front fog lamp opening cover. Refer to <a href="#">Front Fog Lamp Opening Cover Replacement</a> .<br>Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 1                                                                                                                                                                                                                                                               | <b>Front Parking Assist Alarm Sensor Bracket</b><br><b>Procedure</b> <ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.<br/><b>Note:</b> Do Not grind off alignment tabs.</li><li>2. Apply structural adhesive epoxy, Lord Fusor™ 127EZ or local equivalent, to fascia at mating surface.</li><li>3. Using the alignment tabs, install the sensor bracket to the fascia.</li><li>4. Allow adhesive to cure according to manufacturer's directions.</li></ol> |

# Front Parking Assist Alarm Sensor Bracket Replacement (Short Wheelbase Evoke, Fog Lamp Cover)

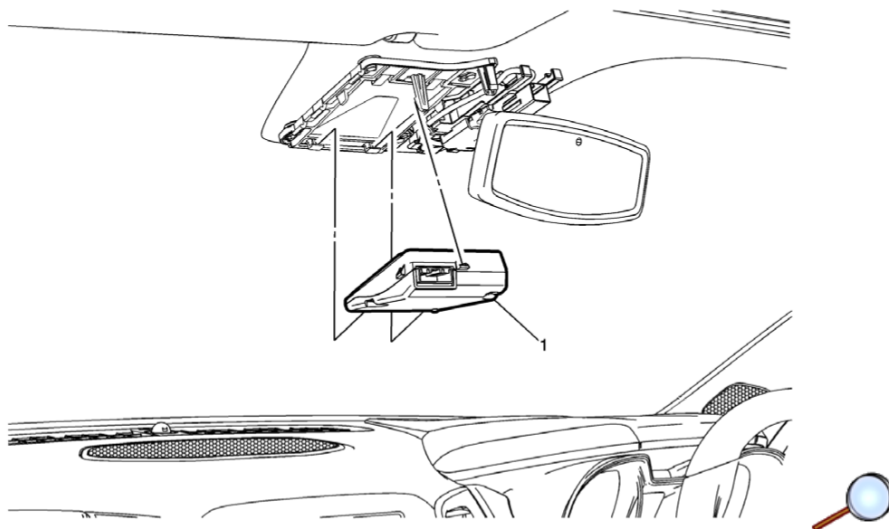


Front Parking Assist Alarm Sensor Bracket Replacement

| Callout                                                                                                                                                                                                                                                         | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the front fog lamp opening cover. Refer to <a href="#">Front Fog Lamp Opening Cover Replacement</a> .<br>Remove the front parking assist alarm sensor. Refer to <a href="#">Front Object Alarm Sensor Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1                                                                                                                                                                                                                                                               | Front Parking Assist Alarm Sensor Bracket<br><b>Procedure</b><br><ol style="list-style-type: none"><li>1. Sand/grind sonic weld plastic residue from the fascia.<br/><b>Note:</b> Do Not grind off alignment tabs.</li><li>2. Apply structural adhesive epoxy, Lord Fusor™ 127EZ or local equivalent, to fascia at mating surface.</li><li>3. Using the alignment tabs, install the sensor bracket to the fascia.</li><li>4. Allow adhesive to cure according to manufacturer's directions.</li></ol> |

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## Front View Camera Replacement

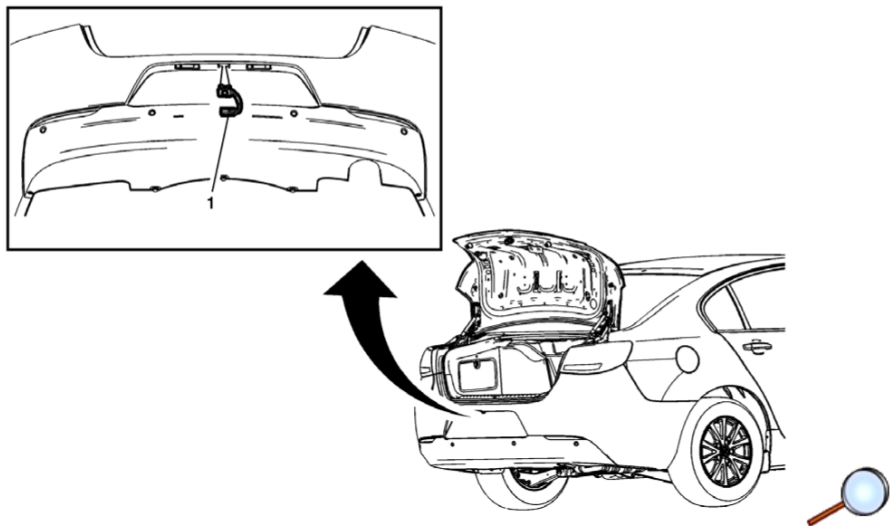


Front View Camera Replacement

| Callout                                                                                                                                                                                      | Component Name                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the windshield multifunction sensor mounting bracket cover Refer to <a href="#">Windshield Multifunction Sensor Mount Bracket Cover Replacement</a> . |                                                                                                                                                                                                                                                                                                                                                         |
| 1                                                                                                                                                                                            | Front View Camera<br><b>Procedure</b> <ol style="list-style-type: none"><li>1. Gently depress top center tab on bracket to release camera.</li><li>2. Disconnect the electrical connector.</li><li>3. Program and calibrate the front view camera. For programming and set up, refer to <a href="#">Front View Camera Module Calibration</a>.</li></ol> |

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# Rearview Driver Information Camera Replacement (Short Wheelbase)

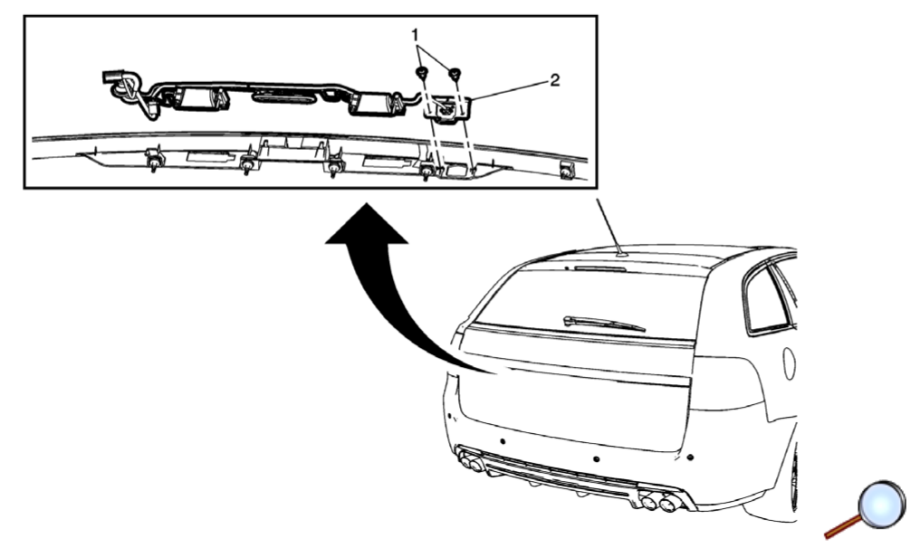


Rearview Driver Information Camera Replacement

| Callout                                                                                                                  | Component Name                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear bumper fascia. Refer to <a href="#">Rear Bumper Fascia Replacement</a> . |                                                                                                                                                                               |
| 1                                                                                                                        | Rearview Camera<br><b>Procedure</b><br>1. Disconnect the electrical connector.<br>2. Depress the clip fingers and push outward to remove the rearview camera from the fascia. |

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Rearview Driver Information Camera Replacement (SS Sportwagon)

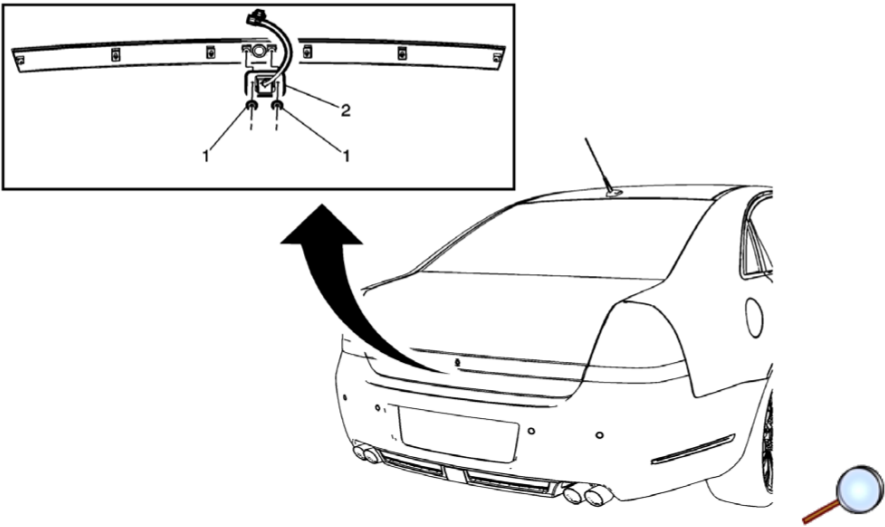


Rearview Driver Information Camera Replacement

| Callout                                                                                                                | Component Name                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the liftgate applique. Refer to <a href="#">Liftgate Applique Replacement</a> . |                                                                                                                 |
| 1                                                                                                                      | Rearview Driver Information Camera Bolts (Qty 2)<br><b>Caution:</b> Refer to <a href="#">Fastener Caution</a> . |
| 2                                                                                                                      | Rearview Driver Information Camera<br><b>Procedure</b><br>1. Disconnect the electrical connector.               |



# Rearview Driver Information Camera Replacement (Long Wheelbase)

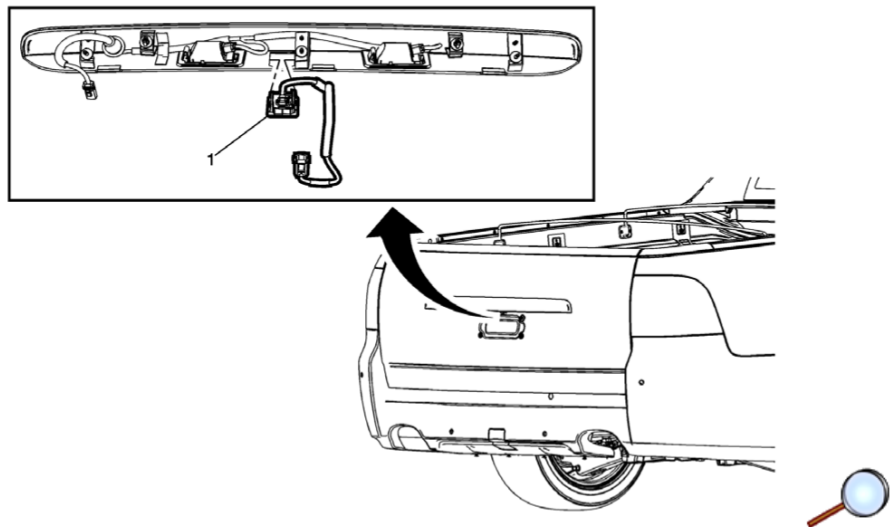


Rearview Driver Information Camera Replacement

| Callout                                                                                                                                      | Component Name                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear closure center applique. Refer to <a href="#">Rear Closure Center Applique Replacement</a> . |                                                                                                                 |
| 1                                                                                                                                            | Rearview Driver Information Camera Screw (Qty 2)<br><b>Caution:</b> Refer to <a href="#">Fastener Caution</a> . |
| 2                                                                                                                                            | Rearview Driver Information Camera<br><b>Procedure</b><br>1. Disconnect the electrical connector.               |

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## Rearview Driver Information Camera Replacement (Ute)

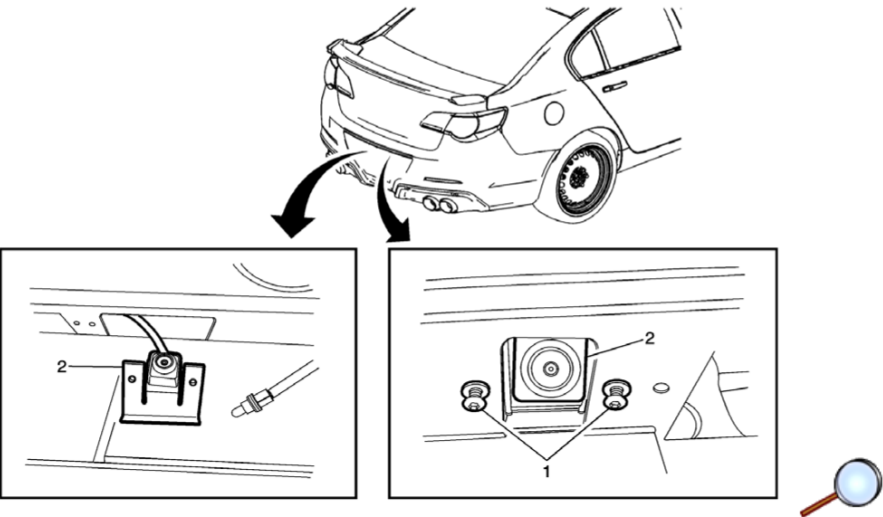


### Rearview Driver Information Camera Replacement

| Callout                                                                                                                   | Component Name                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear endgate applique. Refer to <a href="#">Endgate Applique Replacement</a> . |                                                                                                                                                                                                                                                      |
| 1                                                                                                                         | <b>Rearview Driver Information Camera Procedure</b><br><ol style="list-style-type: none"><li>1. Disconnect the electrical connector.</li><li>2. Depress the clip fingers and push outward to remove the rearview camera from the applique.</li></ol> |

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# Rearview Driver Information Camera Replacement (Short Wheelbase Sedan HSV)



Rearview Driver Information Camera Replacement

| Callout                                                                                                                          | Component Name                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the rear license plate lamp. Refer to <a href="#">Rear License Plate Lamp Replacement</a> |                                                                                                                                                                                            |
| 1                                                                                                                                | Rearview Driver Information Camera Bolt (Qty: 2)<br><b>Caution:</b> Refer to <a href="#">Fastener Caution</a> .<br><b>Tighten</b><br>2.5 N·m (22 lb in)                                    |
| 2                                                                                                                                | Rearview Driver Information Camera<br><b>Procedure</b><br>1. Remove the rearview driver information camera through the license plate lamp hole.<br>2. Disconnect the electrical connector. |

## Front View Camera Module Calibration

The calibration procedure will start automatically after SPS programming is complete. If calibration does not start automatically or if manual initialization is desired, calibration can be initiated by selecting Frontview Camera Learn in the scantool. During this time the Lane Departure Warning amber indicator will illuminate.

### Calibration

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 shall not be 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.).

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](#).

## Object Detection Schematics

**Figure 1:** [Power, Ground, Serial Data, Alarm, Rear Sensors and Controls](#)

**Figure 2:** [Front Sensors](#)

**Figure 3:** [Side Object Sensors \(RHD\)](#)

**Figure 4:** [Side Object Sensors \(LHD\)](#)

**Figure 5:** [Forward Collision \(UEU\) and Lane Departure \(UFL\)](#)

**Figure 6:** [Rearview Camera \(F19/F69 with UVC\)](#)

**Figure 7:** [Rearview Camera \(F35/F80 with UVC\)](#)

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