

2013 ACCESSORIES & EQUIPMENT

Object Detection - Cruze

SCHEMATIC WIRING DIAGRAMS

OBJECT DETECTION WIRING SCHEMATICS

UD7 Wiring Schematics

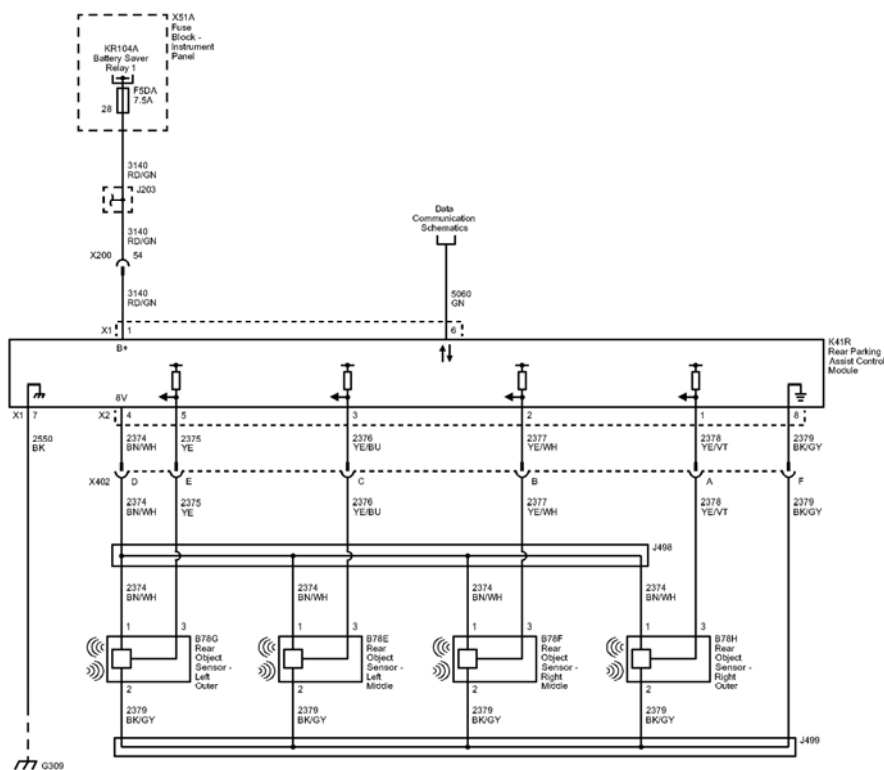


Fig. 1: Object Detection (UD7) Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
CAV_28	28
3140	Battery Positive Voltage
3140 RD/GN	3140 RD/GN
CAV_1	1
CONN_X1	X1
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
CAV_54	54

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5060	Low Speed GMLAN Serial Data
5060_GN	5060 GN
CAV 6	6
2550	Ground
2550_BK	2550 BK
CAV_7	7
CONN_X1	X1
2374	Object Sensor Supply Voltage
2374_BN/WH	2374 BN/WH
CAV 1	1
CAV_4	4
CONN X2	X2
2374_BN/WH	2374 BN/WH
2374_BN/WH	2374 BN/WH
2375	Left Rear Corner Object Sensor Signal
2375_YE	2375 YE
CAV 3	3
CAV_5	5
2375 YE	2375 YE
2376	Left Rear Middle Object Sensor Signal
2376_YE/BU	2376 YE/BU
CAV 3	3
2376_YE/BU	2376 YE/BU
2374 BN/WH	2374 BN/WH
CAV_1	1
2379	Object Sensor Low Reference
2379_BK/GY	2379 BK/GY
CAV_2	2
2379_BK/GY	2379 BK/GY
CAV_2	2
2379_BK/GY	2379 BK/GY
CAV_2	2
2379_BK/GY	2379 BK/GY
CAV_2	2
2374_BN/WH	2374 BN/WH
CAV_1	1
2374_BN/WH	2374 BN/WH
CAV_1	1

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2377	Right Rear Middle Object Sensor Signal
2377_YE/WH	2377 YE/WH
CAV_3	3
CAV_2	2
2377_YE/WH	2377 YE/WH
2378	Right Rear Corner Object Sensor Signal
2378_YE/VT	2378 YE/VT
2378_YE/VT	2378 YE/VT
CAV_3	3
CAV_1	1
2379_BK/GY	2379 BK/GY
CAV_8	8
2379_BK/GY	2379 BK/GY
CAV_3	3
X402	X402
CAV_D	D
CAV_E	E
CAV_C	C
CAV_B	B
CAV_A	A
CAV_F	F
F5DA	F5DA 7.5A
X200	X200
J499	J499
X402	X402
B78G	(UD7)
B78H	(UD7)
B78E	(UD7)
B78F	(UD7)
Data_Communication_Schematics_REF	Data Communication Schematics
X51A	
K41R	(UD7)
KR104A	

Rear View Camera (UVC) Wiring Schematics

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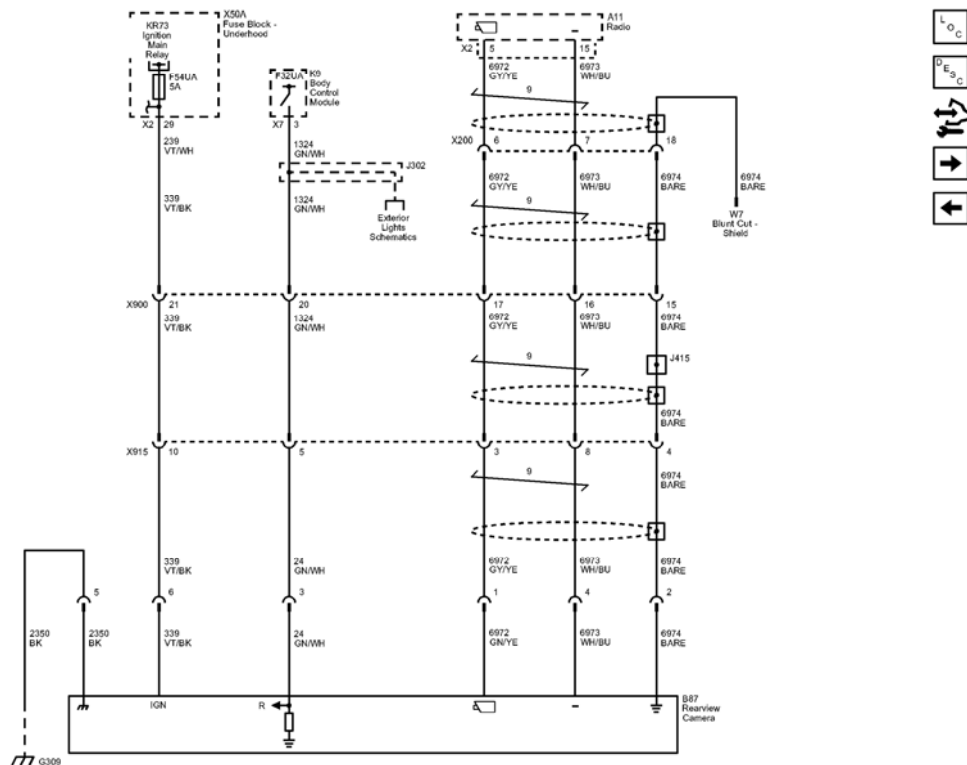


Fig. 2: Rear View Camera (UVC) Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
239	Run/Crank Ignition 1 Voltage
239 VT/WH	239 VT/WH
CAV_29	29
CONN_X2	X2
339	Run/Crank Ignition 1 Voltage
339_VT/BK	339 VT/BK
1324	Backup Lamp Supply Voltage
1324_GN/WH	1324 GN/WH
CAV_3	3
CONN_X7	X7
24	Backup Lamp Supply Voltage
24_GN/WH	24 GN/WH
339_VT/BK	339 VT/BK
1324_GN/WH	1324 GN/WH
339_VT/BK	339 VT/BK
339_VT/BK	339 VT/BK
24_GN/WH	24 GN/WH

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6972	Camera Signal #2 +
6972_GN/YE	6972 GN/YE
6972_GY/YE	6972 GY/YE
CAV_5	5
CONN_X2	X2
1324_GN/WH	1324 GN/WH
6973	Camera Signal #2
6973_WH/BU	6973 WH/BU
CAV_15	15
6972_GY/YE	6972 GY/YE
6973_WH/BU	6973 WH/BU
6973_WH/BU	6973 WH/BU
6974	Camera Drain Wire
6974_BARE	6974 BARE
6974_BARE	6974 BARE
6974_BARE	6974 BARE
2350	Ground
2350_BK	2350 BK
2350_BK	2350 BK
CAV_5	5
CAV_6	6
CAV_3	3
CAV_1	1
CAV_4	4
CAV_2	2
6972_GY/YE	6972 GY/YE
6973_WH/BU	6973 WH/BU
6974_BARE	6974 BARE
6974_BARE	6974 BARE
6972_GY/YE	6972 GY/YE
6973_WH/BU	6973 WH/BU
6974_BARE	6974 BARE
6974_BARE	6974 BARE
X900	X900
CAV_21	21
CAV_20	20
CAV_17	17
CAV_16	16
CAV_15	15
X915	X915
CAV_10	10

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	5
CAV_3	3
CAV_8	8
CAV_4	4
X200	X200
CAV_6	6
CAV_7	7
CAV_18	18
G309	G309
F54UA	F54UA 5A
F32UA	F32UA
J302	J302
TWIST_9	9
TWIST_9	9
TWIST_9	9
TWIST_9	9
X900	X900
X915	X915
X200	X200
K9	
B87	(UVC)
Exterior_Lights_Schematics_REF	Exterior Lights Schematics
X50A	
W7	
KR73	
A11	

Side Blind Zone Alert (UFT) Wiring Schematics

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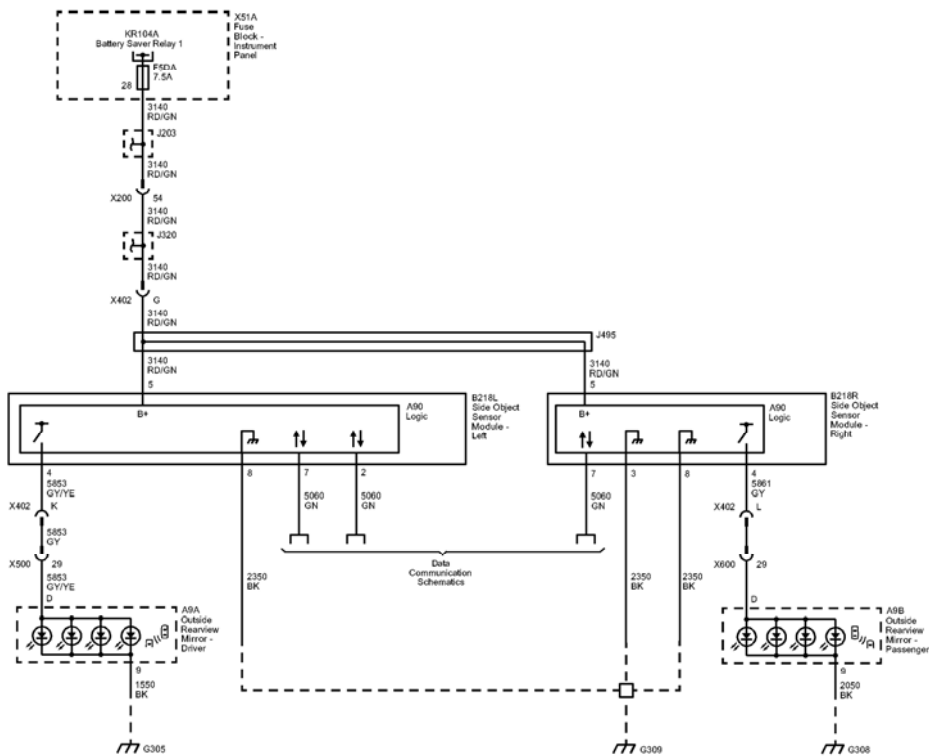


Fig. 3: Side Blind Zone Alert (UFT) Wiring Schematics
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
3140	Battery Positive Voltage
3140 RD/GN	3140 RD/GN
CAV_5	5
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
3140_RD/GN	3140 RD/GN
CAV_28	28
CAV_54	54
CAV_G	G
3140_RD/GN	3140 RD/GN
CAV_5	5
5853	Driver Side Object Detection LED Signal (1)
5853_GY/YE	5853 GY/YE
CAV_4	4

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5853_GY	5853 GY
5853_GY/YE	5853 GY/YE
CAV_D	D
CAV_K	K
CAV_29	29
1550	Ground
1550_BK	1550 BK
CAV_9	9
2350	Ground
2350_BK	2350 BK
CAV_8	8
CAV_8	8
2350 BK	2350 BK
CAV_3	3
2350_BK	2350 BK
2050	Ground
2050_BK	2050 BK
CAV_9	9
5060	Low Speed GMLAN Serial Data
5060 GN	5060 GN
CAV_7	7
5060_GN	5060 GN
CAV_2	2
5060_GN	5060 GN
CAV_7	7
5861	Passenger Side Object Detection LED Signal (1)
5861 GY	5861 GY
CAV_D	D
CAV_4	4
CAV_L	L
CAV_29	29
G309	G309
F5DA	F5DA 7.5A
X200	X200
X402	X402
J495	J495
X402	X402
X500	X500
X402	X402

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X600	X600
A9A	
A9B	
A90	Logic
A90	Logic
B218L	
B218R	
Data_Communication_Schematics_REF	Data Communication Schematics
X51A	
KR104A	

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC B094B or B094C</u>	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
<u>DTC B094D or B094E</u>	DTC B094D 01 Left Side Object Detection Indicator Circuit Short to Battery
	DTC B094D 02 Left Side Object Detection Indicator Circuit Short to Ground
	DTC B094E 01 Right Side Object Detection Indicator Circuit Short to Battery
	DTC B094E 02 Right Side Object Detection

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	Indicator Circuit Short to Ground
<u>DTC B0958, B0959, B0960, or B0961</u>	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
	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
<u>DTC B0967 or B0968</u>	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

<u>DTC B1015</u>	DTC B1015 00 Vehicle Identification Number Information Malfunction
<u>DTC B1405</u>	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

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

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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

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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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**
 1. Program the appropriate B218 Side Object Sensor Module.
 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
 - 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.

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- 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 01

Left Side Object Detection Indicator Circuit Short to Battery

DTC B094D 02

Left Side Object Detection Indicator Circuit Short to Ground

DTC B094E 01

Right Side Object Detection Indicator Circuit Short to Battery

DTC B094E 02

Right Side Object Detection Indicator Circuit Short to Ground

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 01	-
Right Side Object Detection Indicator Control	B094E 02	-	B094E 01	-

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Circuit				
Circuit/System Description Two Side Object Sensor Modules are located on each side of the vehicle near the corners of the rear fascia. The modules are provided with B+ and ground. The Side Object Sensor Module - Right has an additional ground to distinguish it from the Side Object Sensor Module - Left. The Side Object Sensor Module - Left is connected to the serial data line. The serial data line is passed through the module to the Side Object Sensor Module - Right. When vehicle speed is greater than 10 km/h (6.2 MPH) and either Side Object Sensor Module detects an object in the detection area, the module provides a signal to the appropriate Outside Rearview Mirror to illuminate the amber telltale LED. 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 outside rearview mirror - driver circuit. B094D 01 The module has detected a short to voltage in the outside rearview mirror - driver circuit. B094E 02 The module has detected a short to ground in the outside rearview mirror - passenger circuit. B094E 01 The module has detected a short to voltage in the outside rearview mirror - passenger circuit. Action Taken When the DTC Sets The side blind zone alert system is inoperative and Service Blind Zone Alert 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				

Circuit/System Description

Two Side Object Sensor Modules are located on each side of the vehicle near the corners of the rear fascia. The modules are provided with B+ and ground. The Side Object Sensor Module - Right has an additional ground to distinguish it from the Side Object Sensor Module - Left. The Side Object Sensor Module - Left is connected to the serial data line. The serial data line is passed through the module to the Side Object Sensor Module - Right.

When vehicle speed is greater than 10 km/h (6.2 MPH) and either Side Object Sensor Module detects an object in the detection area, the module provides a signal to the appropriate Outside Rearview Mirror to illuminate the amber telltale LED.

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 outside rearview mirror - driver circuit.

B094D 01

The module has detected a short to voltage in the outside rearview mirror - driver circuit.

B094E 02

The module has detected a short to ground in the outside rearview mirror - passenger circuit.

B094E 01

The module has detected a short to voltage in the outside rearview mirror - passenger circuit.

Action Taken When the DTC Sets

The side blind zone alert system is inoperative and Service Blind Zone Alert 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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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 right side object sensor.
 - **If the scan tool can not communicate with the right side object sensor**
3. 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 below - Right Side Object Sensor Malfunction.

- **If the scan tool can communicate with the right side object sensor**

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

- **If the scan tool can communicate with the left 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 when ignition is initially turned ON.
 - **If both side blind zone alert indicators do not briefly turn ON and OFF**

The system may have been disabled, refer to Diagnostic Aids. If system has not been disabled refer to Circuit/System Testing below - Side Object Indicator Malfunction.

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

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

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

6. All OK.

Circuit/System Testing

Right Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down. Disconnect the harness connector at the B218R Side Object Sensor Module - Right.
2. Test for less than 10 ohms between the following ground circuit terminals and ground.
 - Terminal 3
 - Terminal 8
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition Off.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B218R Side Object Sensor Module - Right.
 - **If the test lamp illuminates**
4. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 2 ohms in each of the serial data circuits end to end between the control module harness connector terminal 7 and the DLC terminal 1.

- **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 ohms**

6. Replace B218R Side Object Sensor Module - Right.

Left Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down. Disconnect the harness connector at the B218L Side Object Sensor Module - Left.
2. Test for less than 10 ohms between ground circuit terminal 8 and ground.

- **If 10 ohms or greater**

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

- **If less than 10 ohms**

3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition Off.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.

- **If the test lamp does not illuminate and the circuit fuse is open**

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

- **If the test lamp illuminates**

4. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 2 ohms in each of the serial data circuits end to end between the control module harness connector terminal 2 and the DLC terminal 1.

- **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 ohms**

6. Replace B218L Side Object Sensor Module - Left.

Side Object Indicator Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate A9 Outside Rearview Mirror. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the ground circuit terminal 9 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON, connect a test lamp between the control circuit terminal D and the ground circuit terminal 9.
4. Verify the test lamp turns ON and OFF when commanding the Object Detection Alert Indicators ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object Sensor Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the B218 Side Object Sensor Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - 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 B0958, B0959, B0960, OR B0961

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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

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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

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

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 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 rear parking assist control module triggers the sensors in a sequential loop. After each sensor transmits, the rear parking assist control module uses the sensor echo received through the signal circuit to calculate the distance and position of an object.

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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 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 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 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 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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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 or B0961 01 is not set.
 - **If the DTC is set**

Check the appropriate sensor for contamination with mud. If no contamination is diagnosed, refer to Circuit/System Testing below.

- **If the DTC is not set**

4. Verify that DTC B0958 21, B0959 21, B0960 21 or B0961 21 is not set.
 - **If the DTC is set**

Check the appropriate sensor for contamination with mud, ice or snow. If no contamination is diagnosed, replace the sensor.

- **If the DTC is not set**

5. Verify that DTC B0958 3A, B0959 3A, B0960 3A or B0961 3A is not set.
 - **If the DTC is set**

Replace the appropriate sensor with a sensor of correct sensor type.

- **If the DTC is not set**

6. Ignition ON, transmission in REVERSE, verify the scan tool Parking Assist System Status parameter displays Enabled.

- **If the Parking Assist System displays Disabled**

Refer to Circuit/System Testing below.

- **If the Parking Assist System displays Enabled**

7. All OK.

Circuit/System Testing

1. Ignition OFF for 1 min, scan tool must be disconnected for steps 1 and 2 to allow module to power down. Disconnect the harness connector at the appropriate B78 Rear Object Sensor.
2. Test for less than 10 ohms between the low reference circuit terminal 2 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF, disconnect the harness connector X2 at the K41R Rear Parking Assist Control Module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms replace the K41R Rear Parking Assist Control Module.
 - **If less than 10 ohms**
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**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module.
 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
 3. Test for less than 2 ohms in the 8 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41R Rear Parking Assist Control Module.
 - **If greater than 9.5 V**
 1. Ignition OFF, disconnect the 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 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K41R Rear Parking Assist Control Module.
 - **If between 7.5-9.5 V**
5. Ignition ON.

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6. Test for 4.8-5.2 V between the signal circuit terminal 3 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41R Rear Parking Assist Control Module.
 - **If greater than 5.2 V**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K41R Rear Parking Assist Control Module.
 - **If between 4.8-5.2 V**
7. Test or replace the appropriate B78 rear object sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair

- **Rear Parking Assist Alarm Sensor Replacement**
- **Control Module References** for 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

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DTC B0968 06

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

Circuit/System Description

The parking assist can be activated/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.

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

Conditions for Running the DTC

- Ignition ON
- The parking assist is activated. The activation takes place by putting in the reverse gear or by pressing the parking assist switch.

Conditions for Setting the DTC

B0967 02

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

B0968 01

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

B0968 06

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

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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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 B0967 02 is not set.
 - **If the DTC is set**
3. Verify that B0968 01 or B0968 06 is not set.
 - **If the DTC is set**

Refer to Parking Assist Switch Malfunction below.

- **If the DTC is not set**

Refer to Parking Assist Switch Indicator Malfunction below.

- **If the DTC is not set**

4. Activate and deactivate the parking assist switch and verify the scan tool Park Assist Switch parameter changes between Active and Inactive.
 - **If the Parking Assist Switch parameter does not change between Active and Inactive**

Refer to Circuit/System Testing below.

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

5. All OK.

Circuit/System Testing**Parking Assist Switch Malfunction**

1. Ignition OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel.
2. Test for less than 10 ohms between the S48D Multifunction Switch 2 - Instrument Panel terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the ground circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the control circuit terminal 5 and ground circuit terminal 1.
4. Verify the 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**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41R Rear Parking Assist Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit
 - If less than 1 V, replace the K41R Rear Parking Assist Control Module.
 - **If the test lamp turns ON and OFF**
5. All OK.

Parking Assist Switch Indicator Malfunction

1. Ignition OFF, disconnect the harness connector at the S48D Multifunction Switch 2 - Instrument Panel.
2. Test for less than 10 ohms between the S48D Multifunction Switch 2 - Instrument Panel terminal 1 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.

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2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Connect a test lamp between the voltage circuit terminal 6 and ground circuit terminal 1.
4. Verify the 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**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module.
 2. Test for infinite resistance between the voltage circuit and ground.
 - If less than infinite resistance, repair the short to ground in the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41R Rear Parking Assist Control Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the K41R Rear Parking Assist Control Module, ignition ON.
 2. Test for less than 1 V between the voltage circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K41R Rear Parking Assist Control Module.
 - **If the test lamp turns ON and OFF**
 - 5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair

- **Rear Object Alarm Control Module Replacement**
- **Control Module References** for parking assist control module replacement, programming and setup.

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

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DTC B1015 00

Vehicle Identification Number Information Malfunction

Circuit/System Description

When the ignition is turned ON, the advanced rear parking assist control module and the vehicle direction camera control module receives the vehicle identification number (VIN) from the body control module. The advanced control module will compare the VIN received to the VIN stored in memory.

Conditions for Running the DTC

Ignition voltage is between 9-16 V.

Conditions for Setting the DTC

The stored VIN does not match the received VIN.

Action Taken When the DTC Sets

- The parking assist system or the lane departure warning system is disabled.
- The driver information center displays SERVICE PARK ASSIST or SERVICE LANE DEPARTURE SYSTEM.

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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair

Control Module References for the rear parking assist control module, vehicle direction camera control module replacement, programming and setup.

DTC B1405

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****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
- 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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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

Ignition ON, transmission in REVERSE, observe the scan tool Park Assist Sensor Reference Voltage parameter. The reading should be between 7.2-9.2 V.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at each of the object sensors, ignition On, transmission in REVERSE
2. Test for 7.2-9.2 V between the object sensor reference circuit terminal 1 at all B78 Rear Object Sensor harness connectors and ground.
 - **If less than 7.2 V**
 1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module.
 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
 3. Test for less than 2 ohms in the 8 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41 Parking Assist Control Module.
 - **If greater than 9.2 V**
 1. Disconnect the harness connector X 2 at the K41 Parking Assist Control Module, ignition ON.

2. Test for less than 1 V between the 8 V supply voltage circuit and ground.
 - If 1 V or greater, repair the short to voltage in the circuit.
 - If less than 1 V, replace the K41 Parking Assist Control Module.
 - **If between 7.2-9.2 V**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Rear Object Alarm Control Module Replacement**
- **Control Module References** for parking assist control module replacement, programming and setup

SYMPTOMS - OBJECT DETECTION

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

1. Perform the **Diagnostic System Check - Vehicle** before using the Symptom Tables in order to verify that all of the following are true: before using the Symptom Tables 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.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to **Object Detection Description and Operation (with Side Blind Spot Alert (UFT))**, **Object Detection Description and Operation (with Parking Assist (UD7))**, **Object Detection Description and Operation (with Rearview Camera (UCV))**.

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

- **Side Blind Spot Alert System Malfunction**

- **Parking Assist System Malfunction**
- **Rear Vision Camera System Malfunction**

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

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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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 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 below.

- **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 (Manual Transmission)** , **Backup Lamps Malfunction (Automatic Transmission)** .

- **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 S48D Multifunction Switch 2 - Instrument Panel.

2. Test for less than 10 ohms between the ground circuit terminal 1 and ground.

- **If 10 ohms or greater**

1. Ignition OFF.

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

- If 2 ohms or greater, repair the open/high resistance in the circuit.

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

- **If less than 10 ohms**

3. Ignition ON.

4. Verify the scan tool Parking Assist Switch Status parameter is inactive.

- **If not Inactive**

1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module.

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 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**

1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module

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

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

- If infinite resistance
- 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K41 Parking Assist Control Module.
 - **If the test lamp is always ON**
- 1. Ignition OFF, disconnect the harness connector at the K41 Parking Assist Control Module, ignition ON.
- 2. Test for less than 1 V between the control circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K41 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 S48D Multifunction Switch 2 - 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 S48D Multifunction Switch 2 - Instrument Panel.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Rear Object Alarm Control Module Replacement**

- **Control Module References** for 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.

Circuit/System Description

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

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 - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), **Object Detection Description and Operation (with Parking Assist (UD7))**, **Object Detection Description and Operation (with Rearview Camera (UCV))**

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**
3. Verify the rearview camera there is no debris on the lens and that the bezel or bezel seal is not damaged.
 - **If debris are found on the lens**

Refer to **DTC B2545** .

- **If the DTC is not set**

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 REVERSE.
5. Verify the backup lamps are On.
 - **If the backup lamps are not ON**

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

- **If the backup lamps are ON**

6. Engine running, transmission in REVERSE.
7. Verify a clear rear vision image is displayed on the radio.
 - **If a clear image is not displayed**

Refer to Circuit/System Testing below.

- **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, disconnect the harness connector at the B87 Rearview Camera.
2. Test for less than 10 ohms between the ground circuit terminal 5 and ground.

- **If 10 ohms or greater**

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

- If 2 ohms or greater, repair the open/high resistance in the circuit.
- If less than 2 ohms, repair the open/high resistance in the ground connection.
- **If less than 10 ohms**

3. Ignition ON.

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

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

1. Ignition OFF.
2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is OK and there is voltage at the fuse.
3. If the circuit tests normal, test or replace the KR74 Ignition Run Relay.

- **If the test lamp illuminates**

5. Engine running, park brake applied, transmission in REVERSE.

6. Test for greater than 11 V between the control circuit terminal 3 and ground.

- **If less than 11 V**

1. Ignition OFF, disconnect the X7 harness connector at the K9 Body Control Module.
2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.

- **If greater than 11 V**

7. Ignition OFF, disconnect the X4 harness connector at the A11 Radio, ignition ON.

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

- Signal (+) circuit terminal 1 at the B87 Rearview Camera.
- Signal (-) circuit terminal 4 at the B87 Rearview Camera.
- **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:

- Signal (+) circuit terminal 1 at the B87 Rearview Camera.
- Signal (-) circuit terminal 4 at the B87 Rearview Camera.

- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

10. Test for less than 2 ohms in the signal (+) circuit end to end.

- **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 ohms**

11. Test for less than 2 ohms in the signal (-) circuit end to end.

- **If 2 ohms or greater**

Test the signal circuit for an open/high resistance.

- **If less than 2 ohms**

12. Replace the B87 Rearview Camera.

13. Engine running, transmission in REVERSE, verify a clear rear vision image is displayed on the A11 Radio.

- **If a clear rear vision image is not displayed on the A11 Radio**

Replace the A11 Radio.

- **If a clear rear vision image displayed on the A11 Radio**

14. All Ok.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Rearview Camera Image Display Module Replacement**
- **Control Module References** for body control module or radio 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.

Circuit/System Description

Two Side Object Sensor Modules are located on each side of the vehicle near the corners of the rear fascia. The modules are provided with B+ and ground. The Side Object Sensor Module - Right has an additional ground to distinguish it from the Side Object Sensor Module - Left. The Side Object Sensor Module - Left is connected to the serial data line. The serial data line is passed through the module to the Side Object Sensor Module - Right.

When vehicle speed is greater than 10 km/h (6.2 MPH) and either Side Object Sensor Module detects an object in the detection area, the module provides a signal to the appropriate Outside Rearview Mirror to illuminate the amber telltale LED.

Diagnostic Aids

- The conditions for disabling the side blind zone alert system are captured by DTCs and/or a history buffer that stores the last 16 events, including changes made by the driver and messages displayed in the drivers information center. The history buffer for each side object sensor can be accessed using the scan tool.
- 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.
 - Vehicle Speed Average Validity signal is set Invalid
 - Transmission Shift Lever Position Validity signal set to Invalid
 - Transmission Virtual Device Availability signal is set to Unavailable or has not been received in the last LOSS OF TRANSMISSION VDA PERIODIC UPDATE calibration
 - Engine Virtual Device Availability signal is set to Unavailable or has not been received in the last LOSS OF ENGINE VDA PERIODIC UPDATE calibration
 - There is a loss of serial data communication or a side blind zone system DTC is set.
 - A blockage condition exists (i.e. mud/snow buildup in front of the sensor). A driver information message stating that the side blind zone system is temporarily unavailable will be displayed. The side blind zone 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 blockage determination is performed with the vehicle in a drive gear.
 - The side blind zone system shall 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 require the sensors to be turned off. The "Side Blind Zone Alert System Temporarily Unavailable" message shall 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.

Reference Information

Schematic Reference

Object Detection Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Object Detection Description and Operation (with Side Blind Spot Alert (UFT)), Object Detection Description and Operation (with Parking Assist (UD7)), Object Detection Description and Operation (with Rearview Camera (UCV))

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

Refer to Circuit/System Testing below - Right Side Object Sensor Malfunction.
 - **If the scan tool can communicate with the right side object sensor**
3. 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 below - Left Side Object Sensor Malfunction.
 - **If the scan tool can communicate with the left 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 when ignition is initially turned ON.
 - **If both side blind zone alert indicators do not briefly turn ON and OFF**

The system may have been disabled, refer to Diagnostic Aids. If system has not been disabled refer to Circuit/System Testing below - Side Object Indicator Malfunction.

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

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

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

6. All OK.

Circuit/System Testing

Right Side Object Sensor Malfunction

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down. Disconnect the harness connector at the B218R Side Object Sensor Module - Right.
2. Test for less than 10 ohms between the following ground circuit terminals and ground.
 - Terminal 3
 - Terminal 8
 - **If 10 ohms or greater**
1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Verify a test lamp illuminates between the B+ circuit terminal 5 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
1. Ignition Off.
2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
1. Ignition OFF.
2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the B218R Side Object Sensor Module - Right.
 - **If the test lamp illuminates**
4. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
5. Test for less than 2 ohms in each of the serial data circuits end to end between the control module harness connector terminal 7 and the DLC terminal 1.
 - **If 2 ohms or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 ohms**

6. Replace B218R Side Object Sensor Module - Right.

Left Side Object Sensor Malfunction

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

Repair the open/high resistance in the circuit.
 - **If less than 2 ohms**
6. Replace B218L Side Object Sensor Module - Left.

Side Object Indicator Malfunction

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

2. Test for less than 10 ohms between the ground circuit terminal 9 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON, connect a test lamp between the control circuit terminal D and the ground circuit terminal 9.
4. Verify the test lamp turns ON and OFF when commanding the Object Detection Alert Indicators ON and OFF with a scan tool.
 - **If the test lamp is always OFF**
 1. Ignition OFF, disconnect the harness connector at the appropriate B218 Side Object Sensor Module.
 2. Test for infinite resistance between the control circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the control circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the B218 Side Object Sensor Module.
 - **If the test lamp is always ON**
 1. Ignition OFF, disconnect the harness connector at the B218 Side Object Sensor Module, ignition ON.
 2. Test for less than 1 V between the control circuit and ground.
 - 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 diagnostic procedure.

- **Outside Rearview Mirror Glass Replacement**
- **Control Module References** for Side Object Sensor Module replacement, programming and setup.

REPAIR INSTRUCTIONS

REAR OBJECT ALARM CONTROL MODULE REPLACEMENT

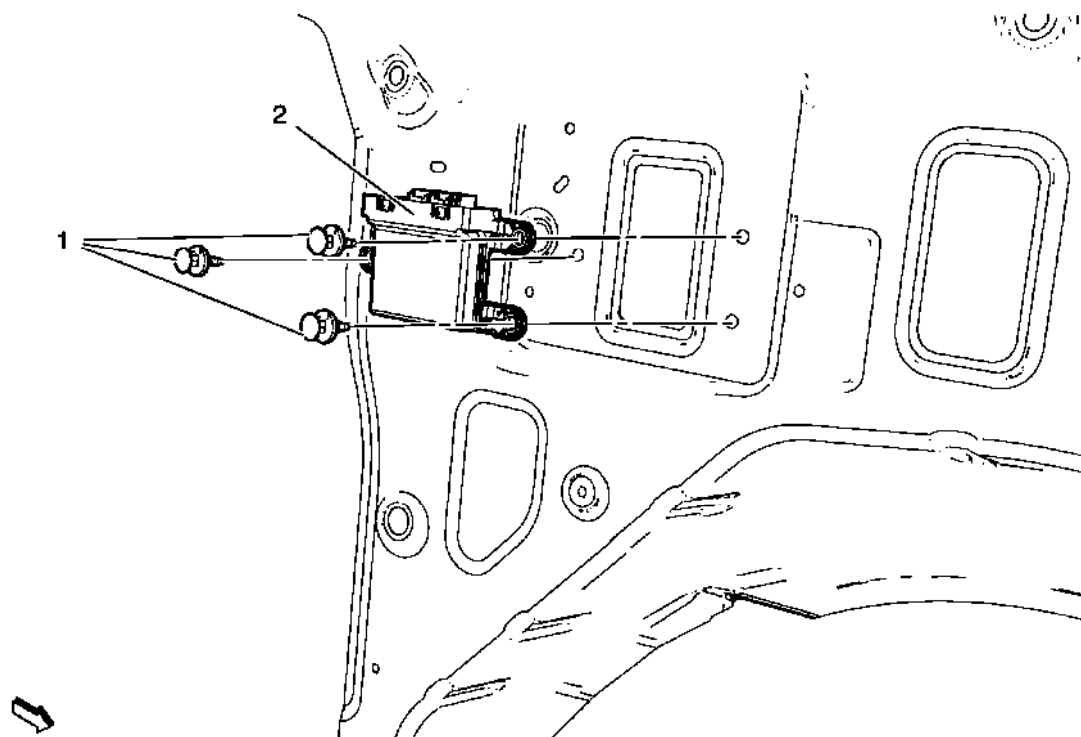


Fig. 4: Rear Object Alarm Module And Clips
Courtesy of GENERAL MOTORS COMPANY

Rear Object Alarm Control Module Replacement

Callout	Component Name
Preliminary Procedures	
Remove the rear compartment side trim. Refer to <u>Rear Compartment Side Trim Replacement - Left Side</u> .	
1	Rear Object Alarm Module Clip (Qty: 3)
2	Rear Object Alarm Module

REAR PARKING ASSIST ALARM SENSOR REPLACEMENT

Removal Procedure

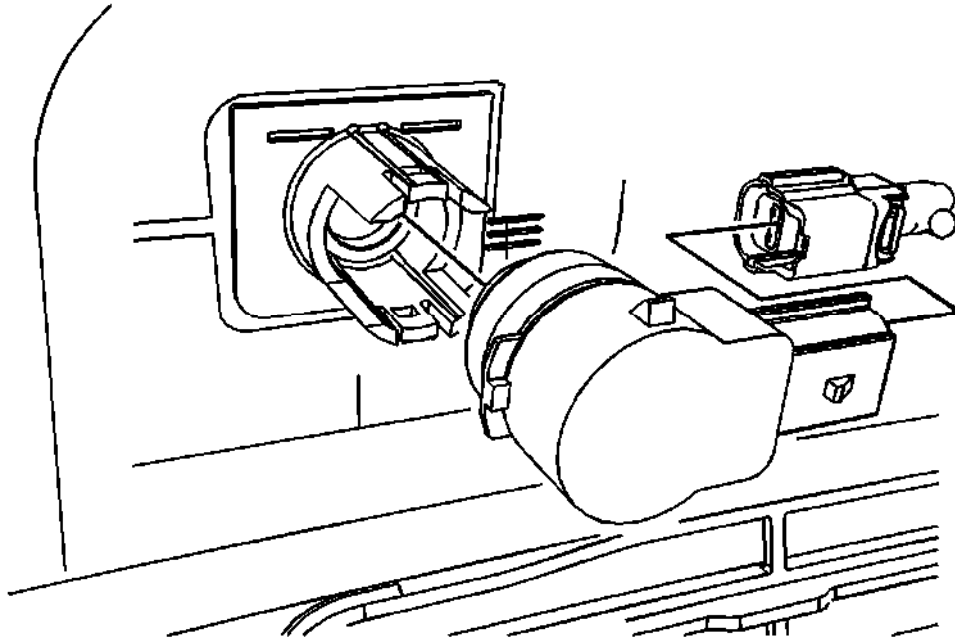


Fig. 5: Identifying Rear Object Sensor Housing
Courtesy of GENERAL MOTORS COMPANY

1. Remove the rear bumper fascia. Refer to **Rear Bumper Fascia Replacement**
2. Disconnect electrical from the rear object sensor.
3. Lift the locking tabs on the housing and remove the rear object sensor.

Installation Procedure

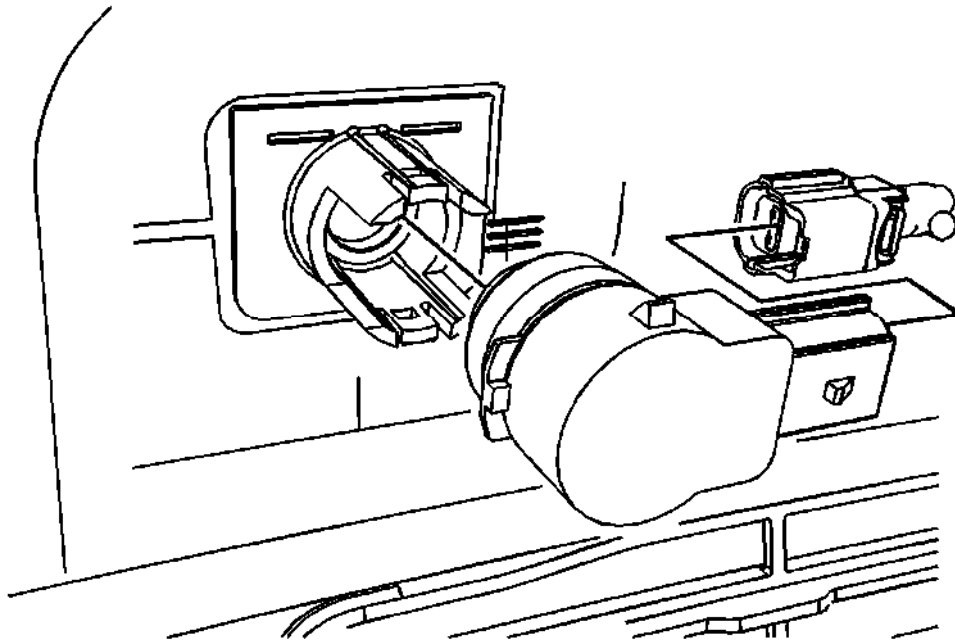


Fig. 6: Identifying Rear Object Sensor Housing
Courtesy of GENERAL MOTORS COMPANY

1. Insert the sensor into the housing.
2. Connect the electrical connector to the rear object sensor.
3. Install the rear bumper fascia. Refer to **Rear Bumper Fascia Replacement** .

REAR OBJECT SENSOR HOUSING REPLACEMENT

1. Remove the rear fascia. Refer to **Rear Bumper Fascia Replacement** .

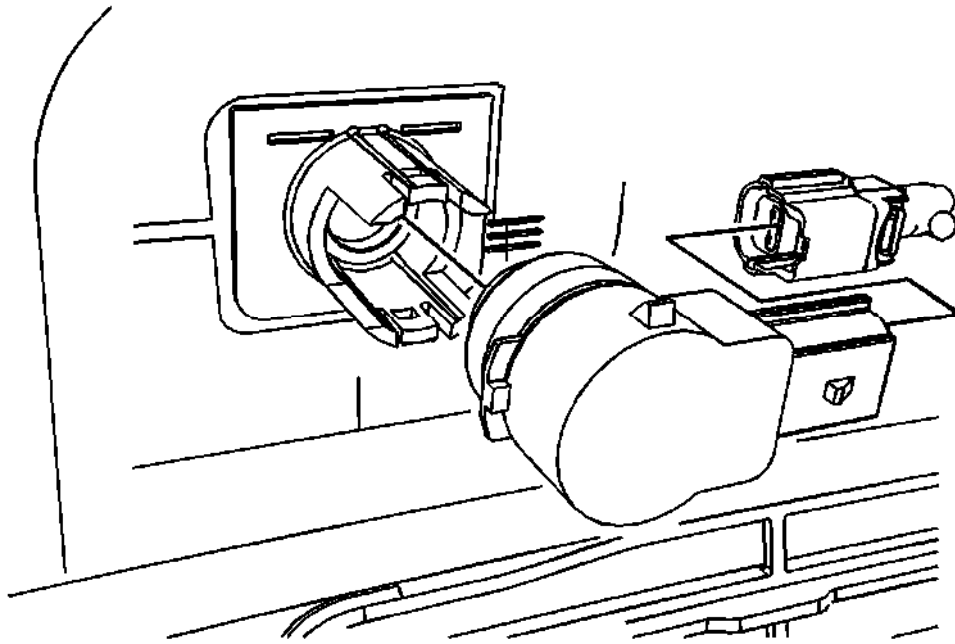


Fig. 7: Identifying Rear Object Sensor Housing
Courtesy of GENERAL MOTORS COMPANY

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

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

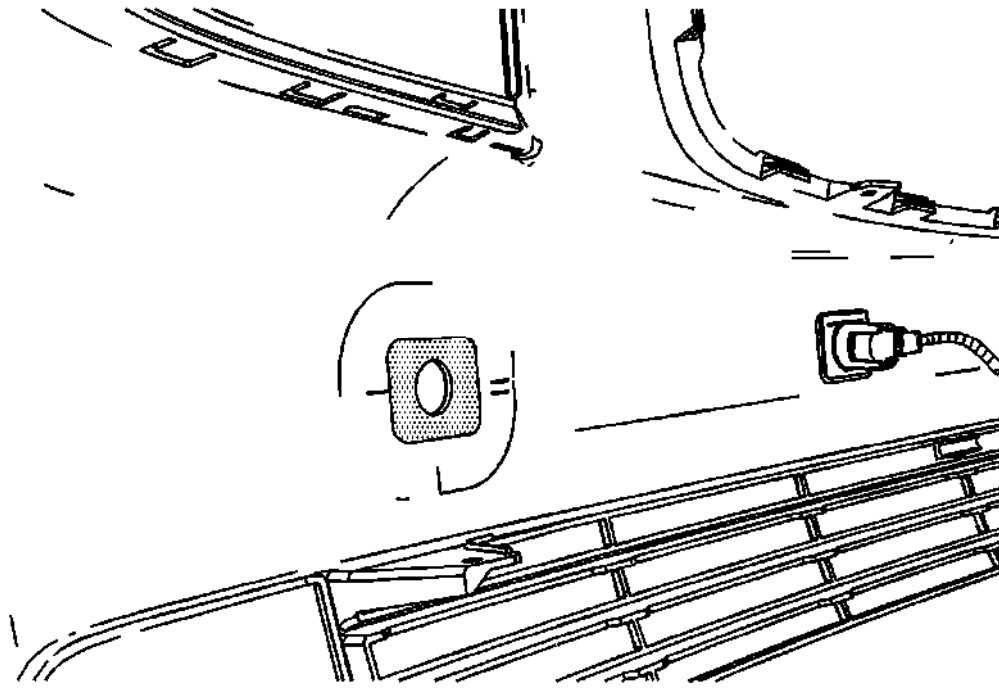


Fig. 8: Sanding/Grinding Sonic Weld Plastic Residue From Fascia
Courtesy of GENERAL MOTORS COMPANY

IMPORTANT: Do Not grind off alignment tabs.

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

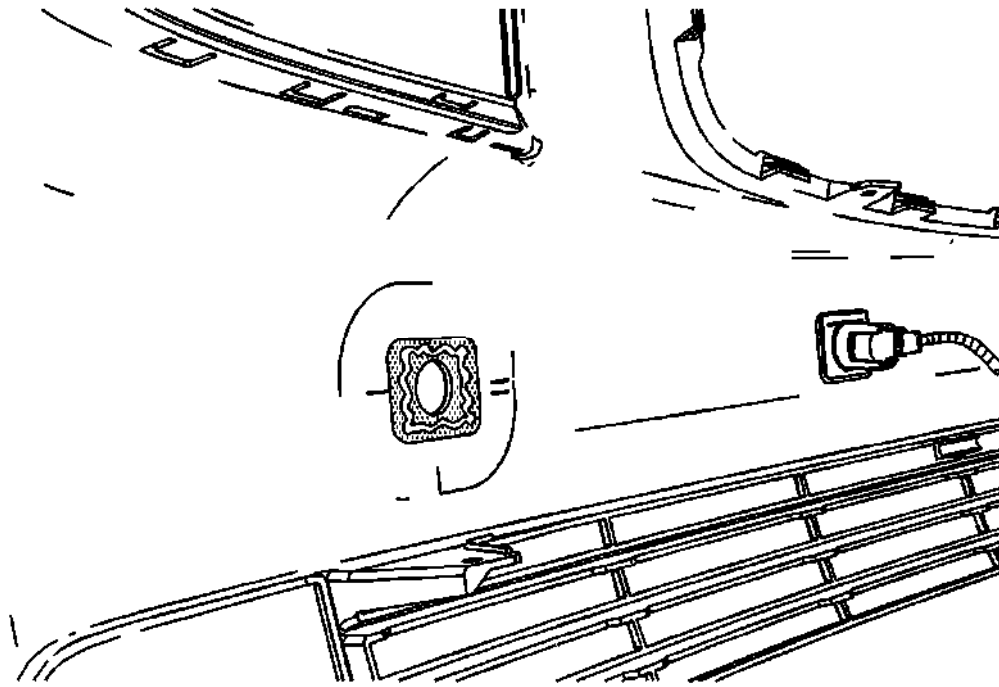


Fig. 9: View Of Structural Adhesive Epoxy On Fascia
Courtesy of GENERAL MOTORS COMPANY

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

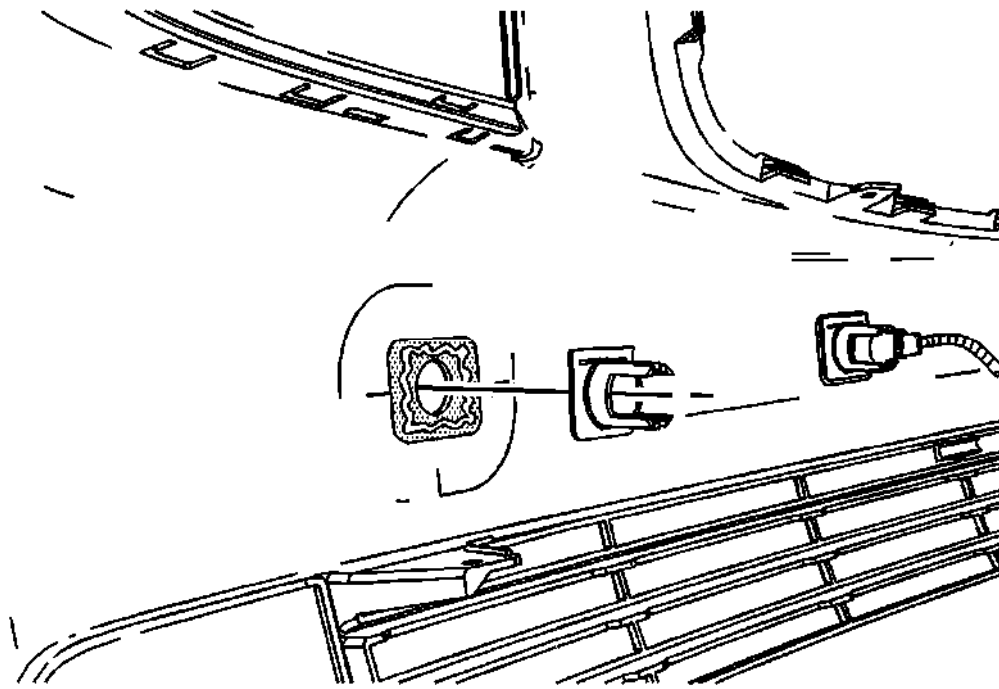


Fig. 10: Identifying Sensor Housing & Tabs

Courtesy of GENERAL MOTORS COMPANY

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

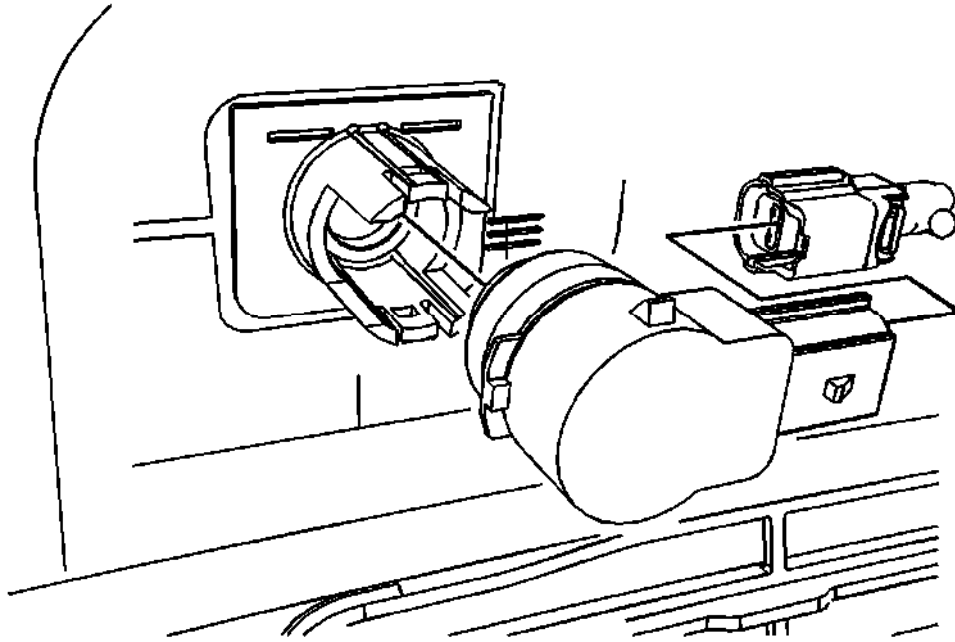


Fig. 11: Identifying Rear Object Sensor Housing
Courtesy of GENERAL MOTORS COMPANY

8. Install the sensor to the sensor housing.
9. Connect the electrical harness.
10. Install the rear fascia. Refer to **Rear Bumper Fascia Replacement** .

REARVIEW CAMERA IMAGE DISPLAY MODULE REPLACEMENT

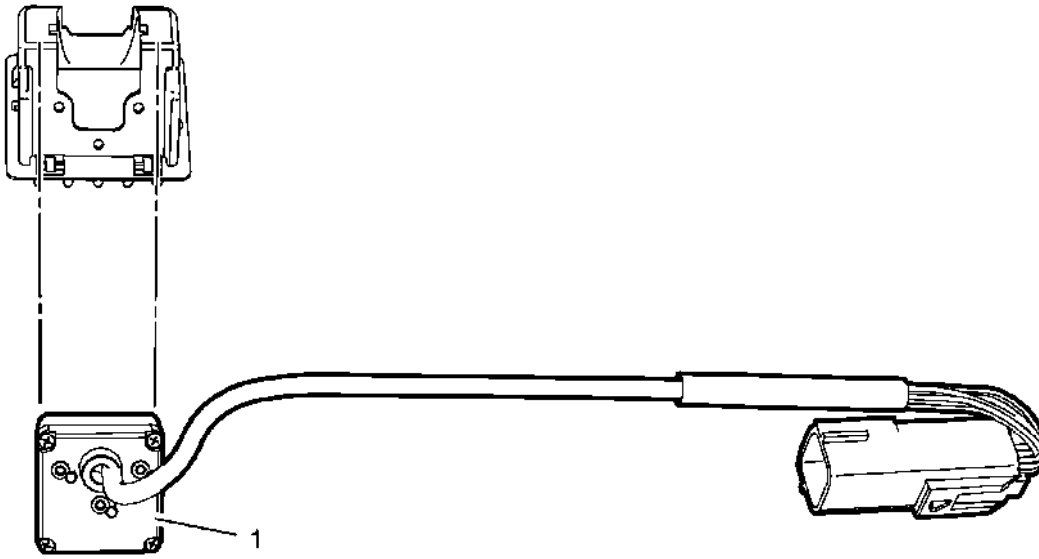


Fig. 12: Rearview Camera Image Display Module
Courtesy of GENERAL MOTORS COMPANY

Rearview Camera Image Display Module Replacement

Callout	Component Name
Preliminary Procedure Remove the rearview camera image display module bracket. Refer to <u>Rearview Camera Image Display Module Bracket Replacement</u> .	
1	Rearview Camera Image Display Module Procedure Use a suitable tool to remove.

REARVIEW CAMERA IMAGE DISPLAY MODULE BRACKET REPLACEMENT

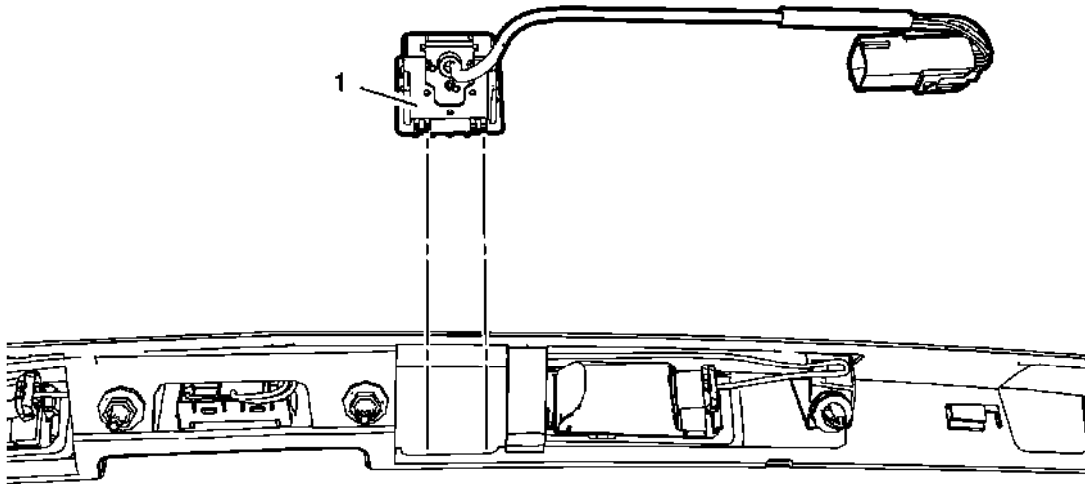


Fig. 13: Rearview Camera Image Display Module Bracket
Courtesy of GENERAL MOTORS COMPANY

Rearview Camera Image Display Module Bracket Replacement

Callout	Component Name
Preliminary Procedure Remove the rear compartment lid applique. Refer to <u>Rear Compartment Lid Applique Replacement</u> .	
1	Rearview Camera Image Display Module Bracket Procedure 1. Use a suitable tool to remove. 2. Remove the rearview camera image display module. Refer to <u>Rearview Camera Image Display Module Replacement</u>.

DESCRIPTION AND OPERATION

OBJECT DETECTION DESCRIPTION AND OPERATION (WITH SIDE BLIND SPOT ALERT (UFT))

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

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 remain illuminated at all 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 PARKING ASSIST (UD7))

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

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

- Parking assist control module
- Rear object alarm sensors

Parking Assist Control Module

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

Rear Object Alarm Sensors

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

Rear Parking Assist Operation

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

When backing up at speed of less than 8 km/h (5 MPH), the system is constantly monitoring for object of interest located behind the vehicle. The rear parking assist system can detect objects greater than 7.6 cm (3 in) wide and 25.4 cm (10 in) tall. The system cannot detect objects below the bumper, underneath the vehicle. If an object is detected within 2.5 m (8 ft) there will be a audible beep notification out of both rear speakers based upon the distance to the object. As the vehicle gets closer to an object, the time between the beeps become shorter.

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

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

Parking Assist System Driver Information Center Messages

SERVICE PARK ASSIST

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

PARK ASSIST OFF

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

- The rear parking assist system is manually disabled by the vehicle operator through the audio system personalization menu.
- The park brake is applied or not fully released.
- An object is attached to the rear of the vehicle, such as a trailer, bicycle rack, trailer hitch receiver, or tow bar. Also, an object extending beyond a lowered endgate will disable the system.
- The parking assist sensors are covered by snow, mud, dirt or ice.
- The vehicle bumper is damaged.
- Excessive paint thickness on a replacement parking assist sensor.
- The parking assist sensors are disrupted by vibrations, like those caused by a large nearby vehicle or from heavy equipment such as a jackhammer.

OBJECT DETECTION DESCRIPTION AND OPERATION (WITH REARVIEW CAMERA (UCV))

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.