

FASTENER SPECIFICATIONS

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Front Grille Bolt	2.5 N.m (22 lb in)
Front View Camera Bolt	2.5 N.m (22 lb in)
Rearview Driver Information Camera Bolt	2.5 N.m (22 lb in)
Video Processing Module Nut	9 N.m (80 lb in)

IMAGE DISPLAY CAMERA WIRING SCHEMATICS

The diagram illustrates the electrical system for the rearview camera. Key components and their connections include:

- Power Source:** The system is powered by the ignition (IGN) line, which passes through a 139 PU/GY wire.
- Fuse Blocks:**
 - X20A Fuse Block - Underhood:** Contains a 10A F44UA fuse.
 - X2:** A fuse block with terminals 4 and 5.
 - X1:** A fuse block with terminals 6 and 18.
 - X203:** A fuse block with terminals 66, 67, and 65.
- Control Modules:**
 - K74 Human Machine Interface Control Module:** Receives input from X2 and X1, and controls the camera and other components.
 - K188 Human Machine Interface Control Module Bypass Module:** Receives input from X1 and controls the camera.
- Wiring Details:**
 - Wire Colors and Gauges:** 139 PU/GY, 2550 BK, 6972 RD, 6973 BU, 6974 WH, 6974 SR, 6972 GY/YE, 6973 WH/BU, 6974 WH.
 - Connections:** The IGN line passes through X20A and X2. X2 connects to X1, which then connects to K74 and K188. K74 and K188 control the camera (B87) and other components like the radio (A11) and blunt cut (W7).

Rearview Camera (UVC with X88) (2 of 2)

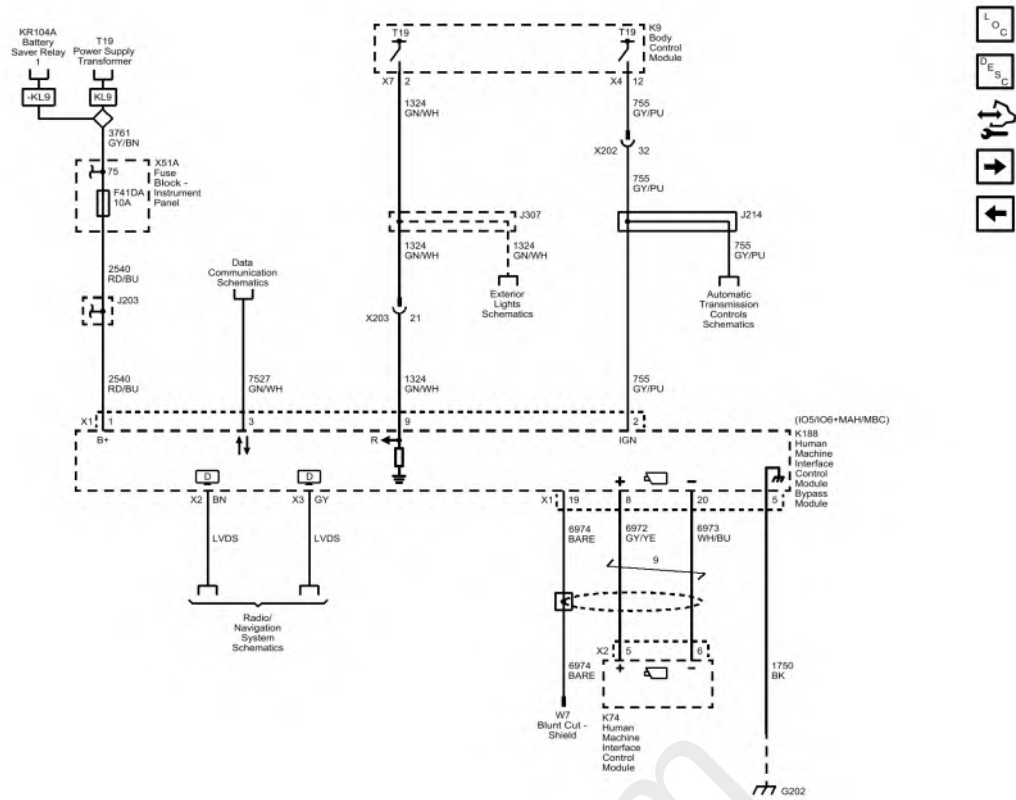


Fig. 2: Rearview Camera (UVC with X88) (2 of 2)
 Courtesy of GENERAL MOTORS COMPANY

Rearview Camera (UVC with Z88)

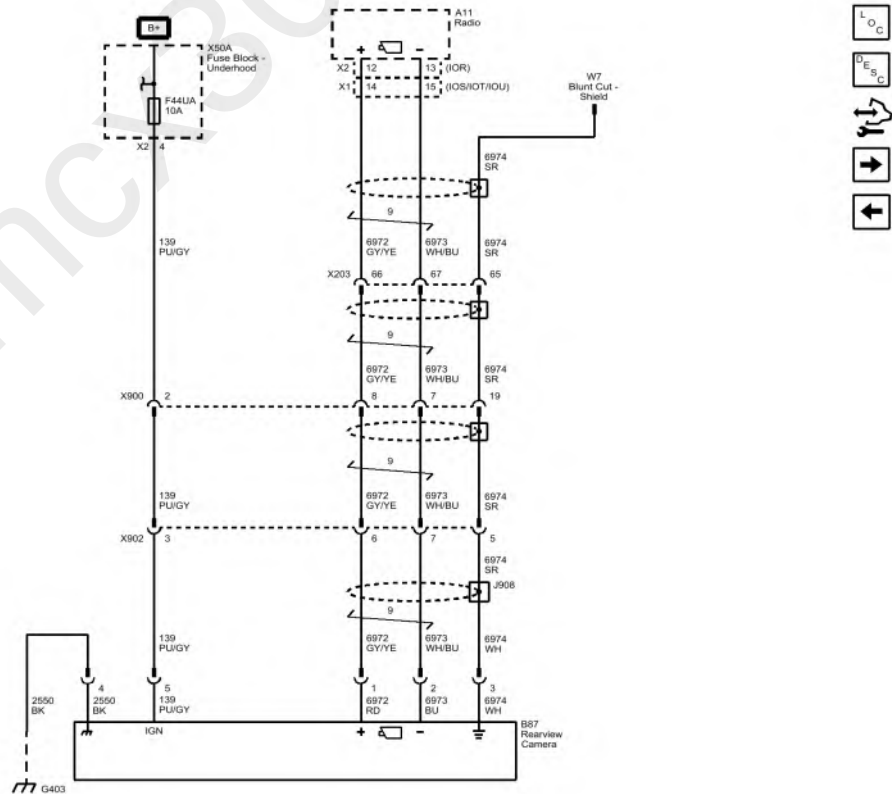


Fig. 3: Rearview Camera (UVC with Z88)
 Courtesy of GENERAL MOTORS COMPANY

360 Degree Vision - Power, Ground, and Serial Data (UVH)

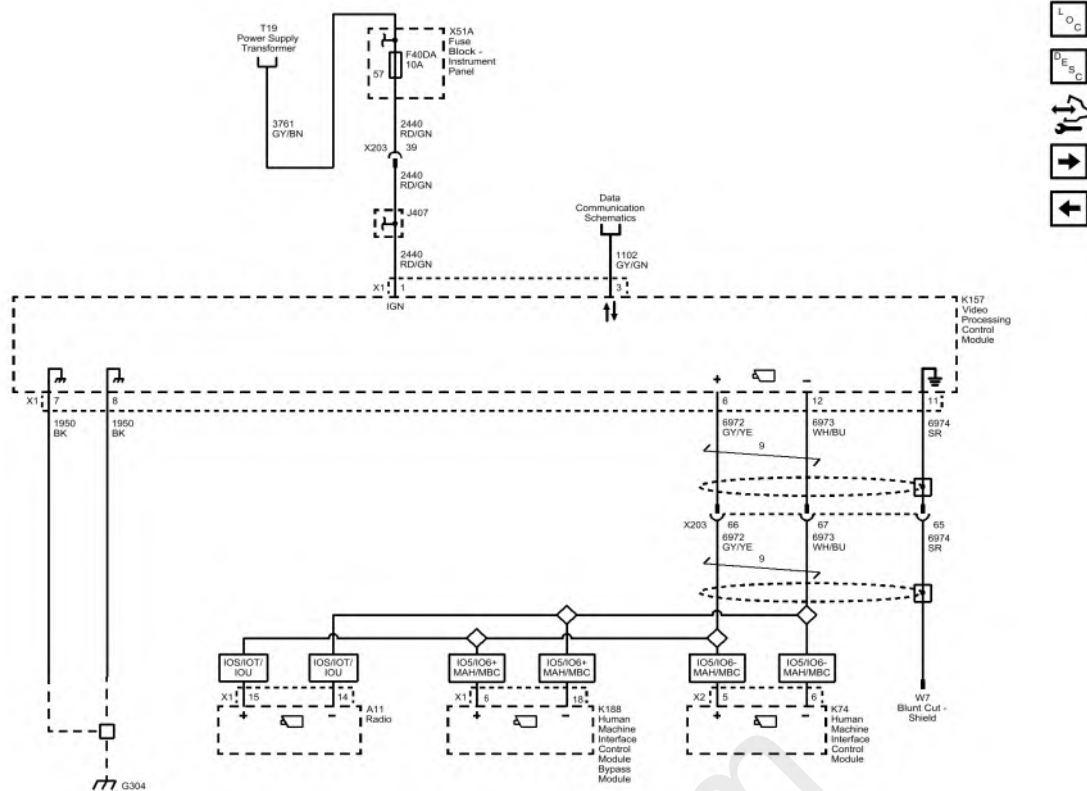


Fig. 4: 360 Degree Vision - Power, Ground, and Serial Data (UVH)
 Courtesy of GENERAL MOTORS COMPANY

360 Degree Vision - Front and Rear Cameras (UVH with X88)

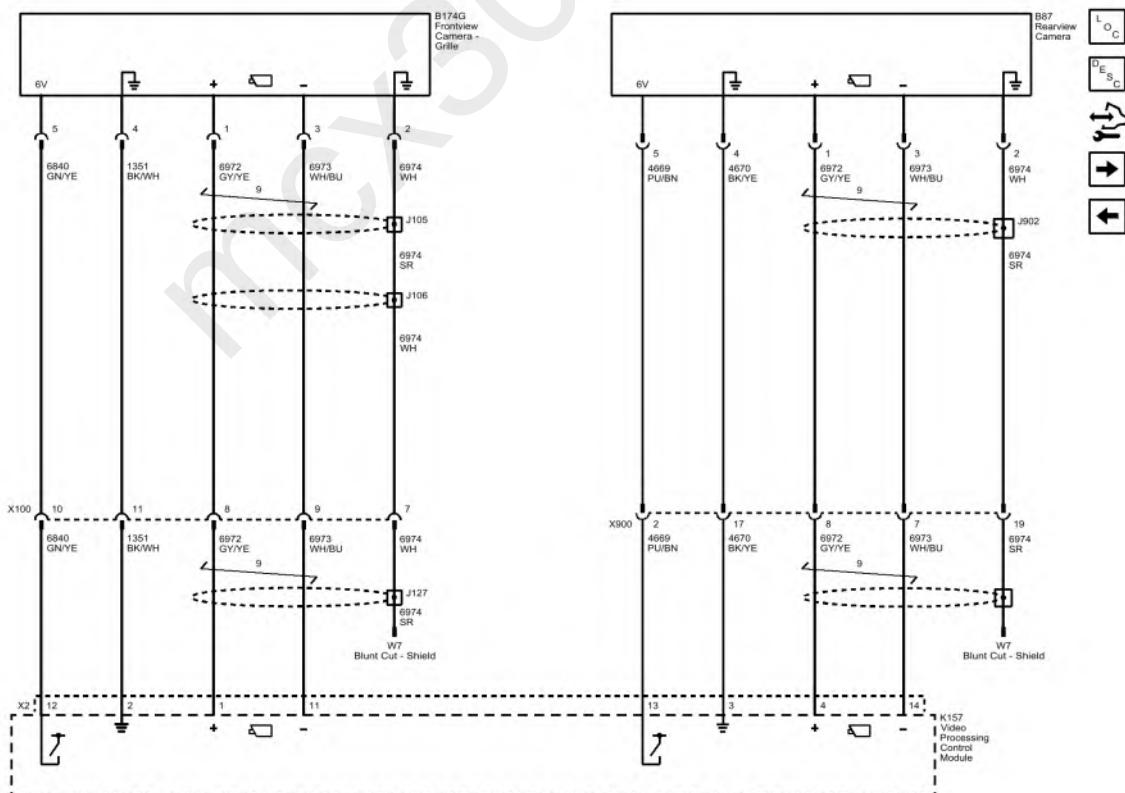


Fig. 5: 360 Degree Vision - Front and Rear Cameras (UVH with X88)
 Courtesy of GENERAL MOTORS COMPANY

360 Degree Vision - Front and Rear Cameras (UVH with Z88)

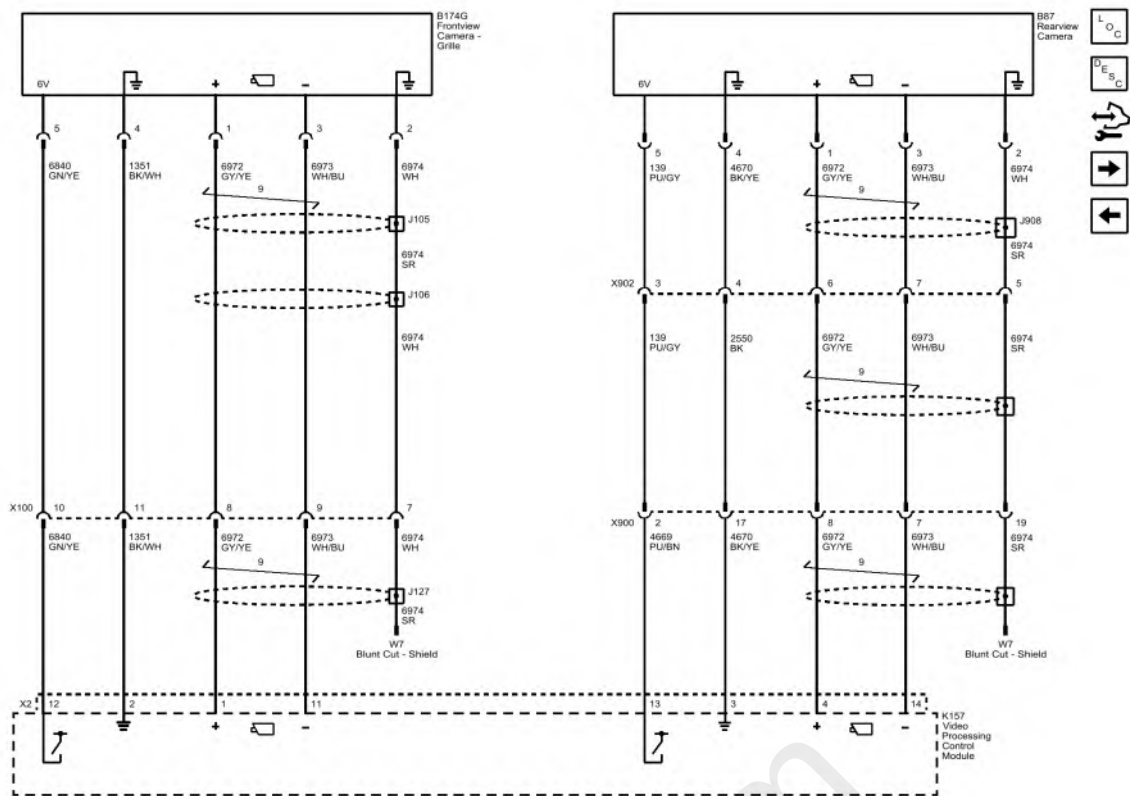


Fig. 6: 360 Degree Vision - Front and Rear Cameras (UVH with Z88)
 Courtesy of GENERAL MOTORS COMPANY

360 Degree Vision - Side Vision Cameras (UVH)

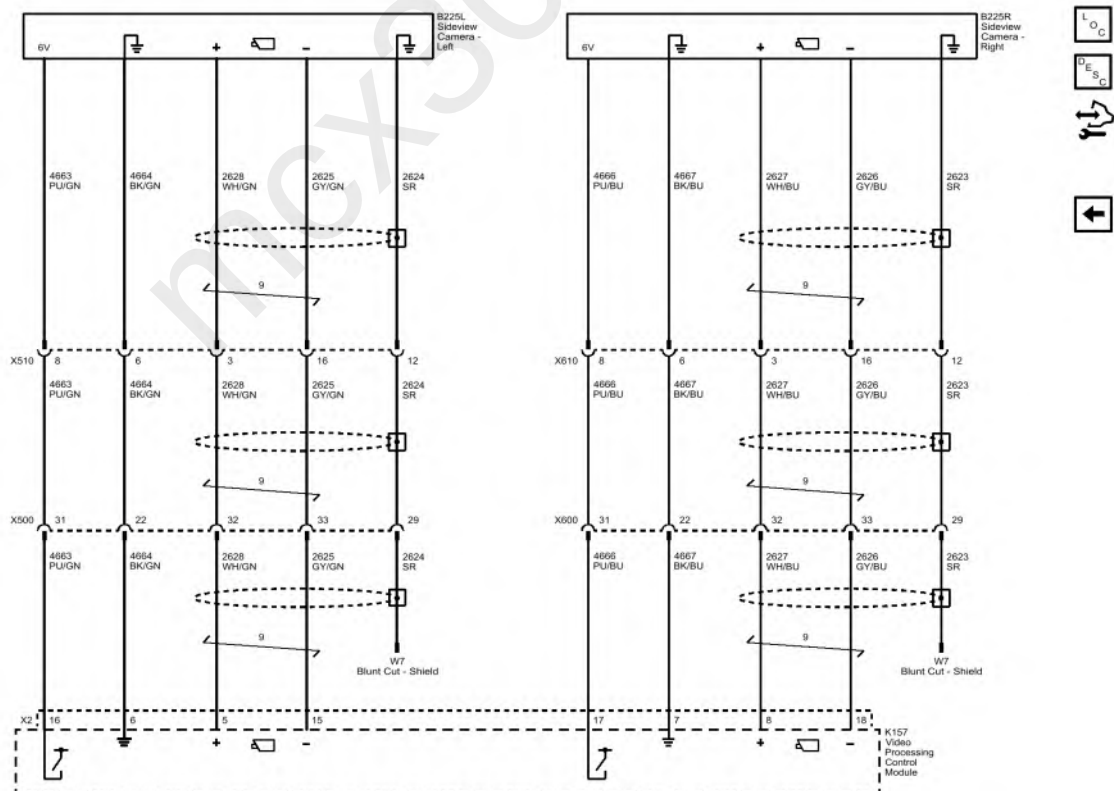


Fig. 7: 360 Degree Vision - Side Vision Cameras (UVH)
 Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0010: REVERSE GEAR SIGNAL CIRCUIT

Diagnostic Instructions

- Perform the Diagnostic System Check prior to using this diagnostic procedure: [Diagnostic System Check - Vehicle](#)
- Review the description of Strategy Based Diagnosis: [Strategy Based Diagnosis](#)
- An overview of each diagnostic category can be found here: [Diagnostic Procedure Instructions](#)

DTC Descriptor

DTC B0010

Reverse Gear Signal Circuit

Symptom Byte Information: [Symptom Byte List](#)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Reverse Gear Signal	B0010 00	B0010 00	B0010 00	-

Circuit/System Description

The control module K9 sends the gear selector lever position over serial data to the control module A11.

For an overview of the component/system, refer to: [Rear Vision Camera System Malfunction \(IOB/IOR/IOS/IOT/IOU\)](#)[Rear Vision Camera System Malfunction \(IO5/IO6 with MAH/MBC\)](#)[Rear Vision Camera System Malfunction \(IO5/IO6 without MAH/MBC\)](#)

Circuit	Description
Reverse Gear Signal	Activated by Reverse Gear

Conditions for Running the DTC

Ignition - On / Vehicle - In Service Mode

The K9 sends a serial data message to the A11 indicating the reverse gear function that has been requested.

Conditions for Setting the DTC

Reverse Gear Signal Serial Data

Actions Taken When the DTC Sets

Rearview Camera Display=Malfunction

Conditions for Clearing the DTC

The conditions for setting the DTC no longer exist.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Electrical Information Reference

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

- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#)

[Circuit/System Verification](#)

1. Ignition - On / Vehicle - In Service Mode
2. Verify DTC B2545 is not set.

- **If the DTC is set**

Refer to:[DTC B2545](#) .

- **Go to next step: If the DTC is not set**

3. Inspect the following for debris or dirt:B87 Rearview Camera & Clean the components as necessary.
4. Apply the parking brake.
5. Engine RunningTransmission in Reverse
6. Verify the component activates:Backup Lamps

- **If the component does not activate**

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

- **Go to next step: If the component activates**

7. Refer to Circuit/System Testing.

[Circuit/System Testing](#)

1. Ignition/Vehicle & All vehicle systems - Off
2. Disconnect the electrical connector: X2 @A11 Radio
3. Apply the parking brake.
4. Engine Running & Transmission in Reverse
5. Verify a test lamp turns On between the test points:Control circuit terminal 13 & Ground

- **If the test lamp does not turn On**

1. Ignition/Vehicle - Off & Remove - Test lamp
2. Test for less than 2 ohms between the test points:Control circuit terminal 13 @Component harness & The other end of the circuit
 - If 2 ohms or greater - Repair the open/high resistance in the circuit.
 - If less than 2 ohms
3. Test for infinite resistance between the test points:Control circuit terminal 13 & Ground
 - If less than infinite resistance - Repair the short to ground on the circuit.
 - If infinite resistance - Test or replace the component:K9 Body Control Module

- **Go to next step: If the test lamp turns On**

6. Ignition/Vehicle & All vehicle systems - Off
7. Disconnect the electrical connector: X7 @K9 Body Control Module
8. Ignition - On / Vehicle - In Service Mode
9. Test for less than 1 V between the test points: Control circuit terminal 13 & Ground
 - If 1 V or greater - Repair the short to voltage on the circuit.
10. Replace the component:A11 Radio

[Repair Instructions](#)

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

For control module replacement, programming, and setup refer to: [Control Module References](#)

DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT (IOB/IOR/IOS/IOT/IOU)

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

B127B

Rearview Camera Input Signal Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 1	-	-
Camera Module signal +	B127B 2B, B127B 08, or 3	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 2	-
Camera Module signal -	B127B 2B, B127B 08, or 3	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 1	-
Ground	-	B127B 2B, B127B 08, or 1	-	-
Shield	-	3	-	-
1. Rear vision camera image not displayed 2. Rear vision camera image always displayed 3. Poor Quality Image (as described in Circuit/System Verification)				

Circuit/System Description

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

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera has not been received by the radio for 2.5 s.

Action Taken When the DTC Sets

- The human machine interface control module stores the DTC in memory.
- A service message may be displayed on the driver information center of info display module.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

[Image Display Camera Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Rear Vision Camera Description and Operation \(with IOB/IOR\)](#)

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](#).
 - **Go to next step: If the DTC is not set**
3. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.
 - **If the P17 Info Display is not displaying properly**
Refer to [Radio Information Display Malfunction \(IOB\)](#) [Radio Information Display Malfunction \(IOS/IOT/IOU\)](#) [Radio Information Display Malfunction \(IOR\)](#).
 - **Go to next step: If the P17 Info Display displays properly**
4. Verify the rearview camera has no debris on the lens and that the bezel or bezel seal is not damaged.
 - **If debris are found on the lens**
Clean the lens using water and a soft cloth. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 - **Go to next step: If no debris on the lens**
5. Engine running, parking brake applied, transmission in REVERSE.
6. Verify the backup lamps are On.
 - **If the backup lamps are not ON**
Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#) [Backup Lamps Malfunction \(Manual Transmission\)](#).
 - **Go to next step: If the backup lamps are ON**
7. Engine running, parking brake applied, transmission in REVERSE.

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.

8. Verify a clear rear vision image is displayed on the radio.

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

Refer to Circuit/System Testing.

- **Go to next step: If a clear image is displayed**

9. 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 Ω between the ground circuit terminal 4 and ground.

- **If 10 Ω or greater**

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.
- **Go to next step: If less than 10 Ω**

3. Ignition ON.

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

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

1. Ignition OFF.

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is OK 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 ignition circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, test or replace the KR73 Ignition Main Relay.

- **Go to next step: If the test lamp illuminates**

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

6. 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 2 at the B87 Rearview Camera.
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

7. 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 2 at the B87 Rearview Camera.
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If infinite resistance**

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

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

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

- **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.

- **Go to next step: If less than 2 Ω**

10. Replace the B87 Rearview Camera.

11. Engine running, parking brake applied, 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.

- **Go to next step: If a clear rear vision image displayed on the A11 Radio**

12. All OK.

Repair Instructions

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

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

DTC B127B: REARVIEW CAMERA INPUT SIGNAL CIRCUIT (IO5/IO6 WITHOUT MAH/MBC)

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

B127B

Rearview Camera Input Signal Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B or 1	B127B 2B or 1	-	-
Camera Module signal +	B127B 2B or 3	B127B 2B or 1	B127B 2B or 2	-
Camera Module signal -	B127B 2B or 3	B127B 2B or 1	B127B 2B or 1	-
Ground	-	B127B 2B or 1	-	-
Shield	-	3	-	-
1. Rear vision camera image not displayed 2. Rear vision camera image always displayed 3. Poor Quality Image (as described in Circuit/System Verification)				

Circuit/System Description

Ignition voltage and ground are supplied to the Rearview Camera. When the transmission is placed into R, a signal is sent to the K74 Human Machine Interface Control Module indicating that camera operation is requested. The Rearview Camera sends video image to the K74 Human Machine Interface Control Module through a video signal + and a video signal - circuit. The K74 Human Machine Interface Control Module then sends the video signal via digital LVDS circuits (USB cable) to the P17 Info Display Module to be displayed.

Conditions for Running the DTC

- Engine running

- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera has not been received by the human machine interface control module for 2.5 s.

Action Taken When the DTC Sets

- The human machine interface control module stores the DTC in memory.
- A service message may be displayed on the driver information center of info display module.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Vision Camera Description and Operation (IO5/IO6 without MAH/MBC)

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

Special Tools

EL-50334-50 GM Infotainment Tester Kit

Circuit/System Verification

1. Verify there is no debris on the B87 Rearview Camera lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**

Clean the lens using water and a soft cloth. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 - **Go to next step: If there is no debris on the lens**
2. Engine running, parking brake applied, transmission in REVERSE.
3. Verify the backup lamps are illuminated.

- If the backup lamps are not illuminated

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

- Go to next step: If the backup lamps are illuminated

4. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.

- If the P17 Info Display is not displaying properly

Refer to [Radio Information Display Malfunction \(IO5/IO6 Without MAH/MBC\)](#).

- Go to next step: If the P17 Info Display displays properly

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

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.

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

- If a clear image is not displayed

Refer to Circuit/System Testing.

- Go to next step: If a clear image is displayed

7. All OK.

Circuit/System Testing

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

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

- If 10 Ω or greater

1. Ignition OFF.

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

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

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

- Go to next step: If less than 10 Ω

3. Ignition ON.

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

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

1. Ignition OFF.

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

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

- If less than 2 Ω , verify the fuse is 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

1. Ignition OFF.

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

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

- Go to next step: If the test lamp illuminates

5. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X1 harness connector. Ignition ON.

6. Verify a test lamp illuminates between serial data communication enable circuit terminal 5 and ground.

- If the test lamp does not illuminate

1. Ignition/Vehicle OFF.
2. Test for infinite resistance between the serial data communication enable circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the serial data communication enable circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the control module that controls the serial data communication enable circuit.

• **Go to next step: If the test lamp illuminates**

7. Ignition OFF, Connect the K74 Human Machine Interface Control Module X1 harness connector.
8. Disconnect the X2 harness connector at the K74 Human Machine Interface Control Module, ignition ON.
9. Test for less than 1 V between the signal circuit terminals listed below and ground:
 - K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2
 - K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2
 - **If 1 V or greater**

Repair the short to voltage on the circuit.

• **Go to next step: If less than 1 V**

10. Ignition OFF.
11. Test for infinite resistance between the signal circuit terminals listed below and ground:
 - K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2
 - K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2
 - **If less than infinite resistance**

Repair the short to ground on the circuit.

• **Go to next step: If infinite resistance**

12. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2 and the B87 Rearview Camera signal (+) circuit terminal 1.

• **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

• **Go to next step: If less than 2 Ω**

13. Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2 and the B87 Rearview Camera signal (-) circuit terminal 2.

• **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

• **Go to next step: If less than 2 Ω**

14. Replace the B87 Rearview Camera.
15. Engine running, parking brake applied, transmission in REVERSE.
16. Verify the rear view image displays properly.
 - **If rear view image is not displayed**

Replace the K74 Human Machine Interface Control Module.

• **Go to next step: If rear view image is displayed**

17. All OK.

Repair Instructions

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

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

DTC B133B: REVERSE GEAR STATUS NOT PLAUSIBLE

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 B133B 00

Reverse Gear Status Not Plausible

Circuit/System Description

The Human Machine Interface Control Module receives a signal from the Human Machine Interface Control Module Bypass Module indicating reverse gear status. The reverse gear status is used to determine when to activate the rearview camera display. The Human Machine Interface Control Module also receives another reverse gear status message via serial data. The Human Machine Interface Control Module compares the two serial data messages to verify the plausibility of the messages.

Conditions for Running the DTC

Ignition ON/Vehicle in Service Mode.

Conditions for Setting the DTC

The Human Machine Interface Control Module has determined the reverse message states do not match and are therefore not plausible.

Action Taken When the DTC Sets

The Human Machine Interface Control Module may not activate the rearview camera display.

Conditions for Clearing the DTC

The Human Machine Interface Control Module no longer detects a malfunction.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

[Rear Vision Camera Description and Operation \(with IOB/IO6\)](#)[Rear Vision Camera Description and Operation \(IO5/IO6 with MAH/MBC\)](#)[Rear Vision Camera Description and Operation \(IO5/IO6 without MAH/MBC\)](#)

Electrical Information Reference

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

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON/Vehicle in Service Mode.
2. Verify no other DTC is not set.

- **If other DTC is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

- **Go to next step: If no other DTCs are set**

NOTE: A clear rear vision image is an image that is free of flickering, blinking, excessive blue/yellow hue, and/or blurriness/pixelation such that it obstructs the drivers view out the rear of the vehicle.

3. Verify Rear Vision Camera Display operates properly. Refer to **Rear Vision Camera System Malfunction (IOB/IOR/IOS/IOT/IOU)Rear Vision Camera System Malfunction (IO5/IO6 with MAH/MBC)Rear Vision Camera System Malfunction (IO5/IO6 without MAH/MBC)**.
4. Engine running, parking brake applied, transmission in R.
5. Verify the scan tool BCM Backup Lamps Relay Command parameter is Active.
 - **If Backup Lamps Relay Command parameter is not Active**
Test or replace the K9 Body Control Module.
 - **Go to next step: If Backup Lamps Relay Command parameter is Active**
6. Test or replace the K74 Human Machine Interface Control Module.

Repair Instructions

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

Control Module References for control module replacement, programming and setup

DTC B390F: FRONTVIEW CAMERA

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 B390F 08

Frontview Camera Performance - Signal Invalid

DTC B390F 66

Frontview Camera Wrong Mounting Position

DTC B390F 4B

Frontview Camera Calibration Not Learned

For symptom byte information, refer to **Symptom Byte List** .

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B390F 08, B399A 02	B390F 08, 1	B399A 01	-
Video Signal +	1, 2	1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B390F 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B390F 08

The frontview camera video circuit is open, shorted to voltage, or shorted to ground.

B390F 66

The frontview camera is incorrectly mounted.

B390F 4B

The camera calibration is not learned.

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the Surround Vision Camera 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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

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Description and Operation

Surround Vision Camera Description and Operation

Electrical Information Reference

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

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B390F 4B is not set.
 - **If the DTC is set**
 1. Program the K157 Video Processing Control Module.
 2. Verify DTC B390F 4B is not set after programming and performing **Video Processing Control Module Calibration**.
 - If the DTC sets after programming, replace the B174G Frontview Camera - Grille.
 - If the DTC does not set
 - 3. All OK.
 - **Go to next step: If both DTCs are not set**
3. Verify DTC B390F 66 is not set.
 - **If the DTC is set**

Remove the B174G Frontview Camera - Grille and reinstall

 - **Go to next step: If the DTC is not set**
4. Verify DTC B390F 08 is not set.
 - **If DTC is set**

Refer to Circuit/System Testing

 - **Go to next step: If DTC is not set**
5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the B174G Frontview Camera - Grille harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 5 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for infinite resistance between the 6 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 6 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **If greater than 7.2 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.
 2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.

- **Go to next step: If between 4.8 - 7.2 V**

5. Ignition ON.

6. Test for less than 10 V between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 3
- **If 10 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 3
- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.
2. Test for infinite between the signal circuit and ground.
 - If less than infinite resistance, repair the short to voltage on the circuit.
 - If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B174G Frontview Camera - Grille video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 1 X1
- B174G Frontview Camera - Grille video signal (-) circuit terminal 3 and the K157 Video Processing Control Module video signal (-) circuit terminal 11 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B174G Frontview Camera - Grille.

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

12. Verify DTC B390F is not set.

- **If DTC B390F is set**

Replace the B174G Frontview Camera - Grille.

- **Go to next step: If DTC B390F is not set**

13. All OK.

Repair Instructions

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

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

DTC B395A: REARVIEW CAMERA

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 B395A 08

Rearview Camera Performance - Signal Invalid

DTC B395A 66

Rearview Camera Wrong Mounting Position

DTC B395A 4B

Rearview Camera Calibration Not Learned

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395A 02, B399B 08	B395A 08, 1	B399B 08	-
Video Signal +	1, 2	B395A 08, 1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B395A 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B395A 08

The rearview camera video circuit is open, shorted to voltage, or shorted to ground.

B395A 66

The rearview camera is incorrectly mounted.

B395A 4B

The camera calibration is not learned.

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

[Image Display Camera Wiring Schematics](#)

Connector End View Reference

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Description and Operation

[Surround Vision Camera Description and Operation](#)

Electrical Information Reference

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

Scan Tool Reference

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

[Circuit/System Verification](#)

1. Ignition ON.
2. Verify DTC B395A 4B is not set.
 - **If the DTC is set**
 1. Program the K157 Video Processing Control Module.
 2. Verify DTC B395A 4B is not set after programming and performing [Video Processing Control Module Calibration](#).
 - If the DTC sets after programming, replace the B87 Rearview Camera.
 - If the DTC does not set
 - 3. All OK.
 - **Go to next step: If the DTC is not set**
3. Verify DTC B395A 66 is not set.
 - **If the DTC is set**

Remove the B87 Rearview Camera and reinstall
 - **Go to next step: If the DTC is not set**
4. Verify DTC B395A 08 is not set.
 - **If DTC is set**

Refer to Circuit/System Testing
 - **Go to next step: If DTC is not set**
5. All OK.

[Circuit/System Testing](#)

1. Ignition OFF, disconnect the B87 Rearview Camera harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 5 and ground.

- **If less than 4.8 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.

2. Test for infinite resistance between the 6 V reference circuit and ground.

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

3. Test for less than 2 Ω in the 6 V reference circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K157 Video Processing Control Module.

- **If greater than 7.2 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.

2. Test for less than 1 V between the 5 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 K157 Video Processing Control Module.

- **Go to next step: If between 4.8 - 7.2 V**

5. Ignition ON.

6. Test for less than 10 V between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 3

- **If 10 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 3

- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.

2. Test for infinite between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B87 Rearview Camera video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 4 X1
- B87 Rearview Camera video signal (+) circuit terminal 3 and the K157 Video Processing Control Module video signal (+) circuit terminal 14 X1

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B87 Rearview Camera.

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

12. Verify DTC B395A is not set.

- If DTC B395A is set

Replace the B87 Rearview Camera.

- Go to next step: If DTC B395A is not set

13. All OK.

Repair Instructions

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

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

DTC B395B: SIDEVIEW CAMERA

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 B395B 08

Sideview Camera - Left Performance - Signal Invalid

DTC B395B 66

Sideview Camera - Left Wrong Mounting Position

DTC B395B 4B

Sideview Camera - Left Calibration Not Learned

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395B 08, B399C 02	B395B 08, 1	B399C 01	-
Video Signal +	1, 2	B395B 08, 1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B395B 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B395B 08

The sideview camera - left video circuit is open, shorted to voltage, or shorted to ground.

B395B 66

The sideview camera - left is incorrectly mounted.

B395B 4B

The sideview camera - left is not learned.

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that camera's portion of the display.

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.

Reference Information

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Image Display Camera Wiring Schematics

Connector End View Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B395B 4B is not set.
 - **If the DTC is set**
 1. Program the K157 Video Processing Control Module.
 2. Verify DTC B395B 4B is not set after programming and performing **Video Processing Control Module Calibration**.
 - If the DTC sets after programming, replace the B225L Sideview Camera - Left.
 - If the DTC does not set
 3. All OK.
 - **Go to next step: If the DTC is not set**
3. Verify DTC B395B 66 is not set.
 - **If the DTC is set**

Remove the B225L Sideview Camera - Left and reinstall

- **Go to next step: If the DTC is not set**

4. Verify DTC B395B 08 is not set.

- **If DTC is set**

Refer to Circuit/System Testing

- **Go to next step: If DTC is not set**

5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the B225L Sideview Camera - Left harness connector. It may take up to 2 min for all vehicle systems to power down.

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

- **If 10 Ω or greater**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K157 Video Processing Control Module.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 6 and ground.

- **If less than 4.8 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.

2. Test for infinite resistance between the 6 V reference circuit and ground.

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

3. Test for less than 2 Ω in the 6 V reference circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K157 Video Processing Control Module.

- **If greater than 7.2 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.

2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.

- **Go to next step: If between 4.8 - 7.2 V**

5. Ignition ON.

6. Test for less than 10 V between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 4

- **If 10 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1

- Vision Signal - signal circuit terminal 4

- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.
2. Test for infinite between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B225L Sideview Camera - Left video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 5 X1
- B225L Sideview Camera - Left video signal (+) circuit terminal 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 15 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B225L Sideview Camera - Left.
11. Ignition ON, clear DTCs. Operate the vehicle within the Conditions for Running the DTC.
12. Verify DTC B395B is not set.

- **If DTC B395B is set**

Replace the B225L Sideview Camera - Left.

- **Go to next step: If DTC B395B is not set**

13. All OK.

Repair Instructions

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

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

DTC B395C: SIDEVIEW CAMERA

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 B395C 08

Sideview Camera - Right Performance - Signal Invalid

DTC B395C 66

Sideview Camera - Right Wrong Mounting Position

DTC B395C 4B

Sideview Camera - Right Calibration Not Learned

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395C 08, B399D 02	B395C 08, 1	B399D 01	-
Video Signal +	1, 2	B395C 08, 1	1, 2	-
Video Signal -	B395C 08, 1	1	1, 2	-
Low Reference	-	B395C 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B395C 08

The sideview camera - right video circuit is open, shorted to voltage, or shorted to ground.

B395C 66

The sideview camera - right is incorrectly mounted.

B395C 4B

The sideview camera - right is not learned.

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

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Surround Vision Camera Description and Operation

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Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC B395C 4B is not set.
 - **If the DTC is set**
 1. Program the K157 Video Processing Control Module.
 2. Verify DTC B395C 4B is not set after programming and performing **Video Processing Control Module Calibration**.
 - If the DTC sets after programming, replace the B225R Sideview Camera - Right.
 - If the DTC does not set
 - 3. All OK.
 - **Go to next step: If the DTC is not set**
3. Verify DTC B395C 66 is not set.
 - **If the DTC is set**

Remove the B225R Sideview Camera - Right and reinstall

 - **Go to next step: If the DTC is not set**
4. Verify DTC B395C 08 is not set.
 - **If DTC is set**

Refer to Circuit/System Testing

 - **Go to next step: If DTC is not set**
5. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the B225R Sideview Camera - Right harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 6 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for infinite resistance between the 6 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 6 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **If greater than 7.2 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.
 2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.

- **Go to next step: If between 4.8 - 7.2 V**

5. Ignition ON.

6. Test for less than 10 V between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 4
- **If 10 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 4
- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.
2. Test for infinite between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B225R Sideview Camera - Right video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 8 X1
- B225R Sideview Camera - Right video signal (+) circuit terminal 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 18 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B225R Sideview Camera - Right.

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

12. Verify DTC B395C is not set.

- **If DTC B395C is set**

Replace the B225R Sideview Camera - Right.

- **Go to next step: If DTC B395C is not set**

13. All OK.

Repair Instructions

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

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

DTC B399A: FRONTVIEW CAMERA SUPPLY CIRCUIT SHORT TO BATTERY/GROUND

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 B399A 01

Frontview Camera Supply Circuit Short to Battery

DTC B399A 02

Frontview Camera Supply Circuit Short to Ground

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B390F 08, B399A 02	B390F 08, 1	B399A 01	-
Video Signal +	1, 2	1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B390F 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B399A 01

The frontview camera 6V reference circuit is shorted to voltage

B399A 02

The frontview camera 6V reference circuit is shorted to ground

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

Description and Operation

Surround Vision Camera Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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

Circuit/System Testing

1. Ignition OFF, disconnect the B174G Frontview Camera - Grille harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 5 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for infinite resistance between the 6 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 6 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **If greater than 7.2 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.
 2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.
 - **Go to next step: If between 4.8 - 7.2 V**
5. Ignition ON.
6. Test for less than 10 V between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 3
 - **If 10 V or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 3
- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.

2. Test for infinite between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B174G Frontview Camera - Grille video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 1 X1
- B174G Frontview Camera - Grille video signal (+) circuit terminal 3 and the K157 Video Processing Control Module video signal (+) circuit terminal 11 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B174G Frontview Camera - Grille.

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

12. Verify DTC B399A is not set.

- **If DTC B399A is set**

Replace the B174G Frontview Camera - Grille.

- **Go to next step: If DTC B399A is not set**

13. All OK.

Repair Instructions

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

- [Front View Driver Information Camera Replacement \(Equinox\)](#)[Front View Driver Information Camera Replacement \(Terrain\)](#)
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B399B: REARVIEW CAMERA SUPPLY CIRCUIT SHORT TO BATTERY/GROUND

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 B399B 01

Rearview Camera Supply Circuit Short to Battery

DTC B399B 02

Rearview Camera Supply Circuit Short to Ground

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395A 02, B399B 08	B395A 08, 1	B399B 08	-
Video Signal +	1, 2	B395A 08, 1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B395A 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B399B 01

The rearview camera 6V reference circuit is shorted to voltage

B399B 02

The rearview camera 6V reference circuit is shorted to ground

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Surround Vision Camera Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Circuit/System Testing

1. Ignition OFF, disconnect the B87 Rearview Camera harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 4 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 5 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for infinite resistance between the 6 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 6 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **If greater than 7.2 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.
 2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.
 - **Go to next step: If between 4.8 - 7.2 V**
5. Ignition ON.
6. Test for less than 10 V between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 3
 - **If 10 V or greater**
 1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.
 - **Go to next step: If less than 10 V**
7. Ignition OFF.
8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 3
 - **If less than 100 Ω**
 1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.
 2. Test for infinite between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K157 Video Processing Control Module.
 - **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B87 Rearview Camera video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 4 X1
- B87 Rearview Camera video signal (+) circuit terminal 3 and the K157 Video Processing Control Module video signal (+) circuit terminal 14 X1
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B87 Rearview Camera.

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

12. Verify DTC B399B is not set.

- **If DTC B399B is set**

Replace the B87 Rearview Camera.

- **Go to next step: If DTC B399B is not set**

13. All OK.

Repair Instructions

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

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

DTC B399C: SIDEVIEW CAMERA - LEFT SUPPLY CIRCUIT SHORT TO BATTERY/GROUND

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 B399C 01

Sideview Camera - Left Supply Circuit Short to Battery

DTC B399C 02

Sideview Camera - Left Supply Circuit Short to Ground

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395B 08, B399C 02	B395B 08, 1	B399C 01	-
Video Signal +	1, 2	B395B 08, 1	1, 2	-
Video Signal -	1, 2	1	1, 2	-
Low Reference	-	B395B 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B399C 01

The sideview camera - left 6V reference circuit is shorted to voltage

B399C 02

The sideview camera - left 6V reference circuit is shorted to ground

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

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Description and Operation

Surround Vision Camera Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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

Circuit/System Testing

1. Ignition OFF, disconnect the B225L Sideview Camera - Left harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 6 and ground.

- **If less than 4.8 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.

2. Test for infinite resistance between the 6 V reference circuit and ground.

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

3. Test for less than 2 Ω in the 6 V reference circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the K157 Video Processing Control Module.

- **If greater than 7.2 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.

2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.

- **Go to next step: If between 4.8 - 7.2 V**

5. Ignition ON.

6. Test for less than 10 V between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 4

- **If 10 V or greater**

1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.

- **Go to next step: If less than 10 V**

7. Ignition OFF.

8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:

- Vision Signal + signal circuit terminal 1
- Vision Signal - signal circuit terminal 4

- **If less than 100 Ω**

1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.

2. Test for infinite between the signal circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K157 Video Processing Control Module.

- **Go to next step: If greater than 100 Ω**

9. Test for less than 2 Ω between the video signal circuit terminals listed below:

- B225L Sideview Camera - Left video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 5 X1
- B225L Sideview Camera - Left video signal (+) circuit terminal 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 15 X1

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition OFF, connect the harness connector at the B225L Sideview Camera - Left.

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

12. Verify DTC B399C is not set.

- **If DTC B399C is set**

Replace the B225L Sideview Camera - Left.

- **Go to next step: If DTC B399C is not set**

13. All OK.

Repair Instructions

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

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

DTC B399D: SIDEVIEW CAMERA - RIGHT SUPPLY CIRCUIT SHORT TO BATTERY/GROUND

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 B399D 01

Sideview Camera - Right Supply Circuit Short to Battery

DTC B399D 02

Sideview Camera - Right Supply Circuit Short to Ground

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
6 V Reference	B395C 08, B399D 02	B395C 08, 1	B399D 01	-
Video Signal +	1, 2	B395C 08, 1	1, 2	-
Video Signal -	B395C 08, 1	1	1, 2	-
Low Reference	-	B395C 08, 1	-	-
1. Camera inoperative 2. Poor image quality displayed from camera				

Circuit/System Description

The video processing control module performs fault detection on itself and the cameras attached to it.

Conditions for Running the DTC

Ignition voltage is between 9 - 16 V.

Conditions for Setting the DTC

B399D 01

The sideview camera - right 6V reference circuit is shorted to voltage

B399D 02

The sideview camera - right 6V reference circuit is shorted to ground

Action Taken When the DTC Sets

- The Video Processing Control Module requests the instrument cluster to display "Service Surround Vision Camera".
- The Video Processing Control Module will disable the camera and that cameras portion of the display.

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.

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

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Surround Vision Camera Description and Operation

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

Scan Tool Reference

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

Circuit/System Testing

1. Ignition OFF, disconnect the B225R Sideview Camera - Right harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 5 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8 - 7.2 V between the 6 V reference circuit terminal 6 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module.
 2. Test for infinite resistance between the 6 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 6 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.
 - **If greater than 7.2 V**

1. Ignition OFF, disconnect the harness connector at the K157 Video Processing Control Module, ignition ON.
2. Test for less than 1 V between the 6 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 K157 Video Processing Control Module.
- **Go to next step: If between 4.8 - 7.2 V**
5. Ignition ON.
6. Test for less than 10 V between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 4
 - **If 10 V or greater**
1. Ignition OFF, disconnect the X1 harness connector at the K157 Video Processing 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 K157 Video Processing Control Module.
- **Go to next step: If less than 10 V**
7. Ignition OFF.
8. Test for greater than 100 Ω between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 4
 - **If less than 100 Ω**
1. Disconnect the X1 harness connector at the K157 Video Processing Control Module.
2. Test for infinite between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K157 Video Processing Control Module.
- **Go to next step: If greater than 100 Ω**
9. Test for less than 2 Ω between the video signal circuit terminals listed below:
 - B225R Sideview Camera - Right video signal (+) circuit terminal 1 and the K157 Video Processing Control Module video signal (+) circuit terminal 8 X1
 - B225R Sideview Camera - Right video signal (+) circuit terminal 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 18 X1
 - **If 2 Ω or greater**
- Repair the open/high resistance in the circuit.
- **Go to next step: If less than 2 Ω**
10. Ignition OFF, connect the harness connector at the B225R Sideview Camera - Right.
11. Ignition ON, clear DTCs. Operate the vehicle within the Conditions for Running the DTC.
12. Verify DTC B399D is not set.
 - **If DTC B399D is set**
- Replace the B225R Sideview Camera - Right.
- **Go to next step: If DTC B399D is not set**
13. All OK.

Repair Instructions

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

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

SYMPTOMS - IMAGE DISPLAY CAMERAS

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

1. Perform the [Diagnostic System Check - Vehicle](#) before using the Symptom Tables in order to verify that all of the following are true:
 - There are no DTCs set.

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

- 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 [Rear Vision Camera Description and Operation \(with IOB/IOB\)Rear Vision Camera Description and Operation \(IO5/IO6 with MAH/MBC\)Rear Vision Camera Description and Operation \(IO5/IO6 without MAH/MBC\)](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which may affect the operation of the system. Refer to [Checking Aftermarket Accessories](#).
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.
- This system uses a camera that needs to be clean in order to function properly. Make sure to check the rear vision camera lens for obstructions.

Intermittent

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

Symptom List

- [Rear Vision Camera System Malfunction \(IOB/IOB/IOS/IOT/IOU\)Rear Vision Camera System Malfunction \(IO5/IO6 with MAH/MBC\)Rear Vision Camera System Malfunction \(IO5/IO6 without MAH/MBC\)](#)

REAR VISION CAMERA SYSTEM MALFUNCTION (IOB/IOB/IOS/IOT/IOU)

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

B127B

Rearview Camera Input Signal Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 1	-	-
Camera Module signal +	B127B 2B, B127B 08, or 3	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 2	-
Camera Module signal -	B127B 2B, B127B 08, or 3	B127B 2B, B127B 08, or 1	B127B 2B, B127B 08, or 1	-
Ground	-	B127B 2B, B127B 08, or 1	-	-
Shield	-	3	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
1. Rear vision camera image not displayed 2. Rear vision camera image always displayed 3. Poor Quality Image (as described in Circuit/System Verification)				

Circuit/System Description

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

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera has not been received by the radio for 2.5 s.

Action Taken When the DTC Sets

- The human machine interface control module stores the DTC in memory.
- A service message may be displayed on the driver information center of info display module.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

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Description and Operation

Rear Vision Camera Description and Operation (with IOB/IOR)

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](#).
 - **Go to next step: If the DTC is not set**
3. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.
 - **If the P17 Info Display is not displaying properly**
Refer to [Radio Information Display Malfunction \(IOB\) Radio Information Display Malfunction \(IOS/IOT/IOU\) Radio Information Display Malfunction \(IOR\)](#).
 - **Go to next step: If the P17 Info Display displays properly**
4. Verify the rearview camera has no debris on the lens and that the bezel or bezel seal is not damaged.
 - **If debris are found on the lens**
Clean the lens using water and a soft cloth. If the lens, bezel, or bezel seal are damaged, replace as necessary.
 - **Go to next step: If no debris on the lens**
5. Engine running, parking brake applied, transmission in REVERSE.
6. Verify the backup lamps are On.
 - **If the backup lamps are not ON**
Refer to [Backup Lamps Malfunction \(Automatic Transmission\) Backup Lamps Malfunction \(Manual Transmission\)](#).
 - **Go to next step: If the backup lamps are ON**
7. Engine running, parking brake applied, transmission in REVERSE.

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.
8. Verify a clear rear vision image is displayed on the radio.
 - **If a clear image is not displayed**
Refer to Circuit/System Testing.
 - **Go to next step: If a clear image is displayed**
9. 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 Ω between the ground circuit terminal 4 and ground.
 - **If 10 Ω or greater**
Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **Go to next step: If less than 10 Ω**
3. Ignition ON.
4. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

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

1. Ignition OFF.
2. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK 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 ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, test or replace the KR73 Ignition Main Relay.

- **Go to next step: If the test lamp illuminates**

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

6. 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 2 at the B87 Rearview Camera.

- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

7. 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 2 at the B87 Rearview Camera.

- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If infinite resistance**

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

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **Go to next step: If less than 2 Ω**

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

- **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.

- **Go to next step: If less than 2 Ω**

10. Replace the B87 Rearview Camera.

11. Engine running, parking brake applied, 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.

- **Go to next step: If a clear rear vision image displayed on the A11 Radio**

12. All OK.

Repair Instructions

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

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

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 B127B

Rearview Camera Input Signal Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Camera Ignition/RAP voltage	1	1	-	-
Camera Backup Signal	1	1	-	-
Camera Module signal +	1	1	1	-
Camera Module signal -	1	1	1	-
Camera Ground	-	1	-	-
Bypass Module B+	B127E 00, 2 or 4	B127E 00, 2 or 4	-	-
Bypass Module Ignition	5	5	-	-
Bypass Module Backup Signal	5	5	-	-
Bypass Module signal +	B127B 2B or 3	B127B 2B or 3	B127B 2B or 3	-
Bypass Module signal -	B127B 2B or 3	B127B 2B or 3	B127B 2B or 3	-
Bypass Module Ground	-	2, 4	-	-
Shield	-	-	-	-
LIN serial Data	B127E 00	6	-	-
USB harness (K74 to K188)	B127E 00	B127E 00 or 3	-	-
USB harness (K188 to P17)	-	4	-	-
1. Rear vision camera image not displayed 2. No radio information display on P17 Info Display Module 3. Rear vision camera image lacks projection lines and object detection symbols 4. No rear camera or radio information display on P17 Info Display Module 5. Possible delayed rear vision displayed on Info Display Module 6. No start up animation on the P17 Info Display Module.				

Circuit/System Description

Ignition voltage and ground are supplied to the Rearview Camera. When the transmission is placed into R, a signal is sent to the K188 Human Machine Interface Control Module Bypass Module indicating that camera operation is requested. The Rearview Camera sends video image to the K188 Human Machine Interface Control Module Bypass Module through a video signal + and a video signal - circuit. The K188 Human Machine Interface Control Module Bypass Module passes the video image to K74 Human Machine Interface Control Module via video signal + and a video signal - circuits. The K188 Human Machine Interface Control Module Bypass Module is used to ensure the K74 Human Machine Interface Control Module produces a quality rear vision camera image to be displayed on the P17 Info Display Module when the vehicle is placed in reverse gear. In the event the K188 Human Machine Interface Control Module Bypass Module detects an issue with the camera image generated by the K74 Human Machine Interface Control Module, such as a black, solid color, frozen, or image other than the camera image, the K188 Human Machine Interface Control Module Bypass Module will assume control of the image to the P17 Info Display Module and displays a raw camera image with no park assist projection lines or object detection symbols for the entire reverse cycle.

The K188 Human Machine Interface Control Module Bypass Module is part of the video signal + and a video signal - circuits path from the B87 Rearview Camera to the K74 Human Machine Interface Control Module as well as the digital LVDS path (USB cable) between the K74 Human Machine Interface Control Module and P17 Info Display Module and needs to be active for either signal to be received by these modules. The K188 Human Machine

Interface Control Module Bypass Module is not connected to serial data and uses the reverse lamp voltage input to determine the vehicle gear state.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera has not been received by the human machine interface control module for 2.5 s.

Action Taken When the DTC Sets

- The human machine interface control module stores the DTC in memory.
- A service message may be displayed on the driver information center of info display module.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Vision Camera Description and Operation (IO5/IO6 With MAH/MBC)

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

Special Tools

EL-50334-50 GM Infotainment Tester Kit

Circuit/System Verification

1. Verify there is no debris on the B87 Rearview Camera lens and that the bezel and bezel seal are not damaged.
 - **If debris is found on the lens**

Clean the lens using water and a soft cloth. If the lens, bezel, or bezel seal are damaged, replace as necessary.

- **Go to next step: If there is no debris on the lens**

2. Engine running, parking brake applied, transmission in REVERSE.

3. Verify the backup lamps are illuminated.

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

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

- **Go to next step: If the backup lamps are illuminated**

4. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.

- **If the P17 Info Display is not displaying properly**

1. Engine running, parking brake applied, transmission in R.

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.

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

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

Refer to Circuit/System Testing- A: Info Display does not Display Radio Information

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

Refer to Circuit/System Testing - B: Info Display Module does not Display Anything.

- **Go to next step: If the P17 Info Display displays properly**

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

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.

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

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

Refer to Circuit/System Testing - C: No Rear View Camera Image.

- **Go to next step: If a clear image is displayed**

7. Verify a clear enhanced rear vision image, which includes projected path lines and object detection indicators, is displayed on the P17 Info Display Module.

- **If an enhanced clear image is not displayed**

Refer to Circuit/System Testing - D: No Enhanced Rear View Camera Image.

- **Go to next step: If an enhanced clear image is displayed**

8. All OK.

Circuit/System Testing

Circuit/System Testing- A: Info Display does not Display Radio Information

1. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X5 and the K188 Human Machine Interface Control Module Bypass Module harness connector X2.
2. Connect the EL-50334-2 to the K74 Human Machine Interface Control Module connector X5 and EL-50334-14 to the K188 Human Machine Interface Control Module Bypass Module connector X2. Connect EL-50334-2 and EL-50334-14 together.
3. Ignition ON/Vehicle in Service Mode, infotainment system ON.

4. Verify the P17 Info Display Module displays and image.

- **If the P17 Info Display Module does not display an image.**

Replace the K74 Human Machine Interface Control Module.

- **Go to next step: If the P17 Info Display Module displays an image.**

5. Replace the USB harness between the K74 Human Machine Interface Control Module to the K188 Human Machine Interface Control Module Bypass Module.

Circuit/System Testing - B: Info Display Module does not Display Anything

1. Ignition OFF and all vehicle systems OFF. It may take up to 2 min for all vehicle systems to power down. Disconnect K188 Human Machine Interface Control Module Bypass Module harness connector X1.

2. Test for less than 10 Ω between the K188 Human Machine Interface Control Module Bypass Module ground circuit terminal 5 X1 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

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

- **Go to next step: If less than 10 Ω**

3. Verify a test lamp illuminates between the B+ circuit terminal 1 X1 and ground.

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

1. Ignition OFF.

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

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

- If less than 2 Ω , verify the fuse is OK 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 K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the test lamp illuminates**

4. Ignition ON.

5. Verify a test lamp illuminates between the ignition circuit terminal 2 X1 and ground.

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

1. Ignition OFF.

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

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

- If less than 2 Ω , verify the fuse is 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**

1. Ignition OFF.

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

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

- If infinite resistance, replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the test lamp illuminates**

6. Engine running, parking brake applied, transmission in REVERSE.

7. Verify a test lamp illuminates between the control circuit terminal 9 X1 and ground.

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

1. Ignition OFF.

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#) [Backup Lamps Malfunction \(Manual Transmission\)](#)

• **Go to next step: If the test lamp illuminates**

8. Reconnect the K188 Human Machine Interface Control Module Bypass Module.
9. Ignition OFF, disconnect the P17 Info Display Module connector X3 and the K188 Human Machine Interface Control Module Bypass Module connector X3.
10. Ignition OFF, connect the EL-50334-14 to the P17 Info Display Module X3 and EL-50334-2 to the K188 Human Machine Interface Control Module Bypass Module connector X3. Connect EL-50334-2 and EL-50334-14 together.
11. Engine running, parking brake applied, transmission in REVERSE.
12. Verify the rear view image displays properly.

• **If the image displays properly**

Replace the USB harness between the P17 Info Display Module connector X3 and the K188 Human Machine Interface Control Module Bypass Module connector X3.

• **Go to next step: If the image does not display properly**

13. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X5.
14. Connect the EL-50334-2 to the K74 Human Machine Interface Control Module connector X5 and connect the EL-50334-14 to the P17 Info Display Module X3. Connect EL-50334-2 and EL-50334-14 together.
15. Engine running, parking brake applied, transmission in REVERSE.
16. Verify the rear view image displays properly.

• **If rear view image displays properly**

Replace the K188 Human Machine Interface Control Module Bypass Module.

• **Go to next step: If the rear view image does not display properly**

17. Replace the P17 Info Display Module.
18. Engine running, parking brake applied, transmission in REVERSE.
19. Verify the rear view image displays properly.

• **If rear view image is not displayed**

Replace the B87 Rearview Camera.

• **Go to next step: If rear view image is displayed**

20. All OK.

Circuit/System Testing - C: No Rear View Camera Image

1. Ignition OFF and all vehicle systems OFF, disconnect the B87 Rearview Camera harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

• **If 10 Ω or greater**

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

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

• **Go to next step: If less than 10 Ω**

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

• **If the test lamp does not illuminate and the circuit fuse is good**

1. Ignition OFF.

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

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is 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**

1. Ignition OFF.

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

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

• **Go to next step: If the test lamp illuminates**

5. Ignition OFF, disconnect the X1 harness connector at the K188 Human Machine Interface Control Module Bypass Module, ignition ON.

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

- K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 6 X1
- K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 18 X1
- **If 1 V or greater**

Repair the short to voltage on the circuit.

• **Go to next step: If less than 1 V**

7. Ignition OFF.

8. Test for infinite resistance between the signal circuit terminals listed below and ground:

- K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 6 X1
- K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 18 X1
- **If less than infinite resistance**

Repair the short to ground on the circuit.

• **Go to next step: If infinite resistance**

9. Test for less than 2 Ω between the K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 6 X1 and the other end of the circuit.

- **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

• **Go to next step: If less than 2 Ω**

10. Test for less than 2 Ω between the K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 18 X1 and the other end of the circuit.

- **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

• **Go to next step: If less than 2 Ω**

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

12. Test for less than 10 Ω between the K188 Human Machine Interface Control Module Bypass Module ground circuit terminal 5 X1 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

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

• **Go to next step: If less than 10 Ω**

13. Verify a test lamp illuminates between the B+ circuit terminal 1 X1 and ground.

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

1. Ignition OFF.
2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is OK 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 K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the test lamp illuminates**

14. Ignition ON.

15. Verify a test lamp illuminates between the ignition circuit terminal 2 X1 and ground.

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

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

1. Ignition OFF.
2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the test lamp illuminates**

16. Engine running, parking brake applied, transmission in REVERSE.

17. Verify a test lamp illuminates between the control circuit terminal 9 X1 and ground.

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

1. Ignition OFF.
2. Test for less than 2 Ω in the control circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is good and there is voltage at the fuse. Refer to [Backup Lamps Malfunction \(Automatic Transmission\)](#) [Backup Lamps Malfunction \(Manual Transmission\)](#).

- **Go to next step: If the test lamp illuminates**

18. Reconnect the K188 Human Machine Interface Control Module Bypass Module.

19. Ignition OFF, disconnect the P17 Info Display Module connector X3 and the K188 Human Machine Interface Control Module Bypass Module connector X3.

20. Ignition OFF, connect the EL-50334-2 to the P17 Info Display Module connector X3 and EL-50334-14 to the K188 Human Machine Interface Control Module Bypass Module connector X3. Connect EL-50334-2 and EL-50334-14 together.

21. Engine running, parking brake applied, transmission in REVERSE.

22. Verify the rear view image displays properly.

- **If the image displays properly**

Replace the USB harness between the P17 Info Display Module connector X3 and the K188 Human Machine Interface Control Module Bypass Module connector X3.

- **Go to next step: If the image does not display properly**

23. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X5.

24. Connect the EL-50334-14 to the K74 Human Machine Interface Control Module connector X5 and connect the EL-50334-2 to the P17 Info Display Module connector X3. Connect EL-50334-2 and EL-50334-14 together.

25. Engine running, parking brake applied, transmission in REVERSE.

26. Verify the rear view image displays properly.

- **If rear view image displays properly**

Replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the rear view image does not display properly**

27. Replace the P17 Info Display Module.

28. Engine running, parking brake applied, transmission in REVERSE.

29. Verify the rear view image displays properly.

- **If rear view image is not displayed**

Replace the B87 Rearview Camera.

- **Go to next step: If rear view image is displayed**

30. All OK.

Circuit/System Testing - D: No Enhanced Rear View Camera Image

1. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X1 harness connector. Ignition ON.

2. Verify a test lamp illuminates between serial data communication enable circuit terminal 5 and ground.

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

1. Ignition/Vehicle OFF.

2. Test for infinite resistance between the serial data communication enable circuit and ground.

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

3. Test for less than 2 Ω in the serial data communication enable circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , replace the control module that controls the serial data communication enable circuit.

- **Go to next step: If the test lamp illuminates**

3. Ignition OFF, Connect the K74 Human Machine Interface Control Module X1 harness connector.

4. Disconnect the K74 Human Machine Interface Control Module X2 harness connector and K188 Human Machine Interface Control Module Bypass Module X1 harness connector. Ignition ON.

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

- K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 8 X1
- K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 20 X1
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **Go to next step: If less than 1 V**

6. Ignition OFF.

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

- K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 8 X1
- K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 20 X1
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **Go to next step: If infinite resistance**

8. Test for less than 2 Ω between the K188 Human Machine Interface Control Module Bypass Module signal (+) circuit terminal 8 X1 and the K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2.

- **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

- **Go to next step: If less than 2 Ω**

9. Test for less than 2 Ω between the K188 Human Machine Interface Control Module Bypass Module signal (-) circuit terminal 20 X1 and the K74 Human Machine Interface Control Module signal (+) circuit terminal 6 X2.

- **If 2 Ω or greater**

Repair the open/high resistance on the circuit.

- **Go to next step: If less than 2 Ω**

10. Ignition ON.

NOTE: For accurate voltage reading, disconnect the battery charger prior to performing the following test step.

11. Test for 2 - 12 V between the K188 Human Machine Interface Control Module Bypass Module LIN serial data circuit terminal 3 X1 and ground.

- **If less than 2 V**

1. Ignition OFF.

2. Test for infinite resistance between the serial data circuit and ground.

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

3. Test for less than 2 Ω in the serial data circuit end to each end.

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

4. Replace P17 Info Display Module.

5. Reconnect the K74 Human Machine Interface Control Module, ignition ON.

6. Test for 2 - 12 V between the LIN serial data circuit terminal and ground.

- If less than 2 V, replace the K74 Human Machine Interface Control Module.
- If greater than 2 V, replace the K188 Human Machine Interface Control Module Bypass Module.

- **If greater than 12 V**

1. Ignition OFF, disconnect the X1 harness connector at the P17 Info Display Module.

2. Ignition ON.

3. Test for less than 1 V between the serial data circuit and ground.

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

4. Replace P17 Info Display Module.

5. Ignition OFF, reconnect the K74 Human Machine Interface Control Module, ignition ON.

6. Test for 2 - 12 V between the LIN serial data circuit terminal and ground.

- If greater than 12 V, replace the K74 Human Machine Interface Control Module.
- If less than 12 V, replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If between 2 - 12 V**

12. Re-connect the K74 Human Machine Interface Control Module and the K188 Human Machine Interface Control Module Bypass Module harness connectors.

13. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X5 and the K188 Human Machine Interface Control Module Bypass Module harness connector X2.

14. Connect the EL-50334-2 to the K74 Human Machine Interface Control Module connector X5 and EL-50334-14 to the K188 Human Machine Interface Control Module Bypass Module connector X2. Connect EL-50334-2 and EL-50334-14 together.

15. Engine running, parking brake applied, transmission in REVERSE.

16. Verify the enhanced rear view image displays properly.

- **If the enhanced image displays properly**

Replace the USB harness between the K74 Human Machine Interface Control Module X5 and the K188 Human Machine Interface Control Module Bypass Module harness connector X2.

- **Go to next step: If the enhanced image does not display properly**

17. Ignition OFF, remove the EL-50334-14 from the K188 Human Machine Interface Control Module Bypass Module harness connector X2 and EL-50334-2 from the K74 Human Machine Interface Control Module connector X5.

18. Re-connect the K188 Human Machine Interface Control Module Bypass Module harness connector X2.

19. Disconnect the P17 Info Display Module harness connector X3.

20. Connect the EL-50334-2 to the K74 Human Machine Interface Control Module connector X5 and EL-50334-14 to the P17 Info Display Module X3. Connect EL-50334-2 and EL-50334-14 together.

21. Engine running, parking brake applied, transmission in REVERSE.

22. Verify the enhanced image displays properly.

- **If the enhanced image displays properly**

Replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the enhanced image does not display properly**

23. Replace the K74 Human Machine Interface Control Module.

Repair Instructions

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

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

REAR VISION CAMERA SYSTEM MALFUNCTION (IO5/IO6 WITHOUT MAH/MBC)

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

B127B

Rearview Camera Input Signal Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B127B 2B or 1	B127B 2B or 1	-	-
Camera Module signal +	B127B 2B or 3	B127B 2B or 1	B127B 2B or 2	-
Camera Module signal -	B127B 2B or 3	B127B 2B or 1	B127B 2B or 1	-
Ground	-	B127B 2B or 1	-	-
Shield	-	3	-	-
1. Rear vision camera image not displayed 2. Rear vision camera image always displayed 3. Poor Quality Image (as described in Circuit/System Verification)				

Circuit/System Description

Ignition voltage and ground are supplied to the Rearview Camera. When the transmission is placed into R, a signal is sent to the K74 Human Machine Interface Control Module indicating that camera operation is requested. The Rearview Camera sends video image to the K74 Human Machine Interface Control Module through a video signal + and a video signal - circuit. The K74 Human Machine Interface Control Module then sends the video signal via digital LVDS circuits (USB cable) to the P17 Info Display Module to be displayed.

Conditions for Running the DTC

- Engine running
- Transmission in R

Conditions for Setting the DTC

The video signal from the rearview camera has not been received by the human machine interface control module for 2.5 s.

Action Taken When the DTC Sets

- The human machine interface control module stores the DTC in memory.
- A service message may be displayed on the driver information center of info display module.

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Rear Vision Camera Description and Operation (IO5/IO6 Without MAH/MBC)

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

Special Tools

EL-50334-50 GM Infotainment Tester Kit

Circuit/System Verification

1. Verify there is no debris on the B87 Rearview Camera lens and that the bezel and bezel seal are not damaged.

- **If debris is found on the lens**

Clean the lens using water and a soft cloth. If the lens, bezel, or bezel seal are damaged, replace as necessary.

- **Go to next step: If there is no debris on the lens**

2. Engine running, parking brake applied, transmission in REVERSE.
3. Verify the backup lamps are illuminated.

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

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

- **Go to next step: If the backup lamps are illuminated**

4. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.

- **If the P17 Info Display is not displaying properly**

Refer to [Radio Information Display Malfunction \(IO5/IO6 Without MAH/MBC\)](#).

- **Go to next step: If the P17 Info Display displays properly**

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

NOTE: A poor quality image is an image that has flickering, blinking, excessively blue/yellow hue, and/or fog/haze such that it obstructs the driver's view out the rear of the vehicle.

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

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

Refer to Circuit/System Testing.

- **Go to next step: If a clear image is displayed**

7. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the B87 Rearview Camera harness connector. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 4 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

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

- **Go to next step: If less than 10 Ω**

3. Ignition ON.

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

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

1. Ignition OFF.

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

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

- If less than 2 Ω , verify the fuse is 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**

1. Ignition OFF.

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

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

• **Go to next step: If the test lamp illuminates**

- Ignition OFF, disconnect the K74 Human Machine Interface Control Module X1 harness connector. Ignition ON.
- Verify a test lamp illuminates between serial data communication enable circuit terminal 5 and ground.
 - **If the test lamp does not illuminate**
 - Ignition/Vehicle OFF.
 - Test for infinite resistance between the serial data communication enable circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - Test for less than 2 Ω in the serial data communication enable circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the control module that controls the serial data communication enable circuit.
 - Go to next step: If the test lamp illuminates**
- Ignition OFF, Connect the K74 Human Machine Interface Control Module X1 harness connector.
- Disconnect the X2 harness connector at the K74 Human Machine Interface Control Module, ignition ON.
- Test for less than 1 V between the signal circuit terminals listed below and ground:
 - K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2
 - K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2
 - **If 1 V or greater**
Repair the short to voltage on the circuit.
 - **Go to next step: If less than 1 V**
- Ignition OFF.
- Test for infinite resistance between the signal circuit terminals listed below and ground:
 - K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2
 - K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2
 - **If less than infinite resistance**
Repair the short to ground on the circuit.
 - **Go to next step: If infinite resistance**
- Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (+) circuit terminal 5 X2 and the B87 Rearview Camera signal (+) circuit terminal 1.
 - **If 2 Ω or greater**
Repair the open/high resistance on the circuit.
 - **Go to next step: If less than 2 Ω**
- Test for less than 2 Ω between the K74 Human Machine Interface Control Module signal (-) circuit terminal 6 X2 and the B87 Rearview Camera signal (-) circuit terminal 2.
 - **If 2 Ω or greater**
Repair the open/high resistance on the circuit.
 - **Go to next step: If less than 2 Ω**
- Replace the B87 Rearview Camera.
- Engine running, parking brake applied, transmission in REVERSE.
- Verify the rear view image displays properly.
 - **If rear view image is not displayed**
Replace the K74 Human Machine Interface Control Module.

- Go to next step: If rear view image is displayed

17. All OK.

Repair Instructions

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

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

REPAIR INSTRUCTIONS

SIDE VIEW DRIVER INFORMATION CAMERA REPLACEMENT

Removal Procedure

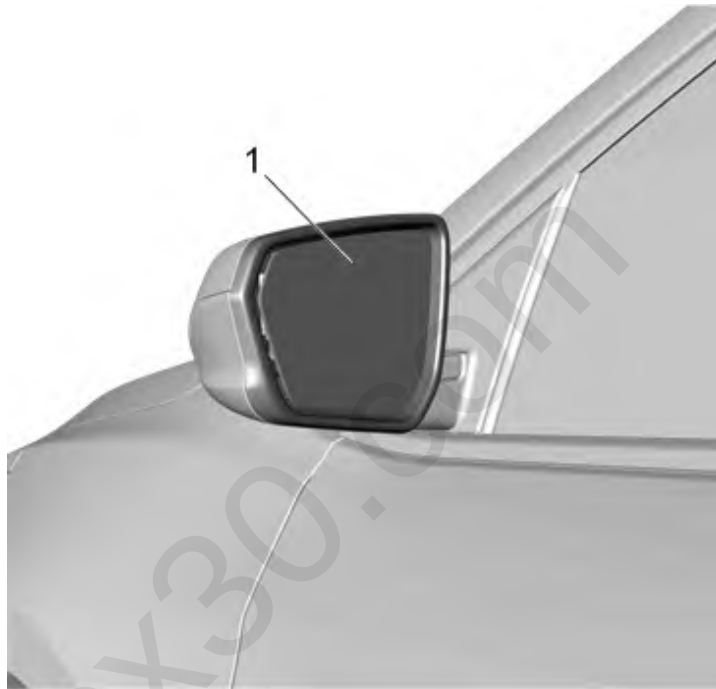


Fig. 8: Outside Rearview Mirror Glass

Courtesy of GENERAL MOTORS COMPANY

1. Remove Outside Rearview Mirror Glass (1)[Outside Rearview Mirror Glass Replacement](#)
2. Disconnect the electrical connectors.

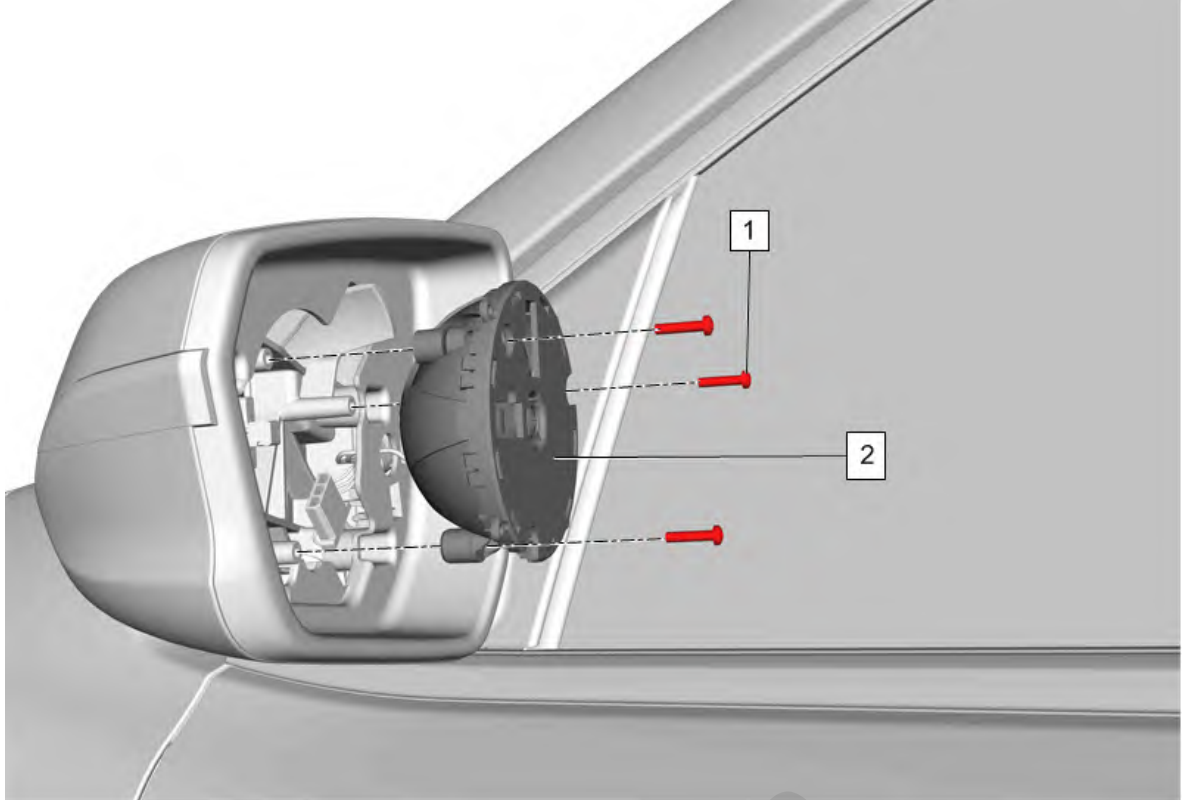


Fig. 9: Outside Rearview Mirror Inner Actuator
 Courtesy of GENERAL MOTORS COMPANY

3. Remove Outside Rearview Mirror Inner Actuator (2) **Outside Rearview Mirror Inner Actuator Replacement**

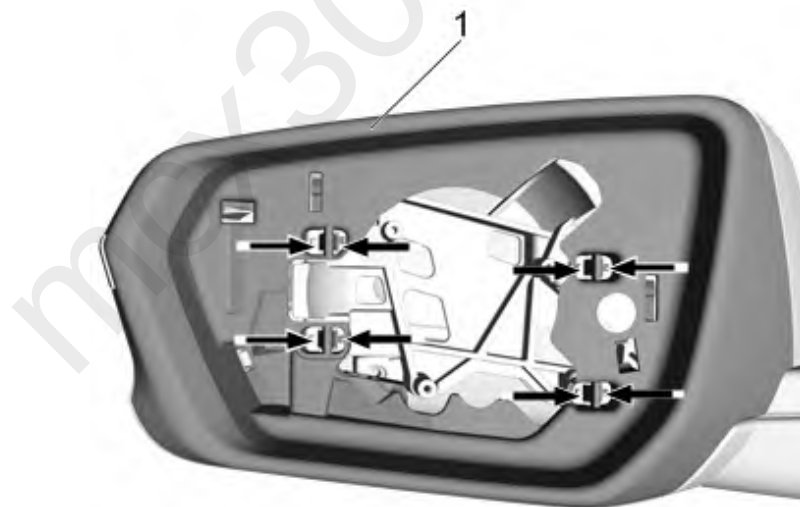


Fig. 10: Outside Rearview Mirror Housing Bezel
 Courtesy of GENERAL MOTORS COMPANY

4. Remove Squeeze the retaining clips to release the outside rearview mirror housing bezel.(1)

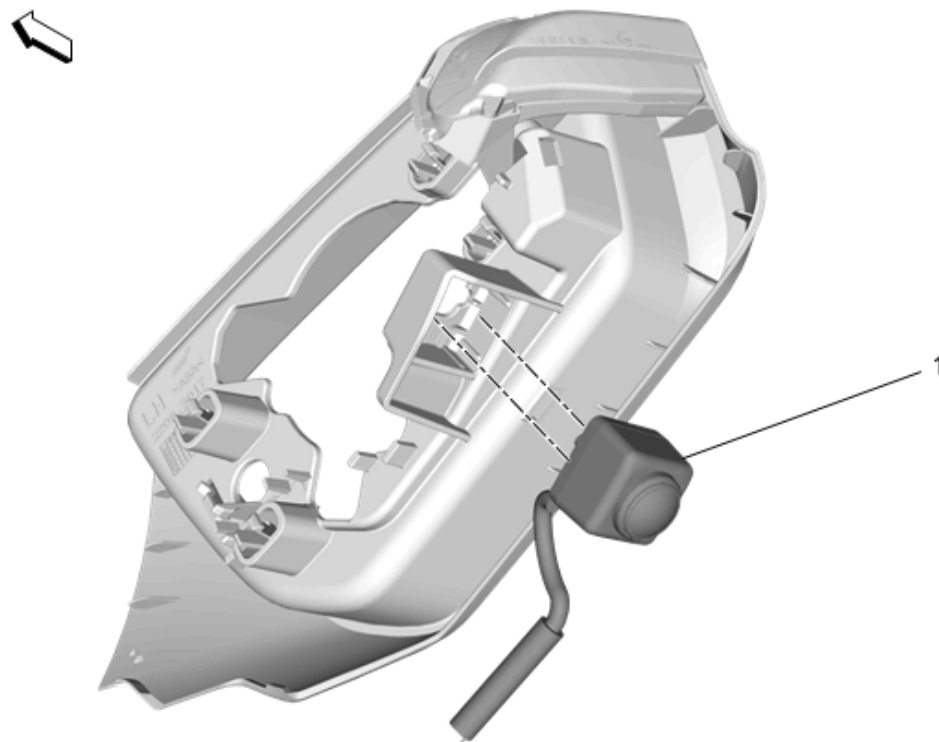


Fig. 11: Side View Driver Information Camera
Courtesy of GENERAL MOTORS COMPANY

5. Route the side view driver information camera (1) through the opening in the housing bezel.
6. Disconnect the electrical connector.

Installation Procedure

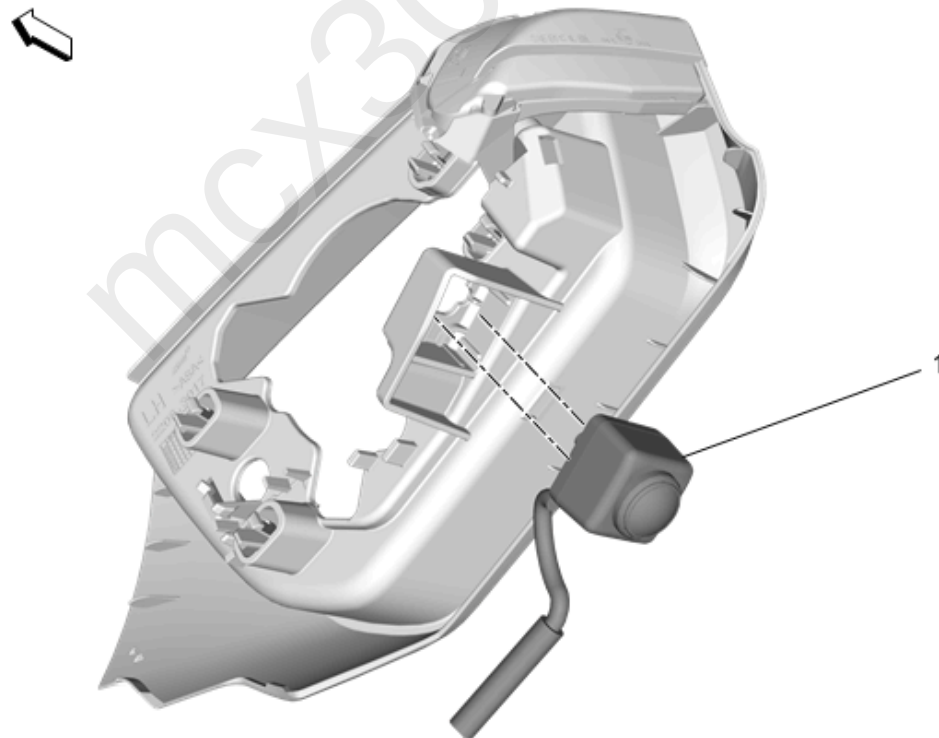


Fig. 12: Side View Driver Information Camera
Courtesy of GENERAL MOTORS COMPANY

1. Route the side view driver information camera (1) through the opening in the housing bezel.
2. Connect the electrical connector.

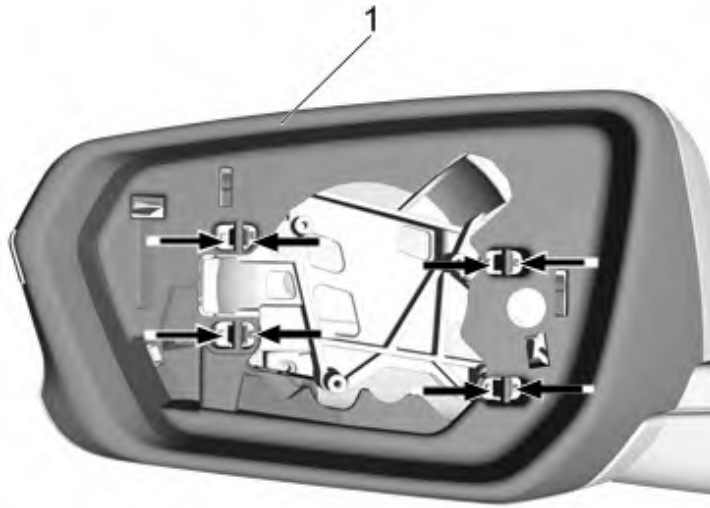


Fig. 13: Outside Rearview Mirror Housing Bezel
 Courtesy of GENERAL MOTORS COMPANY

3. Push the outside rearview mirror housing bezel (1) into the retaining clips until seated.

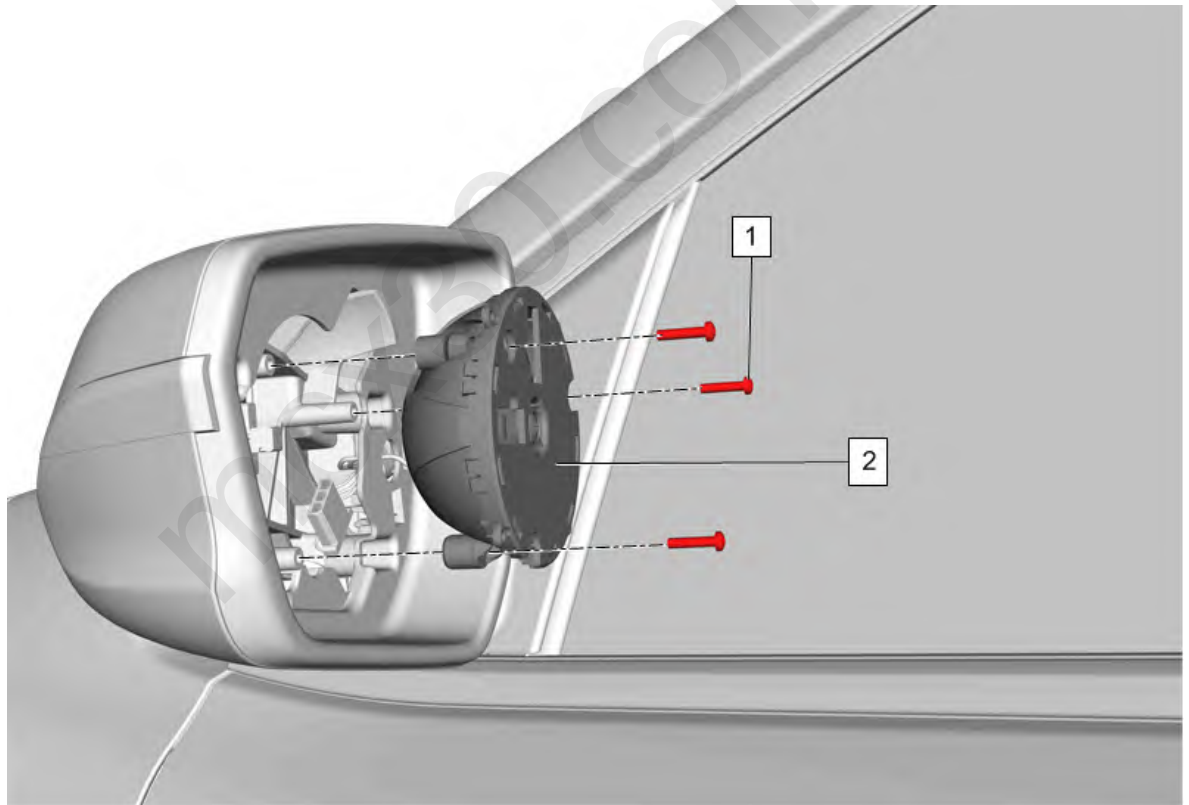


Fig. 14: Outside Rearview Mirror Inner Actuator
 Courtesy of GENERAL MOTORS COMPANY

4. Install Outside Rearview Mirror Inner Actuator (2). [Outside Rearview Mirror Inner Actuator Replacement](#)
5. Connect the electrical connectors.



Fig. 15: Outside Rearview Mirror Glass
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Inspect the outside rearview mirror for proper operation.

6. Install Outside Rearview Mirror Glass (1) **Outside Rearview Mirror Glass Replacement**

FRONT VIEW DRIVER INFORMATION CAMERA REPLACEMENT (EQUINOX)

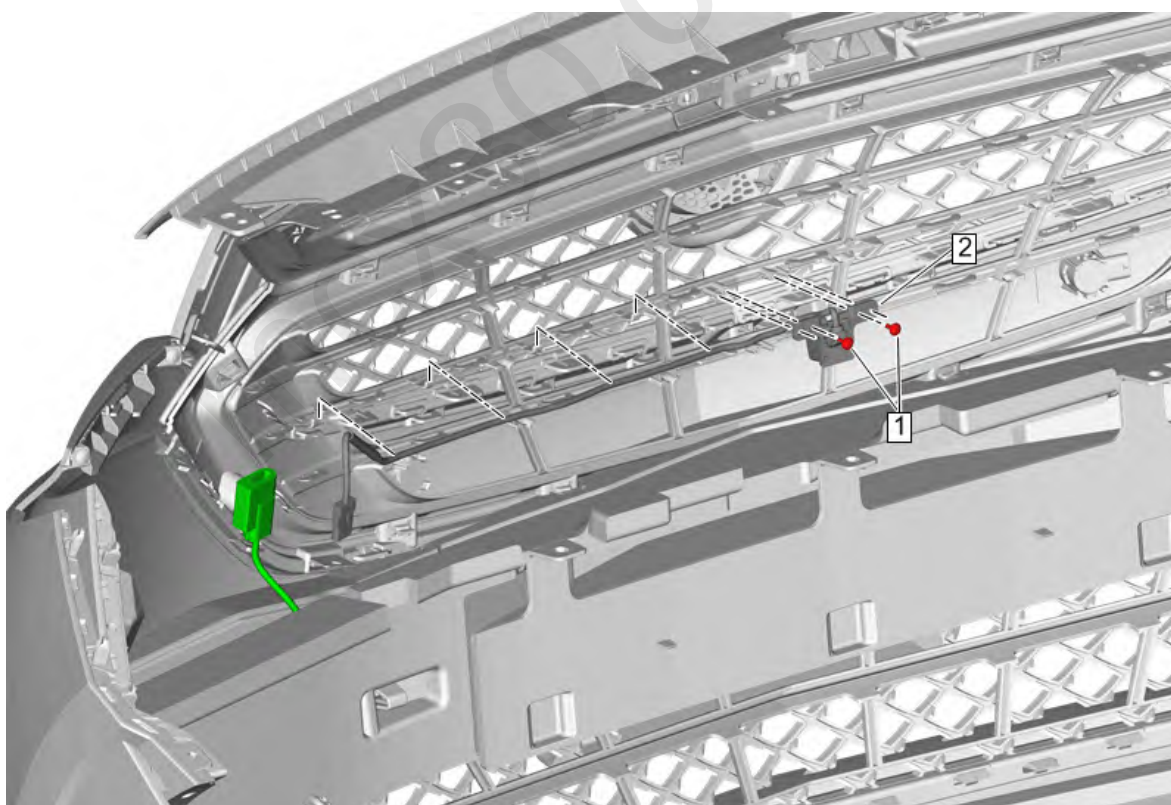


Fig. 16: Front View Driver Camera (Equinox)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
<u>Front Bumper Fascia Replacement (Equinox)</u>	

Callout	Component Name
1	Front View Camera Bolt [2x] CAUTION: Fastener Caution . Tighten 2.5 N.m (22 lb in)
2	Front View Driver Information Camera Procedure Disconnect the electrical connector.

FRONT VIEW DRIVER INFORMATION CAMERA REPLACEMENT (TERRAIN)

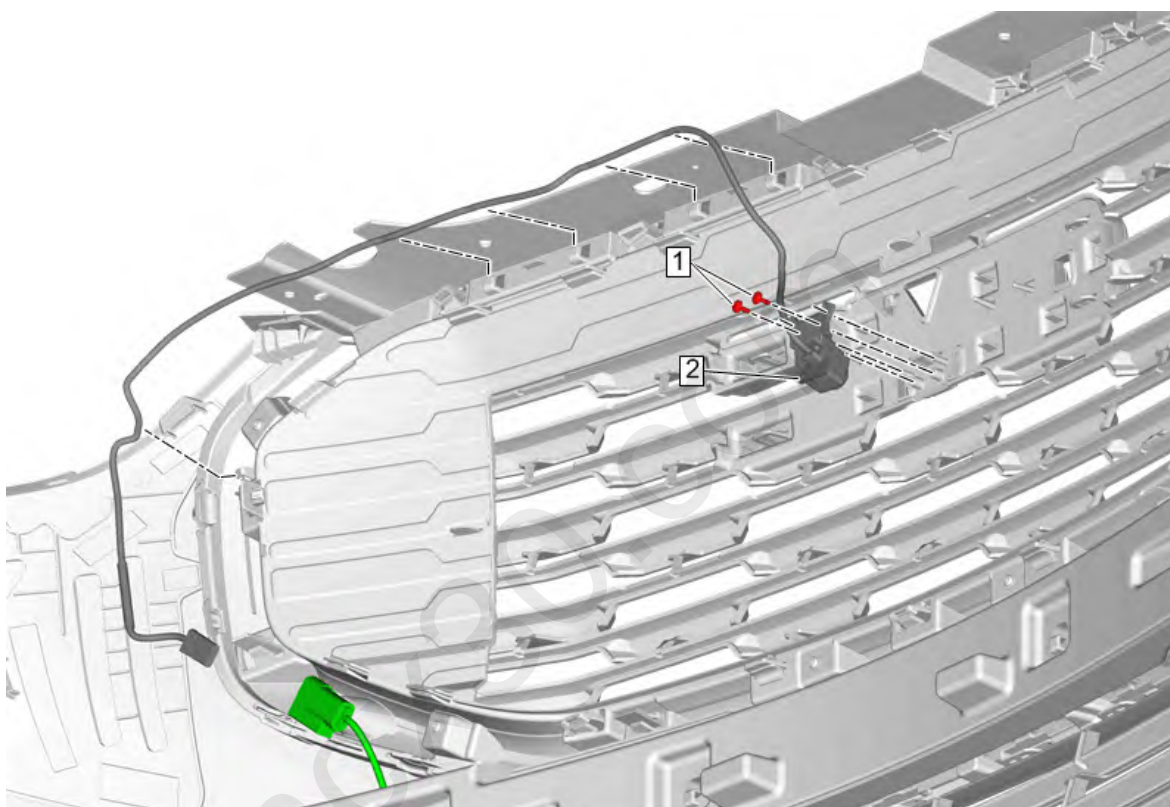


Fig. 17: Front View Driver Camera (Terrain)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Bumper Fascia Replacement (Terrain)	
1	Front Grille Bolt [2x] CAUTION: Fastener Caution . Tighten 2.5 N.m (22 lb in)
2	Front View Driver Information Camera Procedure Disconnect the electrical connector.

REARVIEW DRIVER INFORMATION CAMERA REPLACEMENT (EQUINOX)

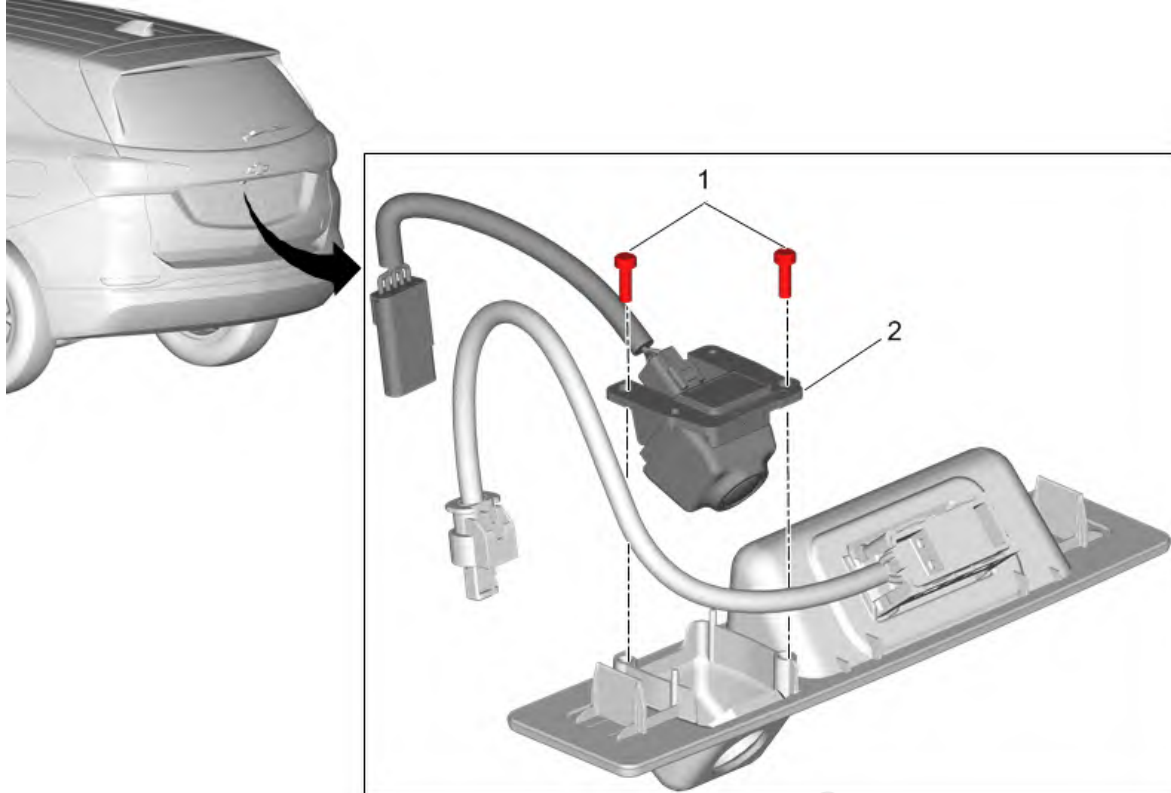


Fig. 18: Rearview Driver Camera (Equinox)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
<u>Rear Closure Fixed Handle Applique Replacement (Equinox)</u>	
1	Rearview Driver Information Camera Bolt [2x] CAUTION: <u>Fastener Caution</u> 2.5 N.m (22 lb in)
2	Rearview Driver Information Camera

REARVIEW DRIVER INFORMATION CAMERA REPLACEMENT (TERRAIN)

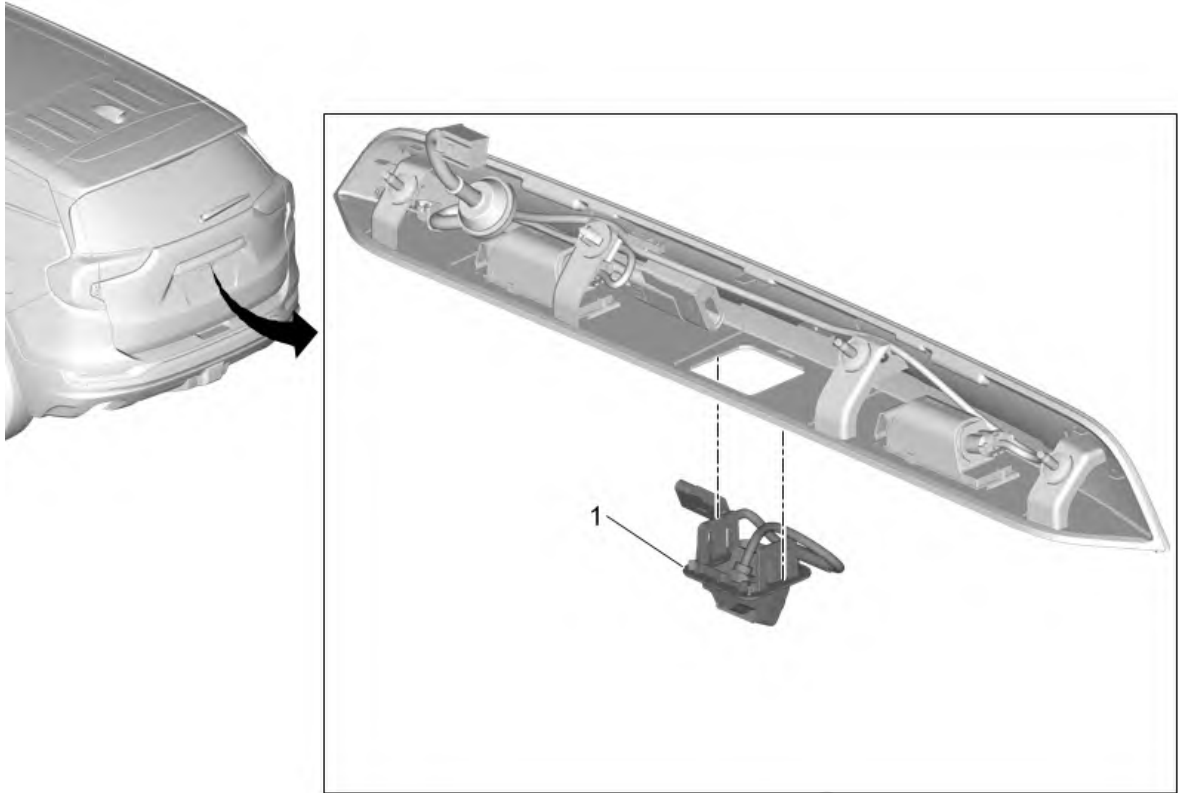


Fig. 19: Rearview Driver Camera (Terrain)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Rear Closure Center Applique Replacement	
1	Rearview Driver Information Camera Procedure 1. Release the retaining tabs. 2. Disconnect the electrical connector.

HUMAN MACHINE INTERFACE CONTROL MODULE BYPASS MODULE REPLACEMENT

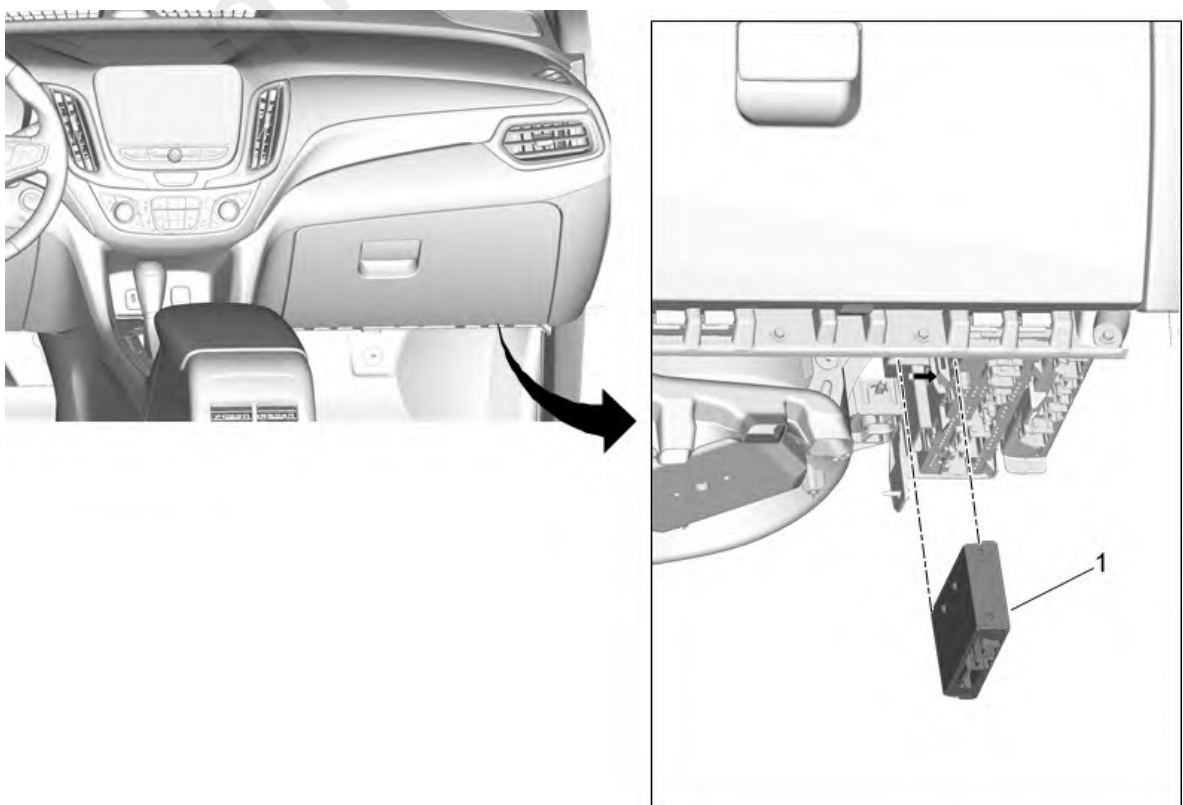


Fig. 20: Human Machine Interface Control Module Bypass Module
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Human Machine Interface Control Module Bypass Module Procedure 1. Disconnect the electrical connectors. 2. Release the retaining tab.

VIDEO PROCESSING MODULE REPLACEMENT (EQUINOX)

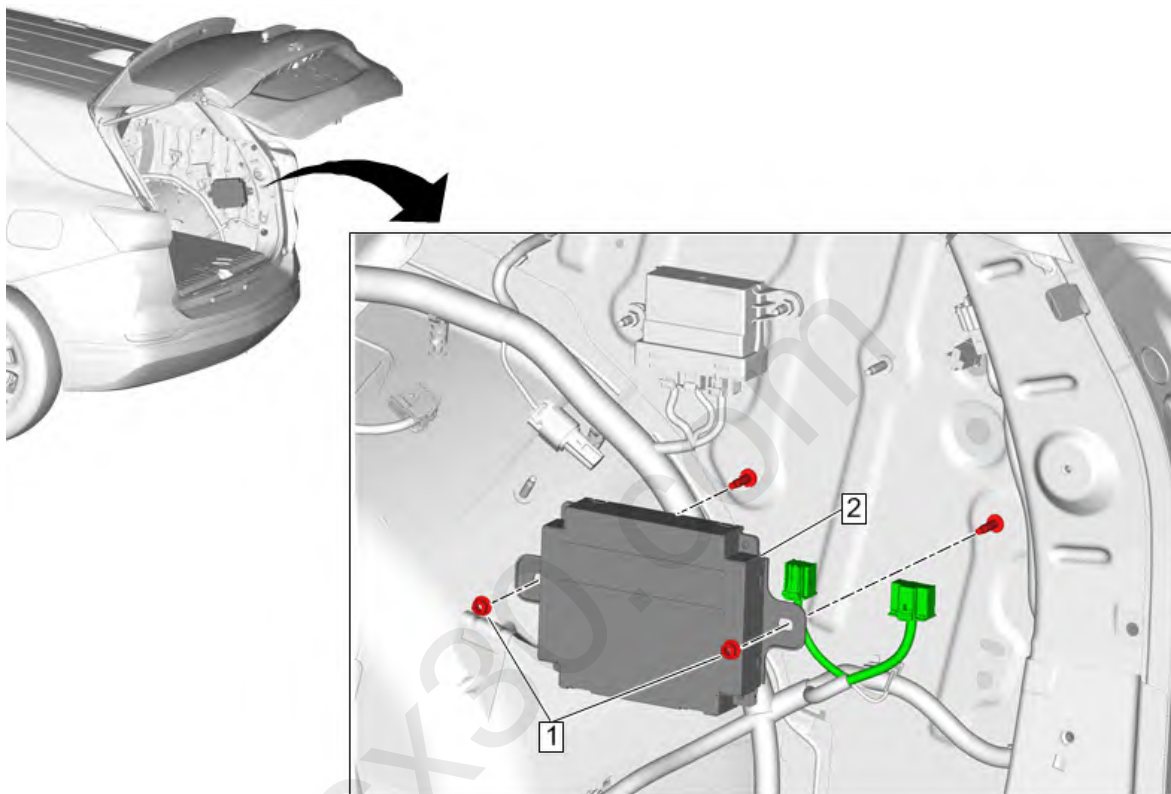


Fig. 21: Video Processing Module And Nut (Equinox)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Quarter Lower Rear Trim Panel Replacement (Left Side) Quarter Lower Rear Trim Panel Replacement (Right Side)</u>	
1	Video Processing Module Nut [2x] CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Video Processing Module Procedure 1. Disconnect the electrical connectors. 2. Perform the necessary programming and setup procedure: <u>Control Module References</u>

VIDEO PROCESSING MODULE REPLACEMENT (TERRAIN)

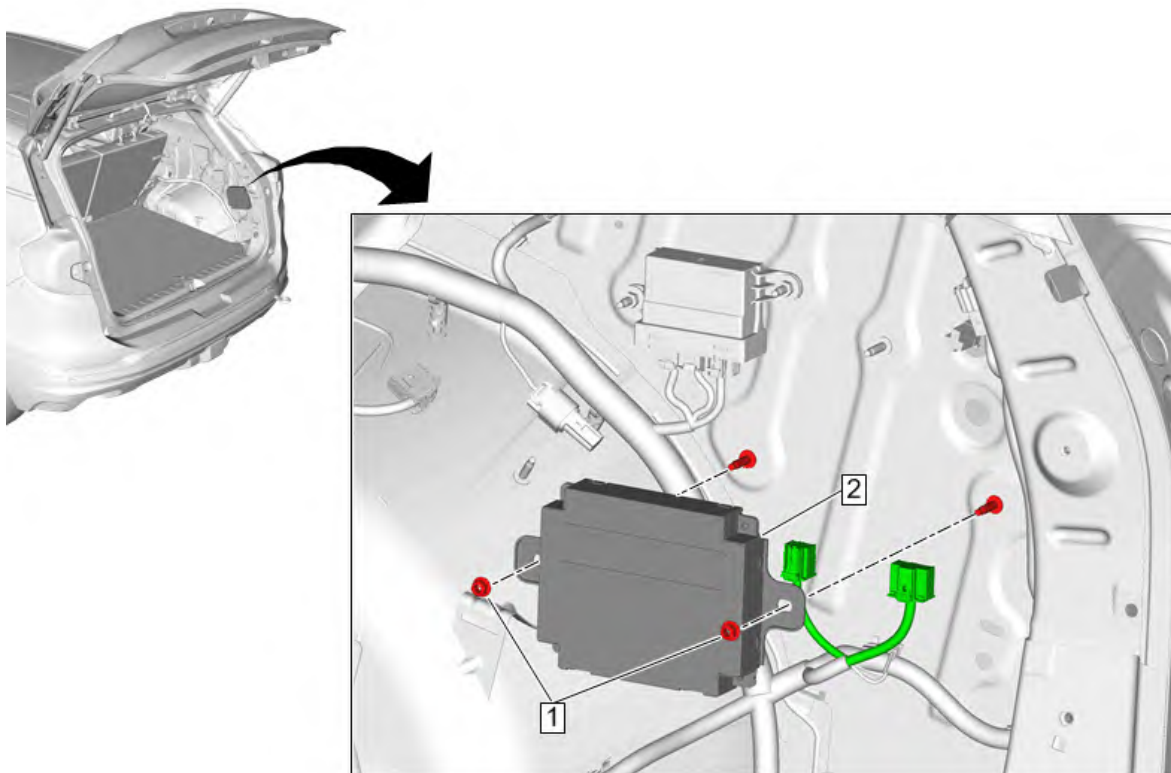


Fig. 22: Video Processing Module And Nut (Terrain)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Quarter Lower Rear Trim Panel Replacement (Left Side) Quarter Lower Rear Trim Panel Replacement (Right Side)</u>	
1	Video Processing Module Nut [2x] CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Video Processing Module Procedure 1. Disconnect the electrical connectors. 2. Perform the necessary programming and setup procedure: <u>Control Module References</u>

VIDEO PROCESSING CONTROL MODULE CALIBRATION

NOTE: Image will be slightly distorted at all times, the camera(s) lens is a fish-eye lens meant to capture as much as possible.

The calibration procedure is to have the Video Processing Control Module learn the new cameras and their positions. The calibration does not start automatically or if manual initialization is desired, calibration can be initiated by selecting Video Processing Control Module Camera Learn in the scantool.

Radio Display Prompt Example

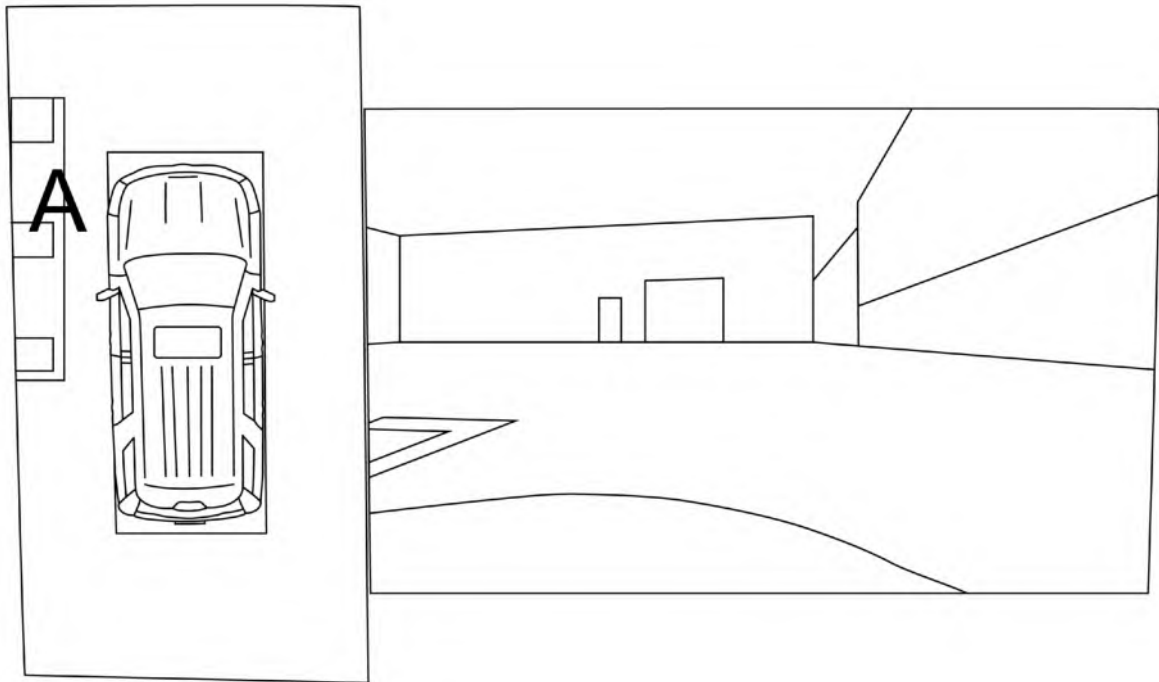


Fig. 23: Radio Display Prompt Example

Courtesy of GENERAL MOTORS COMPANY

NOTE: Only ONE EL-51372 Camera Calibration Mat is required for calibration.

The left side of the screen will display where the **EL-51372** Camera Calibration Mat should be located for each step. The right side of the display is the view from the camera that is being learned during that step.

Mat Position Reference

- Position A is the left front
- Position B is the right front
- Position C is the left rear
- Position D is the right rear

Diagnostic Aids

- If any one of the cameras is replaced on the Surround Vision Camera System, the displayed image may not be correctly stitched due to a change in the location or orientation of the camera. The only way to correct an incorrectly stitched image is to perform the calibration procedure.
- Tires must be inflated properly
- Vehicle must be on a level surface
- Mirrors must be folded out
- It is a good practice to wipe camera lens' clean prior to alignment
- Interfering objects or glare from overhead lighting will fail an alignment
- All points of access to the inside of the vehicle **Must** be closed, including hood.
- **Finalize** is the very last step, this saves all the data from the alignment

Calibration

NOTE: Diagnostic Aids **MUST** be followed prior to Calibration

This is the calibration process for the Surround Vision Camera system. When the Video Processing Control Module is replaced, calibration must be performed. If the following occurs, calibration is recommended but not required:

- If a camera is replaced

- If mirrors or fascias are replaced, removed, or physically adjusted

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

- Clean camera lenses.
- Follow the on screen instructions with regards to EL-51372 camera mat placement
- Vehicle must be ignition ON or Vehicle ON

NOTE:

- **Camera Calibration Mat location is very critical for the cameras to learn. If the image displayed is heavily distorted, the mat position was not correct. For correct mat location, refer to the box EL-51372 came in. Place the mat 50 cm from the vehicle when performing calibration or camera learn. For Fore/Aft alignment, place the mat so the distance from the closest edge of the center square, to the bumper, is 70 cm.**
- **Camera Calibration Mat must be as flat as possible. Wrinkles in the matt will cause a distorted view for the camera.**
- **When an exclamation (!) is seen on the radio display, camera learn was not completed or there was an error. To clear this, press Retry**
- **At any point where the Calibration is stuck and radio display does not show any camera images, clicking Cancel from the scan tool learn screen will resolve the issue and will return to previous learn position**
- **If at any point in the calibration procedure the alignment process is interrupted, clicking Retry from the scan tool learn screen will cancel the current learn process and can be procedure can be restarted**
- **DO NOT Click Finalize prior to step 7**

1. Using the scan tool, select the desired camera to calibrate, or all cameras if necessary.
2. Click Initiate on the scan tool learn screen. This starts the calibration process.
3. The radio display will show the desired EL-51372 camera calibration mat position.

NOTE: Mat must be flat on the floor

4. Place the EL-51372 camera mat in the position shown on the display. Use the box EL-51372 came as a ruler to align the mat with the vehicle correctly.

NOTE: In an event of an error, click the Retry button to reset the image and try a new capture. DO NOT Click Finalize until step 7

5. Once the mat is correctly positioned, Click **Capture** on the scan tool learn screen. This captures the image.
 - If a red "X" is displayed, correct the EL-51372 camera mat position
 - If a green checkmark is displayed, the image was accepted.
6. Leave the EL-51372 camera mat in that position until the camera display prompts for it to be moved to the next position, or if calibration is complete.
7. Once the last camera image has been capture, click Finalize on the scan tool learn screen. This completes the learn.

Sequence of Camera Alignment

Left Camera Alignment Learn:

1. Captures an image at Position C
2. Captures an image at Position A

Right Camera Alignment Learn:

1. Captures an image at Position D
2. Captures an image at Position B

Front Camera Alignment Learn:

1. Captures an image at Position A
2. Captures an image at Position B

Rear Camera Alignment Learn:

1. Captures an image at Position D
2. Captures an image at Position C

All Cameras Alignment Learn:

1. Captures an image at Position A
2. Captures an image at Position B
3. Captures an image at Position C
4. Captures an image at Position D

Error Codes during alignment

Error Code	Cause	Possible Repair
0101 Front Camera 0103 Front Camera 0201 Right Camera 0203 Right Camera 0301 Rear Camera 0303 Rear Camera 0401 Left Camera 0403 Left Camera	Lighting Issue, Obstructed View of Target, Target Position out of Range, Poor Camera installation	Correct Lighting, Reposition Target, Verify Camera correctly installed and clean.
0102 Front 0202 Right 0302 Rear 0402 Left	Lighting Issue, Obstructed View of Target, Target Position out of Range	Correct Lighting, Reposition Target, Verify Camera is clean.
0104 Front 0204 Right 0304 Rear 0404 Left	Camera Position incorrect	Correct camera position
0120 Front 0220 Right 0320 Rear 0420 Left	NTSC error detected	Verify camera electrical connection
FFF0 Passenger Door FFF1 Left Rear Door FFF2 Right Rear Door FFF3 Driver Door FFF4 Trunk FFF5 Hood FFF6 Liftglass	Hood, Door, Liftgate, Trunk or other part of car OPEN	Close all doors, Hood, Liftgate, and Trunk

DESCRIPTION AND OPERATION

REAR VISION CAMERA DESCRIPTION AND OPERATION (WITH IOB/IOR)

Rear Vision Camera System Operation

The rear vision camera system consists of a video camera located at the rear of the vehicle and the Radio.

When the transmission is placed into REVERSE, a signal indicates to the Radio that the vehicle is in reverse and image display is requested. The rear vision camera receives ignition voltage and a constant ground to power the camera. Video signal + and video signal - circuits carry the video image from the rear vision camera to the radio. Additionally, the video signal circuits are shielded to prevent any interference which may lead to a loss of video signal resolution and a degraded video image. The shield is provided a ground path by the rear vision camera.

The following conditions may cause a degraded rear vision camera image:

- Ice, snow, or mud has built up on the rear vision camera
- Dark conditions
- Extreme light conditions, such as glare from the sun or the headlights of another vehicle
- Damage to the rear of the vehicle
- Extreme high temperatures or extreme temperature changes

If a malfunction is detected in the system, Service Rear Vision Camera may be displayed on the Info Display Module as an indicator to the customer that a problem exists that requires service.

REAR VISION CAMERA DESCRIPTION AND OPERATION (IO5/IO6 WITH MAH/MBC)

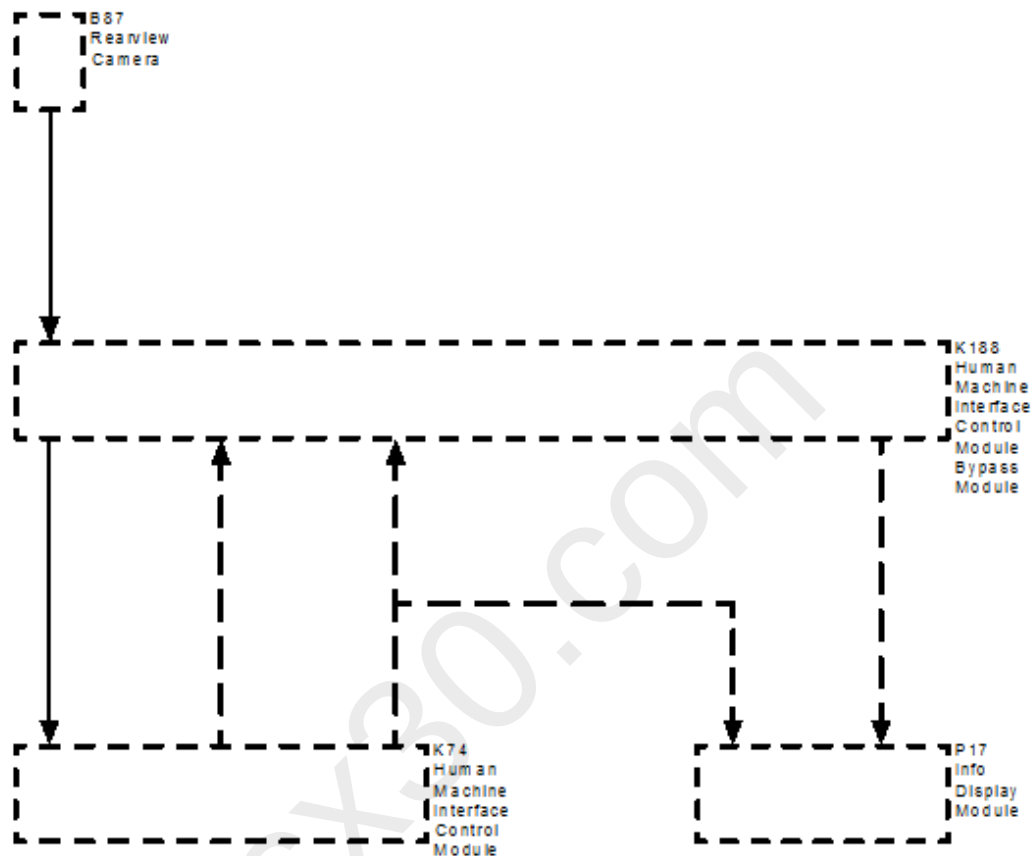


Fig. 24: Rear Camera With VBM Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
K188	K188 Human Machine Interface Control Module Bypass Module
B87	B87 Rearview Camera
K74	K74 Human Machine Interface Control Module
P17	P17 Info Display Module

Rear Vision Camera System Operation

When the transmission is placed into R, a 12 V signal is sent to the Rearview Camera indicating that camera operation is requested. Ignition voltage and ground are supplied to the Rearview Camera. The Rearview Camera sends video image to the K188 Human Machine Interface Control Module Bypass Module through a video signal + and a video signal - circuit. The K188 Human Machine Interface Control Module Bypass Module passes the video image to K74 Human Machine Interface Control Module via video signal + and a video signal - circuits. The K188 Human Machine Interface Control Module Bypass Module is used to ensure the K74 Human Machine Interface Control Module produces a quality rear vision camera image to be displayed on the P17 Info Display Module when the vehicle is placed in reverse gear. In the event the K188 Human Machine Interface Control Module Bypass Module detects an issue with the camera image generated by the K74 Human Machine Interface Control Module, such as a black, solid color, frozen, or image other than the camera image, the K188 Human Machine Interface Control Module Bypass Module will assume control of the image to the P17 Info Display Module and displays a raw camera image with no park assist projection lines or object detection symbols for the entire reverse cycle.

The K188 Human Machine Interface Control Module Bypass Module is part of the video signal + and a video signal - circuits path from the B87 Rearview Camera to the K74 Human Machine Interface Control Module as well as the digital LVDS path (USB cable) between the K74 Human Machine Interface Control Module and P17 Info Display Module and needs to be active for either signal to be received by these modules. The K188 Human Machine Interface Control Module Bypass Module is not connected to serial data and uses the reverse lamp voltage input to determine the vehicle gear state.

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 Info Display Module as an indicator to the customer that a problem exists that requires service.

REAR VISION CAMERA DESCRIPTION AND OPERATION (IO5/IO6 WITHOUT MAH/MBC)

Rear Vision Camera System Operation

Ignition voltage and ground are supplied to the Rearview Camera. When the transmission is placed into R, a signal is sent to the K74 Human Machine Interface Control Module indicating that camera operation is requested. The Rearview Camera sends video image to the K74 Human Machine Interface Control Module through a video signal + and a video signal - circuit. The K74 Human Machine Interface Control Module then sends the video signal via digital LVDS circuits (USB cable) to the P17 Info Display Module to be displayed.

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 Info Display Module as an indicator to the customer that a problem exists that requires service.

SURROUND VISION CAMERA DESCRIPTION AND OPERATION

WARNING:

The Surround Vision cameras have blind spots and will not display all objects near the corners of the vehicle. Folding outside mirrors that are out of position may not display surround view correctly. Always check around the vehicle when parking or backing.

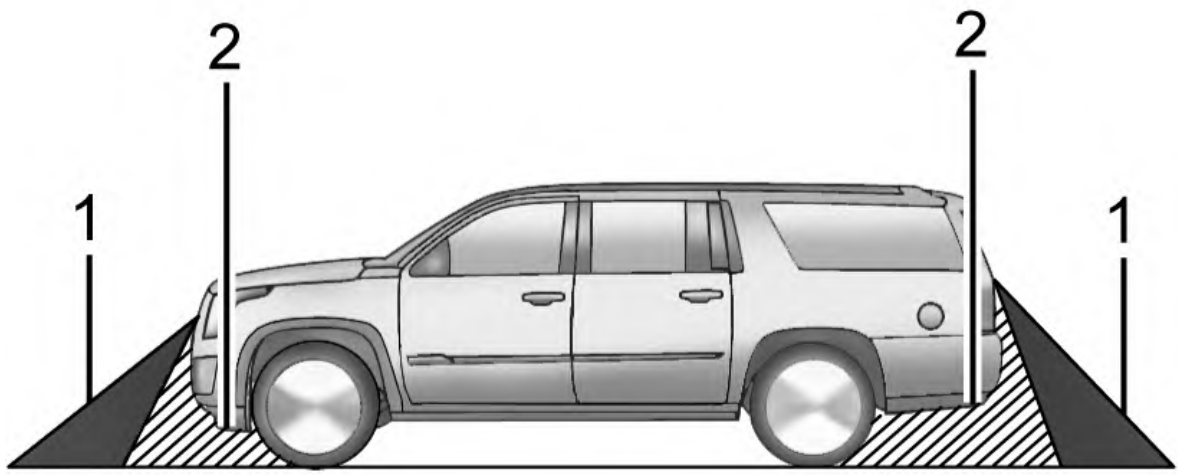


Fig. 25: Surround Vision Camera View And Area
Courtesy of GENERAL MOTORS COMPANY

1. View Displayed by the Surround Vision Camera
2. Area Not Shown

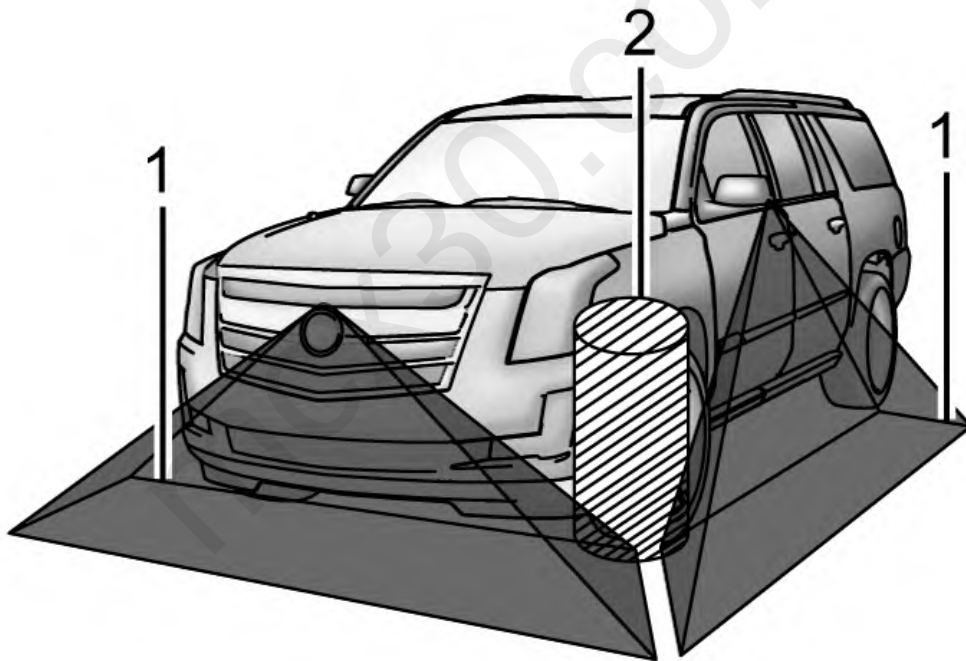


Fig. 26: Surround Vision Camera View And Area
Courtesy of GENERAL MOTORS COMPANY

1. View Displayed by the Surround Vision Camera
2. Area Not Shown

The surround vision camera system consists of the following components:

- B87 Rearview Camera
- B174G Frontview Camera - Grille
- K157 Video Processing Control Module
- A11 Radio **OR** K74 Human Machine Interface Module
- B225L Sideview Camera - Left
- B225R Sideview Camera - Right

When the vehicle is traveling at speeds slower than 6 mph (10kph) the video processing control module will power up the cameras and send a video signal to the radio or human machine interface module.

The following conditions may cause a degraded surround 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

Surround Vision displays an overhead view of the area surrounding the vehicle, along with the front or rear camera views in the center stack. The front camera is in the grille or near the front emblem, the side cameras are on the bottom of the outside rearview mirrors, and the rear vision camera is above the license plate.

Features of the Surround Vision System

- Rear camera (B87 Rearview Camera) view alongside overhead view is displayed in reverse
- Front camera (B174G Frontview Camera - Grille) view alongside overhead view is displayed after shifting out of reverse to Neutral or Drive
- Will display front view when front park assist object is within trigger range calibration value (30 cm (12 in) in a forward gear
- Image is removed from display when vehicle speed exceeds speed calibration (10kph/6 mph) or button press / screen touch

System Operation

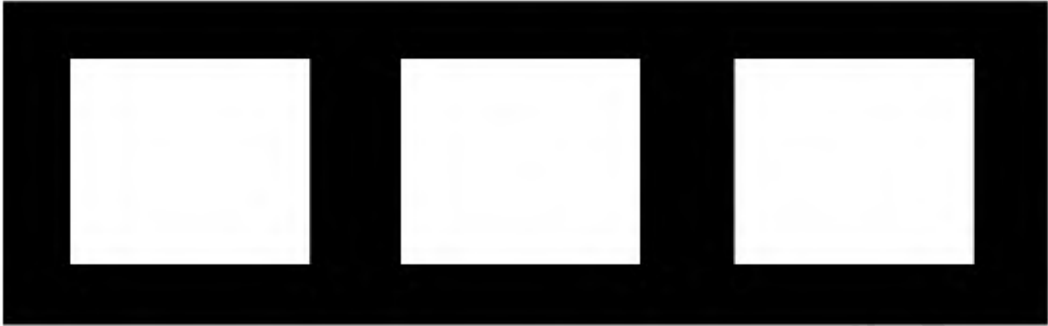
The video processing control module sends voltage and a constant ground to power the cameras. Video signal + and video signal - circuits carry the video image from the cameras to the video processing control module for processing. The video processing control module will then send the processed image output to infotainment system by Video signal + and video signal - circuits. Additionally, all the video signal circuits are twisted and shielded to prevent any interference which may lead to a loss of video signal resolution and cause a degraded video image. These circuits must not be spliced/removed from shielding or will cause image degradation.

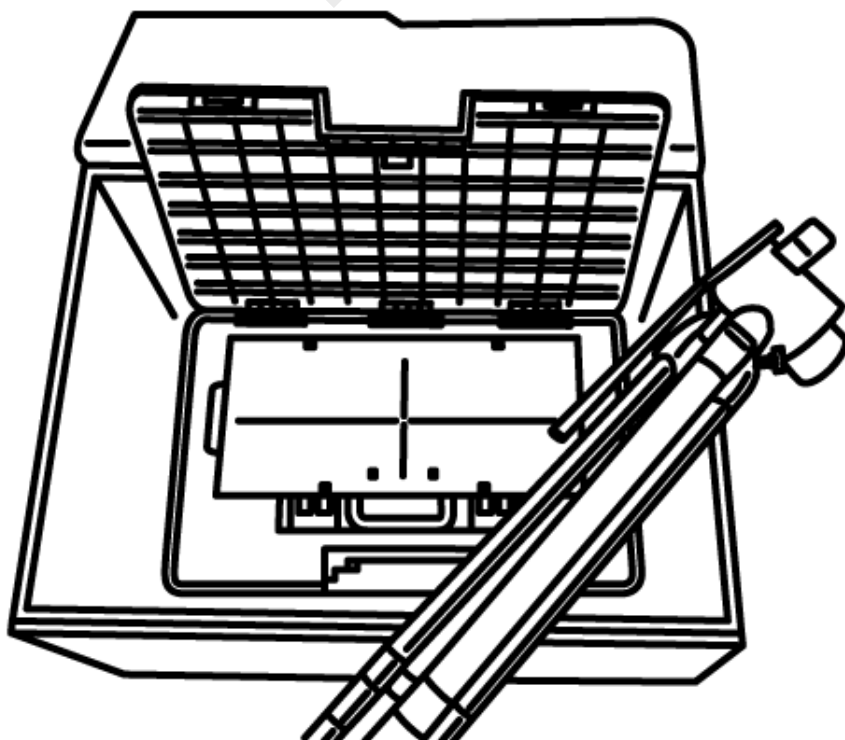
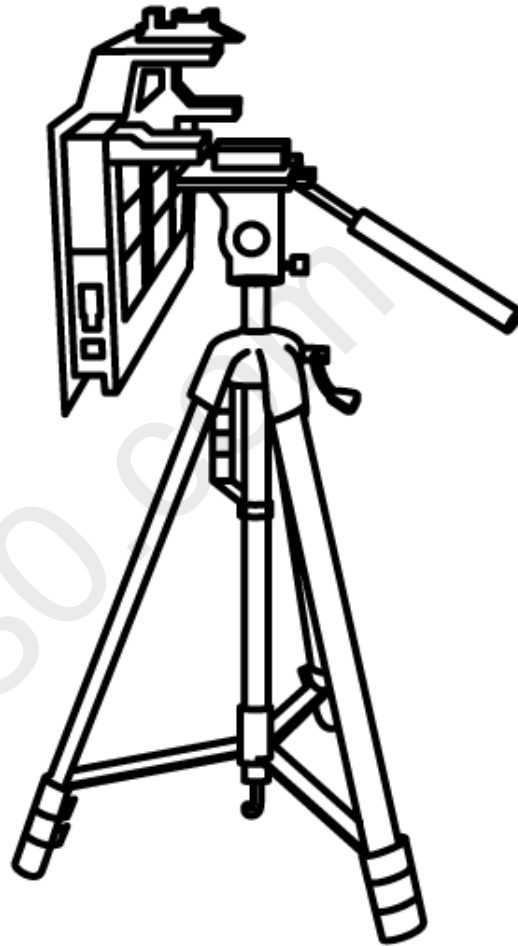
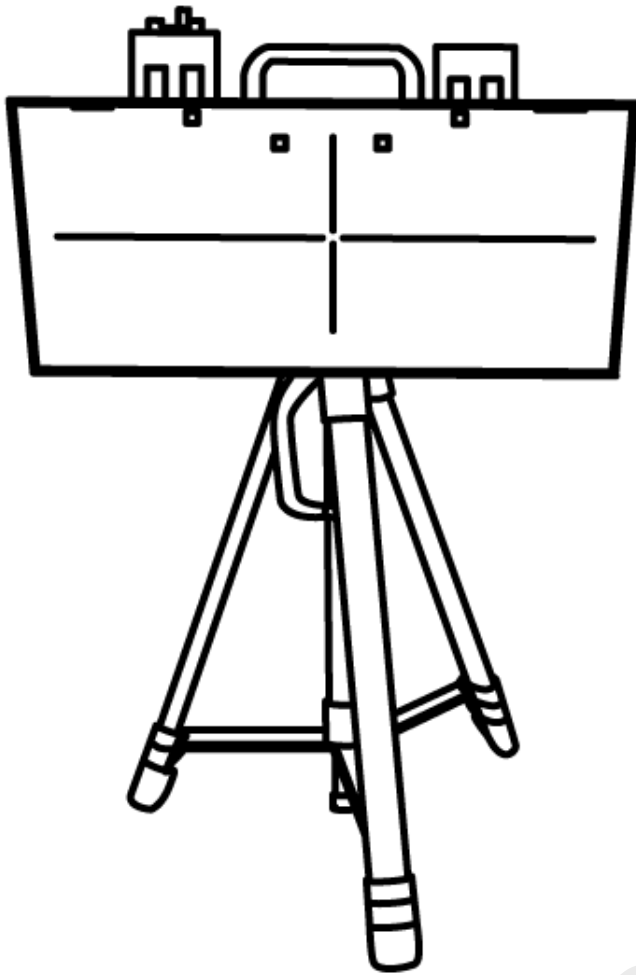
The video processing control module receives CAN information from Rear Park Assist object detection module and Steering Wheel angle from body control module during Reverse. A warning triangle may display during the 360 surround view screen if Rear Parking Assist has detected an object during a reverse. This triangle changes from amber to red and increases in size the closer the object. Also a dynamic guideline is displayed in Reverse to show the projected path of the vehicle.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustrations	Tool Number/Description

Illustrations	Tool Number/Description
	EL-51372 Camera Calibration Mat
	EL-51470 Target, Nightvision Camera Alignment



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