

2018 ACCESSORIES & EQUIPMENT

Image Display Cameras - Traverse

SPECIFICATIONS

FASTENER SPECIFICATIONS

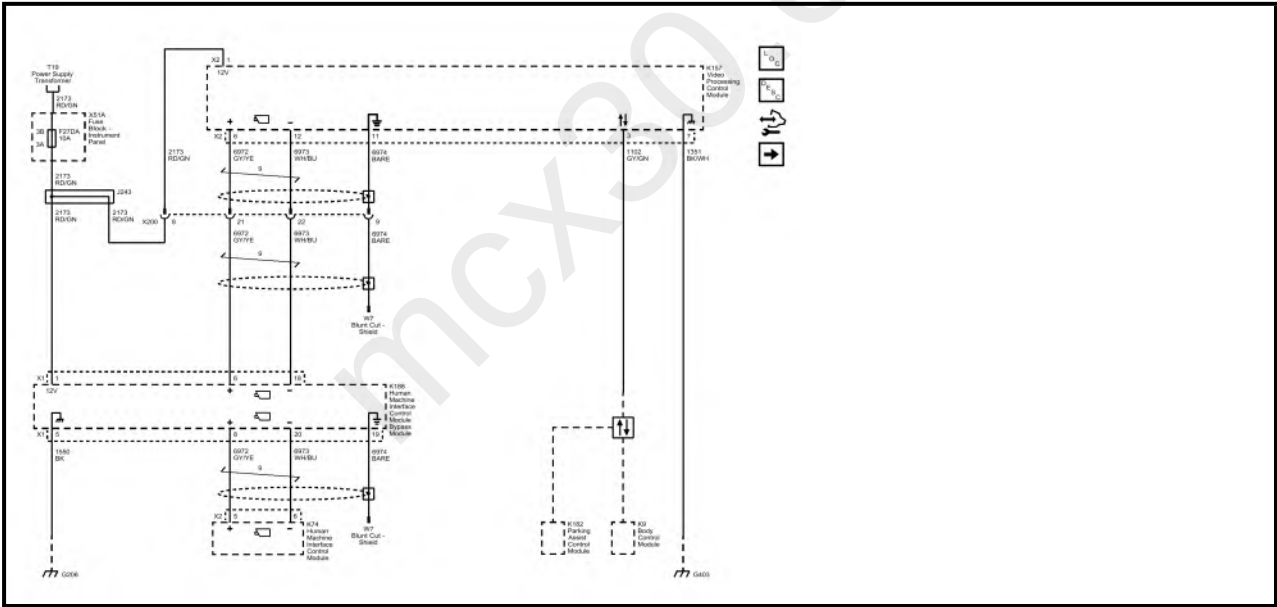
Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Front View Camera Bolt	4.7 N.m (42 lb in)
Radio Bracket Nut	9 N.m (80 lb in)
Video Processing Module Nut	9 N.m (80 lb in)

SCHEMATIC WIRING DIAGRAMS

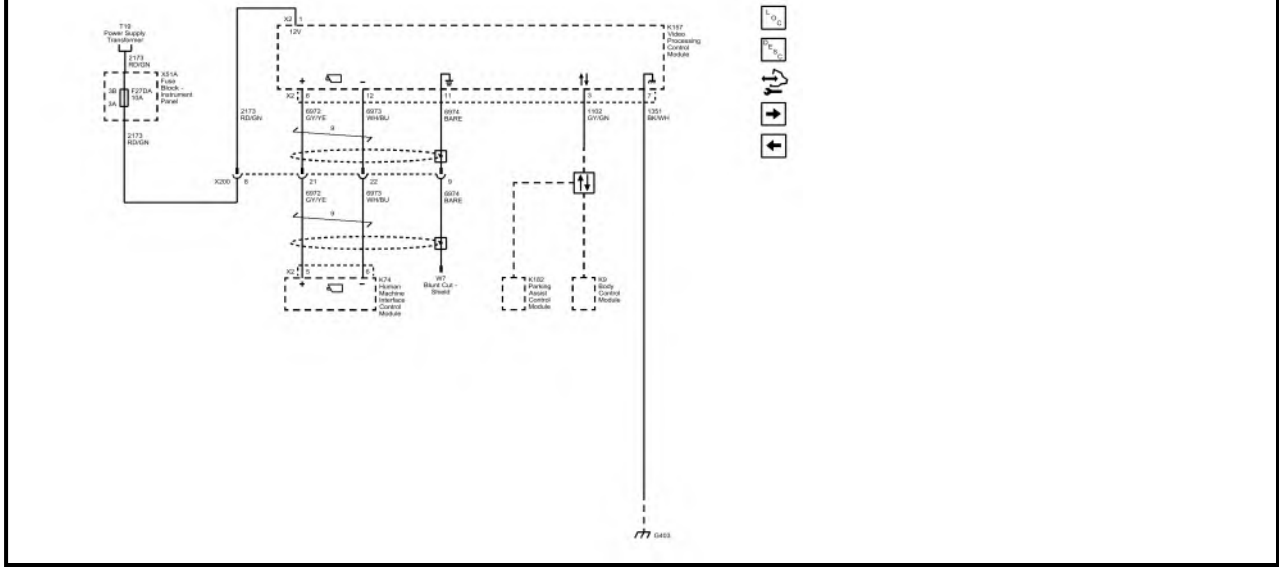
IMAGE DISPLAY CAMERA WIRING SCHEMATICS

360 Degree Vision - Module Power, Ground, Serial Data, and Camera Signals (UVH without UDA/UE3/UI3)

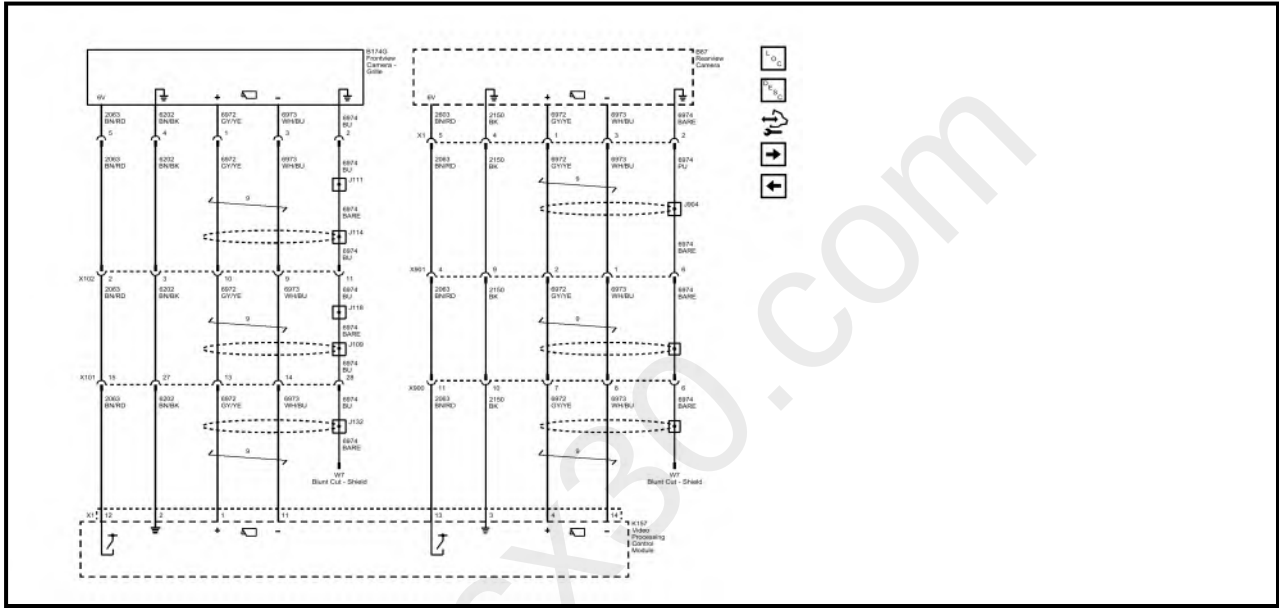


360 Degree Vision - Module Power, Ground, Serial Data, and Camera Signals (UVH with UDA/UE3/UI3)

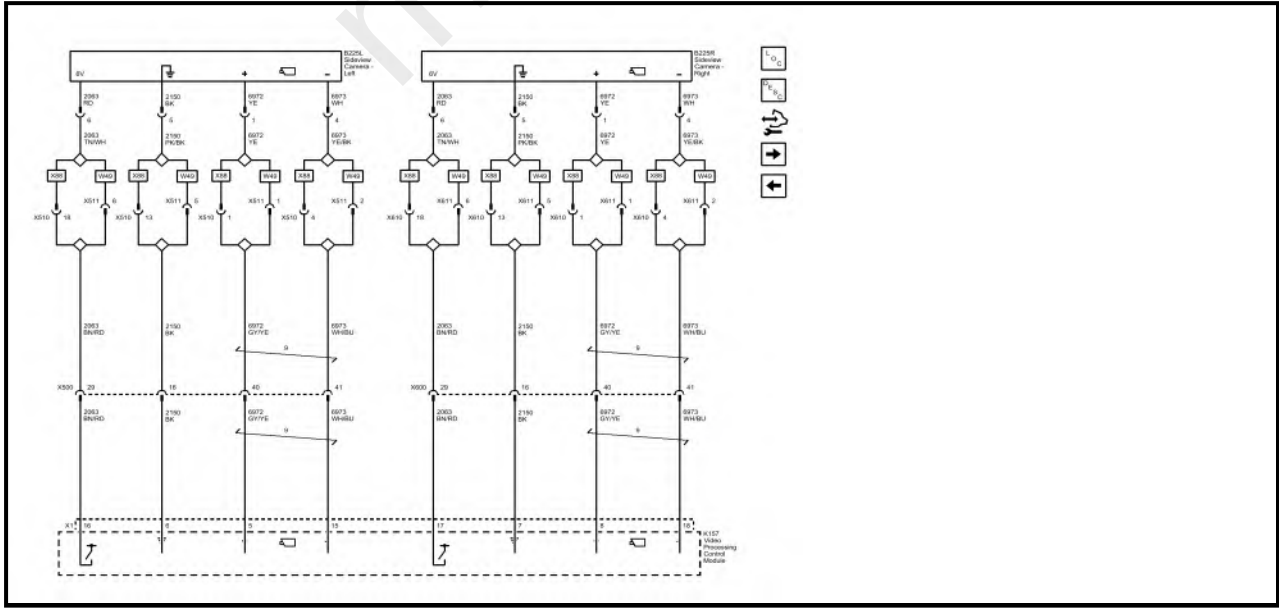




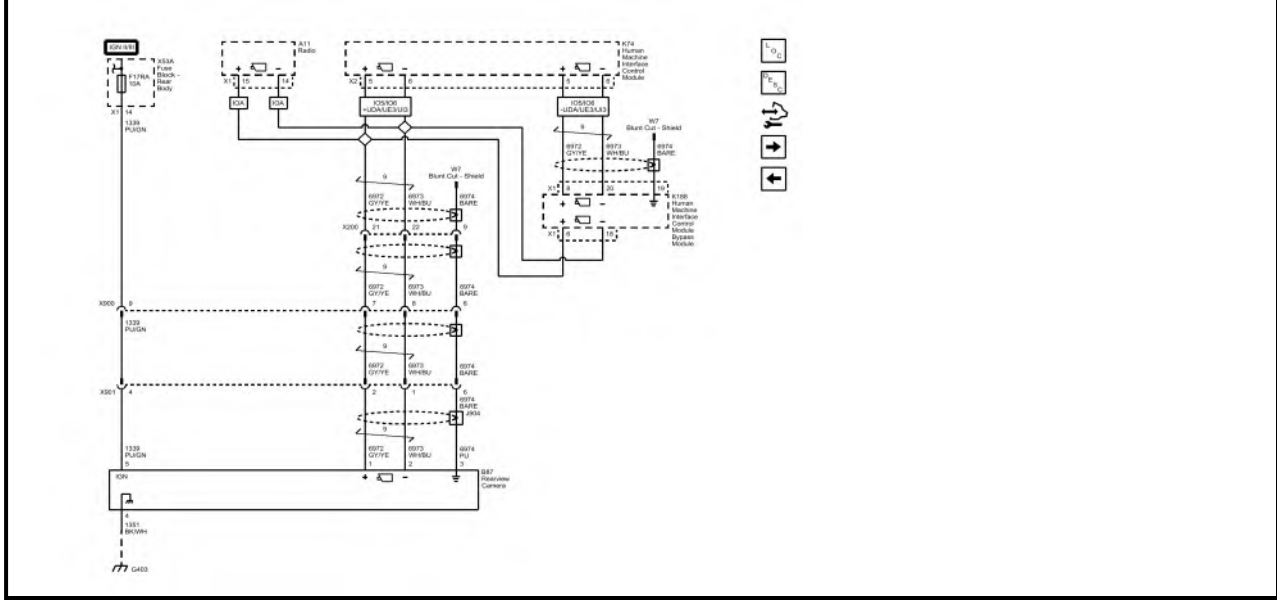
360 Degree Vision - Front and Rear Cameras (UVH)



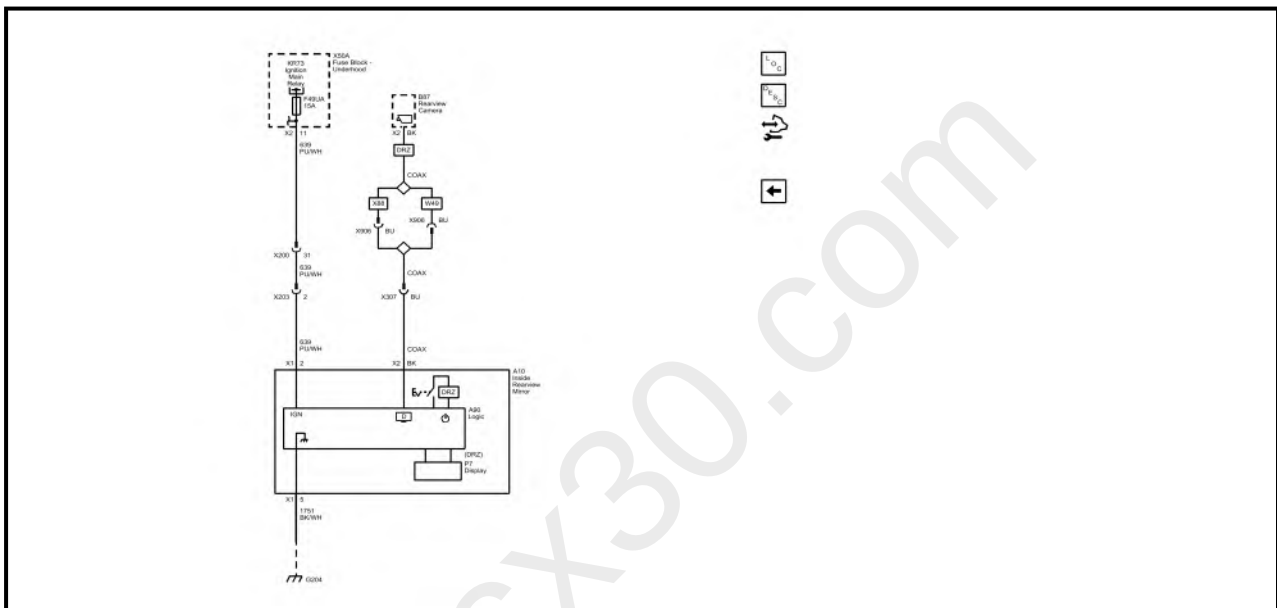
360 Degree Vision - Side Vision Cameras (UVH)



Rearview Camera (without UVH)



Inside Rearview Mirror Camera (DRZ)



DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B127B (IO5/IO6 WITH 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

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	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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](#) .
 - **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 P17 Info Display Module connector X3.
2. 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 connector X3. Connect EL-50334-2 and EL-50334-14 together.
3. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.

- **If the P17 Info Display is displaying home screen and radio information properly**

Replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the P17 Info Display is not displaying home screen and radio information properly**

4. Reconnect the P17 Info Display Module harness connector X3.
5. Ignition OFF, disconnect the K188 Human Machine Interface Control Module Bypass Module harness connector X2.
6. 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.

7. Ignition ON/Vehicle in Service Mode, infotainment system ON.

8. 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.**

9. 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](#).

- **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](#).
 - **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.
 - Go to next step: 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.
- Go to next step: 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.
- Go to next step: 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.
 - Go to next step: 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 \(Without DRZ\)](#).
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B127B (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](#) .
 - **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 \(without MAH/MBC\)](#)
 - **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.

- Go to next step: 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 \(Without DRZ\)](#)
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B133B

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

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/IOR)**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**

Scan Tool Reference

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/pixilation 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 \(IOA\)](#)[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

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
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

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

[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.
 - Go to next step: 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.
 - Go to next step: 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

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

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

COMPONENT CONNECTOR END VIEWS - INDEX

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.
 - Go to next step: 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.
 - Go to next step: 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 \(Without DRZ\)](#).
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B395B

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 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

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.
 - Go to next step: 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.
- Go to next step: 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

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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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 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.
 - Go to next step: If the DTC does not set
 - 3. All OK.
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.
 - Go to next step: 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 B395D

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 B395D 66

Camera Misaligned - Wrong Mounting Position

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

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

B395D 66

- Any of the 4 cameras connected to the Video Processing Control Module are misaligned.
- Cameras are misaligned for greater than 1 hour of driving at freeway speeds.

Action Taken When the DTC Sets

- The Video Processing Control Module reports misalignment causing the instrument cluster to display "Super Cruise Unavailable" (If equipped with Super Cruise)
- The Video Processing Control Module will report "invalid" lane type.

Conditions for Clearing the DTC

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

Diagnostic Aids

There are four conditions that can cause the Video Processing Control Module to cause Super Cruise to disengage or not operate.

- Foreign material on the camera lens (a thick layer of dust, mud, snow, ice, or excessive rain). Cleaning the lens should return the Video Processing Control Module to normal operation.
- A partially or completely folded side mirror. Restoring the mirrors to their fully extended position should return the Video Processing Control Module to normal operation.
- A driver or front passenger door or trunk that is not fully closed. Closing the doors and trunk should return the Video Processing Control Module to normal operation.
- Damage to the mounting location of one or more of the Surround View cameras. This condition may or may not be readily apparent in the overhead view.

A folded side mirror, open trunk, or open driver or passenger door may cause a "Service Drive Assist" warning light.

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

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

Circuit/System Verification

1. Verify there are no other DTCs set in the K157 Video Processing Control Module.
 - **If the DTC is set**
Diagnose those DTCs first. Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#)
 - **Go to next step: If no other DTCs are set**
2. Clean all camera lenses, verify mirrors are folded out, and verify the trunk is closed.
 - **If mirrors are not folded out or trunk lid is not closed**
Perform needed tasks
 - **Go to next step: If mirrors are folded out and trunk is closed**
3. Park the vehicle in a flat area with parallel lines on both sides. Vehicle running, transmission in R, verify the line alignment in overhead view, both lines are parallel and aligned well in the front, side, and rear cameras.
 - **If the overhead view is not clear**
 - Perform the K157 Video Processing Control Module calibration. Refer to [Video Processing Control Module Calibration](#)
 - **Go to next step: If the overhead view is clear**
4. All OK.

Repair Instructions

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

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

DTC B399A

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 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

COMPONENT CONNECTOR END VIEWS - INDEX

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.
 - Go to next step: 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](#)
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B399B

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

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Surround Vision Camera Description and Operation

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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 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.
 - Go to next step: 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 \(Without DRZ\)](#)
- [Control Module References](#) for control module replacement, programming, and setup.

DTC B399C

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	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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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- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

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.
 - Go to next step: 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

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 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

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

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.
 - Go to next step: 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.

REARVIEW CAMERA FULL DISPLAY MIRROR MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

If equipped, full display mirror provides a wider field of view than normally seen from the inside rearview mirror to assist when driving and changing lanes. When the tab under the inside rearview mirror is pulled rearward, a view of the area behind the vehicle displays on the mirror. The inside rearview camera full display mirror is connected to the outside rearview camera via a shielded coaxial cable. When the tab under the inside rearview mirror is pulled rearward, a view of the area behind the vehicle displays on the mirror. Adjust the rearview mirror for a clear view of the area behind the vehicle before turning on full display mirror. Use the button on the back of the mirror to adjust the brightness of the display. Make sure the light sensor is not covered when adjusting the brightness.

Reference Information

Schematic Reference

[Image Display Camera Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Rearview Camera Full Display Mirror 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. Verify there is no debris on the B87 Rearview Camera lens, and the lens is not damaged or the rearview camera is not out of alignment.
 - **If debris is found on the lens, or the lens is damaged, or the rearview camera is out of alignment**

Clean the lens. If the lens, replace as necessary, or adjust the mirror.
 - **Go to next step: If there is no debris on the lens, or the lens is not damaged, or the rearview camera is not out of alignment**
2. All OK.

Circuit/System Testing

1. Ignition OFF/vehicle OFF, disconnect the X1 harness connector at the A10 Inside Rearview Mirror.
2. Test for less than 10 Ω between the A10 Inside Rearview Mirror 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. Ignition ON.
4. 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 A10 Inside Rearview Mirror.
 - **Go to next step: If the test lamp illuminates**
5. Ignition OFF/vehicle OFF, connect the X1 harness connector at the A10 Inside Rearview Mirror.
6. Disconnect the coax cable connector at the A10 Inside Rearview Mirror and wait for 5 sec.
7. Ignition On/Vehicle in Service Mode, test for 7 - 11 V at the A10 Inside Rearview Mirror.
 - **If the value outside range of 7 - 11V**

Test or replace the A10 Inside Rearview Mirror.
 - **Go to next step: If the value within the range of 7 - 11 V**
8. Ignition OFF/vehicle OFF, connect the coax cable connector at the A10 Inside Rearview Mirror.
9. Disconnect the coax cable connector at the B87 Rearview Camera, and wait for 5 sec.
10. Ignition On/Vehicle in Service Mode, test for 7 - 11 V between the center conductor of the coax cable and the coax cable ground shield wires.

- If the value within the range of 7 - 11 V

Replace the B87 Rearview Camera.

- **Go to next step: If the value outside range of 7 - 11V**

11. Replace the coax cable.

Component Testing

CAUTION: Refer to [Test Probe Caution](#)

NOTE:

- Before testing the coax cable, check the cable exterior for being pinched, cut, damaged, or having loose connections at the components, which can cause reception issues.
- To prevent false readings when testing the center coax terminals, use care not to ground the test probe on the outer housing/shield.

Coax Cable Test

1. Test for less than 5 Ω between the coax cable center terminal end to end.

- **If 5 Ω or greater**

Replace the coax cable.

- **Go to next step: If less than 5 Ω**

2. Test for greater than 5 Ω between the coax cable outer shield end to end.

- **If 5 Ω or greater**

Replace the coax cable.

- **Go to next step: If less than 5 Ω**

3. Test for infinite resistance between the coax cable center terminal and the coax cable outer shield.

- **If less than infinite resistance**

Replace the coax cable.

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

4. All OK.

Repair Instructions

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

- [Rearview Driver Information Camera Replacement \(Without DRZ\)](#).
- [Inside Rearview Mirror Replacement](#)
- [Control Module References](#) for control module replacement, programming, and setup.

REAR VISION CAMERA SYSTEM MALFUNCTION (IOA)

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

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

Schematic Reference

Image Display Camera Wiring Schematics

Connector End View Reference

Description and Operation

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)

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 (without MAH/MBC)**. **Radio Information Display Malfunction (with MAH/MBC)**.
 - **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** .
 - **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**

- **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 \(Without DRZ\)](#)
- [Control Module References](#) for control module replacement, programming, and setup

REAR VISION CAMERA SYSTEM MALFUNCTION (IO5/IO6 WITH 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

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	-	-

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

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

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

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](#) .

- **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 P17 Info Display Module connector X3.
2. 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 connector X3. Connect EL-50334-2 and EL-50334-14 together.
3. Ignition ON. Verify P17 Info Display Module displays the home screen and radio information properly.

- **If the P17 Info Display is displaying home screen and radio information properly**

Replace the K188 Human Machine Interface Control Module Bypass Module.

- **Go to next step: If the P17 Info Display is not displaying home screen and radio information properly**

4. Reconnect the P17 Info Display Module harness connector X3.
 5. Ignition OFF, disconnect the K188 Human Machine Interface Control Module Bypass Module harness connector X2.
 6. 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.
 7. Ignition ON/Vehicle in Service Mode, infotainment system ON.
 8. 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.**

9. 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](#).

- **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 connector 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](#).

• **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.

- Go to next step: 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.
- Go to next step: 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.
- Go to next step: 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.
- Go to next step: 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 \(Without DRZ\)](#).
- [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	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
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 (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)**

- [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](#).

- **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 \(without MAH/MBC\)](#), [Radio Information Display Malfunction \(with MAH/MBC\)](#).

- **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.
- Go to next step: 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 \(Without DRZ\)](#).
- [Control Module References](#) for control module replacement, programming, and setup.

SURROUND VISION CAMERA SYSTEM MALFUNCTION (NON-U.S.)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	B399A 02, B399B 02, B399C 02, B399D 02	1	B399A 01, B399B 01, B399C 01, B399D 01	-
Video Signal +	B390F 08, B395A 08, B395B 08 B395C 08, 1, 2	1	1, 2	390F 08, B395A 08, B395B 08 B395C 08
Video Signal -	B395C 08, 1, 2	1	1, 2	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Low Reference	-	B395A 08, B395B 08, B395C 08, B390F 08, 1	-	-
Video Shield	-	2	-	-
1. Camera inoperative 2. Poor image quality				

Circuit/System Description

When the engine is running, and the transmission is placed into R, a vehicle in reverse motion message is sent via serial data to the video processing control module indicating that camera operation is requested. When the engine is running, and the transmission is placed into D, a vehicle in forward motion message is sent via serial data to the video processing control module. The cameras send video information to the video processing control module through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image. The signals from the cameras are combined and sent to the radio or human machine interface module.

Diagnostic Aids

- A poor video image can be caused by ice, snow, and mud buildup on the lens of the appropriate 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.
- If any one of the cameras are **misaligned** or **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, or poorly aligned image is to perform the calibration procedure. Refer to [Video Processing Control Module Calibration](#)

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

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

Circuit/System Verification

1. Verify there is no debris on the appropriate camera lens and that the bezel and bezel seal are not damaged.
 - If debris is found on the lens

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

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

2. Engine running, transmission in R.

3. Verify the backup lamps are illuminated.

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

Refer to [Backup Lamps Malfunction](#) .

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

4. Engine running, transmission in R.

5. Verify a clear rear vision image is displayed on the A11 Radio.

- **If a clear image is not displayed on only one camera**

Refer to Circuit/System Testing - Only one camera image distorted.

- **If a clear image is not displayed for all cameras**

Refer to Circuit/System Testing - All camera images distorted with IO3 **OR** All camera images distorted with IO5 or IO6

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

6. Engine running, transmission in D.

- **If a clear image is not displayed on only one camera**

Refer to Circuit/System Testing - Only one camera image distorted.

- **If a clear image is not displayed for all cameras**

Refer to Circuit/System Testing - All camera images distorted with IO3 **OR** All camera images distorted with IO5 or IO6

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

7. All OK.

Circuit/System Testing

Only one camera image distorted

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

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

- **If 10 Ω or greater**

1. Ignition OFF.

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

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

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

3. Ignition ON.

4. Test for 4.8 - 5.2 V between the 5 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 5 V reference circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- Go to next step: If infinite resistance

3. Test for less than 2 Ω in the 5 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 5.2 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 - 5.2 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 infinite resistance between the signal circuit terminals listed below and ground:
 - Vision Signal + signal circuit terminal 1
 - Vision Signal - signal circuit terminal 4
 - **If less than infinite resistance**
 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 infinite resistance**
 9. Test for less than 2 Ω between the appropriate 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 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 11 X1
 - 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 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 14 X1
 - 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
 - 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. Engine running, transmission in R.

11. Verify a clear surround vision image is displayed on the A11 Radio.

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

1. Replace the appropriate camera.

2. Engine running, transmission in R.

3. Verify a clear surround vision image is displayed on the A11 Radio.

- If a clear surround vision image is not displayed, replace the K157 Video Processing Control Module.

- If a clear surround vision image is displayed, all OK.

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

12. All OK.

All camera images distorted with IO3

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K157 Video Processing Control Module. It may take up to 2 min for all vehicle systems to power down.

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If 1 V or greater**

Repair the short to voltage on the circuit.

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

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If less than infinite resistance**

Repair the short to ground on the circuit.

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

4. Test for less than 2 Ω between the camera signal (+) circuit terminal 6 X2 and the A11 Radio video signal (+) circuit terminal 5 X1.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

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

5. Test for less than 2 Ω between the camera signal (-) circuit terminal 12 X2 and the A11 Radio video signal (-) circuit terminal 4 X1.

- **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.

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

6. Replace the K157 Video Processing Control Module.

7. Engine running, transmission in R.

8. Verify a clear surround vision image is displayed on the A11 Radio.

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

Replace the A11 Radio.

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

9. All OK.

All camera images distorted with IO5 or IO6

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K157 Video Processing Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 1 V between the signal circuit terminals listed below and ground:
 - Camera signal (+) circuit terminal 6 X2
 - Camera signal (-) circuit terminal 12 X2
 - **If 1 V or greater**

Repair the short to voltage on the circuit.
 - **Go to next step: If less than 1 V**
3. Test for infinite resistance between the signal circuit terminals listed below and ground:
 - Camera signal (+) circuit terminal 6 X2
 - Camera signal (-) circuit terminal 12 X2
 - **If less than infinite resistance**

Repair the short to ground on the circuit.
 - **Go to next step: If infinite resistance**
4. Test for less than 2 Ω between the camera signal (+) circuit terminal 6 X2 and the K74 Human Machine Interface Control Module video signal (+) circuit terminal 5 X2.
 - **If 2 Ω or greater**

Repair the open/high resistance in the circuit.
 - **Go to next step: If less than 2 Ω**
5. Test for less than 2 Ω between the camera signal (-) circuit terminal 12 X2 and the K74 Human Machine Interface Control Module video signal (-) circuit terminal 6 X2.
 - **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.
 - **Go to next step: If less than 2 Ω**
6. Replace the K157 Video Processing Control Module.
7. Engine running, transmission in R.
8. Verify a clear surround vision image is displayed on the A22 Radio Controls/P7 Display.
 - **If a clear rear vision image is not displayed**

Replace the component: K74 Human Machine Interface Control Module.
 - **Go to next step: If a clear rear vision image is displayed**
9. All OK.

Repair Instructions

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

- [Rearview Driver Information Camera Replacement \(Without DRZ\)](#)
- [Side View Driver Information Camera Replacement](#)
- [Front View Driver Information Camera Replacement](#)
- [Control Module References](#) for control module replacement, programming, and setup.

SURROUND VISION CAMERA SYSTEM MALFUNCTION (U.S.)

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.

- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	B399A 02, B399B 02, B399C 02, B399D 02	1	B399A 01, B399B 01, B399C 01, B399D 01	-
Video Signal +	B390F 08, B395A 08, B395B 08 B395C 08, 1, 2	1	1, 2	390F 08, B395A 08, B395B 08 B395C 08
Video Signal -	B395C 08, 1, 2	1	1, 2	-
Low Reference	-	B395A 08, B395B 08, B395C 08, B390F 08, 1	-	-
Video Shield	-	2	-	-
1. Camera image not displayed 2. Poor Quality Image (as described in Circuit/System Verification)				

Circuit/System Description

When the engine is running, and the transmission is placed into R, a vehicle in reverse motion message is sent via serial data to the video processing control module indicating that camera operation is requested. When the engine is running, and the transmission is placed into D, a vehicle in forward motion message is sent via serial data to the video processing control module. The cameras send video information to the video processing control module through a video signal + and a video signal - circuit. A grounded shielding also wraps the video signal circuits to reduce electronic interference which may degrade the video signal and cause a distorted or otherwise degraded image. The signals from the cameras are combined and sent to the radio or human machine interface module.

Diagnostic Aids

- A poor video image can be caused by ice, snow, and mud buildup on the lens of the appropriate 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.
- If any one of the cameras are **misaligned** or **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, or poorly aligned image is to perform the calibration procedure. Refer to [Video Processing Control Module Calibration](#)

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](#)

- [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. Verify there is no debris on the appropriate 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, transmission in R.

NOTE: Inoperative or missing backup lamps may cause the surround vision rear view image to be displayed at all times.

3. Verify the backup lamps are illuminated.

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

Refer to [Backup Lamps Malfunction](#).

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

4. Engine running, 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.

5. Verify a clear rear vision image is displayed on the P17 info Display Module.

- **If a clear image is not displayed on only one camera**

Refer to Circuit/System Testing - Only one camera image distorted.

- **If a clear image is not displayed for all cameras**

Refer to Circuit/System Testing - All camera images distorted with IO3 **OR** All camera images distorted with IO5 or IO6

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

6. Engine running, transmission in D.

- **If a clear image is not displayed on only one camera**

Refer to Circuit/System Testing - Only one camera image distorted.

- **If a clear image is not displayed for all cameras**

Refer to Circuit/System Testing - All camera images distorted with IO3 **OR** All camera images distorted with IO5 or IO6

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

7. All OK.

Only one camera image distorted

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the appropriate camera. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 5 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.
2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K157 Video Processing Control Module.

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

3. Ignition ON.

4. Test for 4.8 - 5.2 V between the 5 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 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
3. Test for less than 2 Ω in the 5 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 5.2 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 - 5.2 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 infinite resistance between the signal circuit terminals listed below and ground:

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

- **If less than infinite resistance**

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 infinite resistance**

9. Test for less than 2 Ω between the appropriate 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 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 11 X1
- 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 4 and the K157 Video Processing Control Module video signal (+) circuit terminal 14 X1
- 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
- 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. Engine running, transmission in R.

11. Verify a clear surround vision image is displayed on the P17 Info Display Module.

- **If a clear surround vision image is not displayed**
 1. Replace the appropriate camera.
 2. Engine running, transmission in R.
 3. Verify a clear surround vision image is displayed on the P17 Info Display Module.
 - If a clear surround vision image is not displayed, replace the K157 Video Processing Control Module.
 - If a clear surround vision image is displayed, all OK.
- **Go to next step: If a clear surround vision image is displayed**

12. All OK.

All camera images distorted with IO3

1. Attempt to communicate with the K157 Video Processing Control Module using the scan tool.

- **If K157 Video Processing Control Module does not communicate with the scan tool**

Refer to [Scan Tool Does Not Communicate with Low Speed GMLAN Device](#)

- **Go to next step: If K157 Video Processing Control Module does communicate with the scan tool**

2. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K157 Video Processing Control Module. It may take up to 2 min for all vehicle systems to power down.

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If 1 V or greater**

Repair the short to voltage on the circuit.

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

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If less than infinite resistance**

Repair the short to ground on the circuit.

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

5. Test for less than 2 Ω between the camera signal (+) circuit terminal 6 X2 and the A11 Radio video signal (+) circuit terminal 5 X1.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

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

6. Test for less than 2 Ω between the camera signal (-) circuit terminal 12 X2 and the A11 Radio video signal (-) circuit terminal 4 X1.

- **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.

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

7. Replace the K157 Video Processing Control Module.

8. Engine running, transmission in R.

9. Verify a clear surround vision image is displayed on the P17 Info Display Module.

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

Replace the A11 Radio.

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

10. All OK.

All camera images distorted with IO5 or IO6

1. Attempt to communicate with the K157 Video Processing Control Module using the scan tool.

- **If K157 Video Processing Control Module does not communicate with the scan tool**

Refer to [Scan Tool Does Not Communicate with Low Speed GMLAN Device](#)

- **Go to next step: If K157 Video Processing Control Module does communicate with the scan tool**

2. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K157 Video Processing Control Module. It may take up to 2 min for all vehicle systems to power down.

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If 1 V or greater**

Repair the short to voltage on the circuit.

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

4. Ignition OFF, disconnect the K74 Human Machine Interface Control Module X2 harness connector.

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

- Camera signal (+) circuit terminal 6 X2
- Camera signal (-) circuit terminal 12 X2
- **If less than infinite resistance**

Repair the short to ground on the circuit.

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

6. Test for less than 2 Ω between the camera signal (+) circuit terminal 6 X2 and the K74 Human Machine Interface Control Module video signal (+) circuit terminal 5 X1.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

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

7. Test for less than 2 Ω between the camera signal (-) circuit terminal 12 X2 and the K74 Human Machine Interface Control Module video signal (-) circuit terminal 4 X1.

- **If 2 Ω or greater**

Test the signal circuit for an open/high resistance.

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

8. Replace the K157 Video Processing Control Module.

9. Engine running, transmission in R.

10. Verify a clear surround vision image is displayed on the P17 Info Display Module.

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

Replace the K74 Human Machine Interface Control Module.

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

11. All OK.

Repair Instructions

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

- [Rearview Driver Information Camera Replacement \(Without DRZ\)](#)
- [Side View Driver Information Camera Replacement](#)
- [Front View Driver Information Camera Replacement](#)
- [Control Module References](#) for control module replacement, programming, and setup.

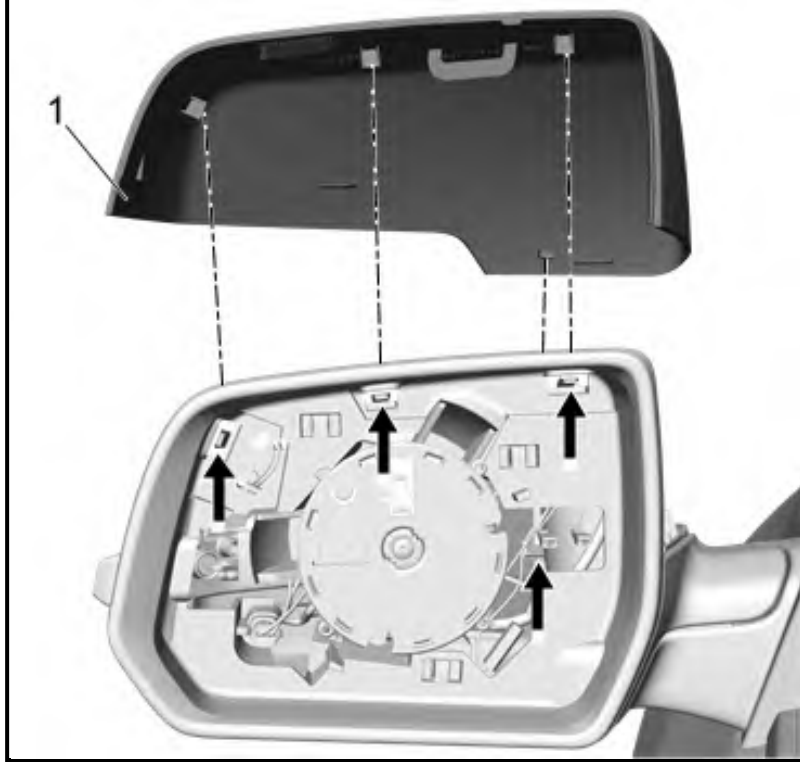
REPAIR INSTRUCTIONS

SIDE VIEW DRIVER INFORMATION CAMERA REPLACEMENT

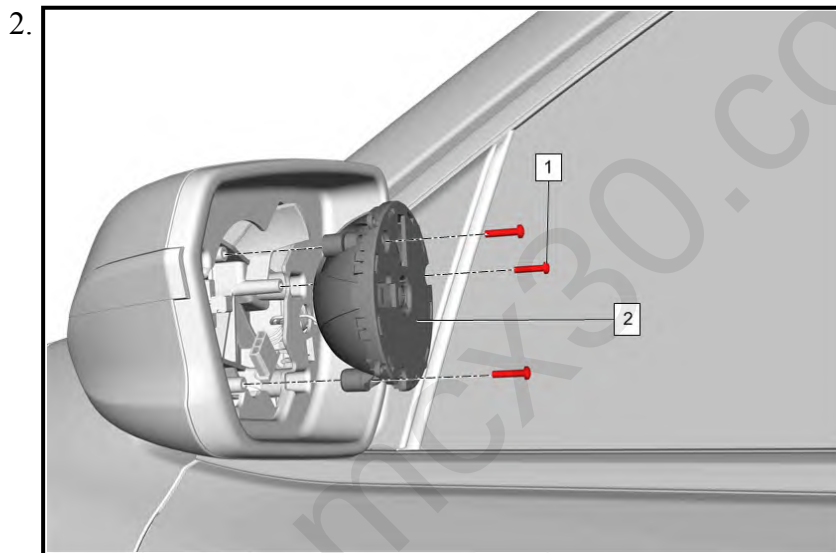
Removal Procedure

1.

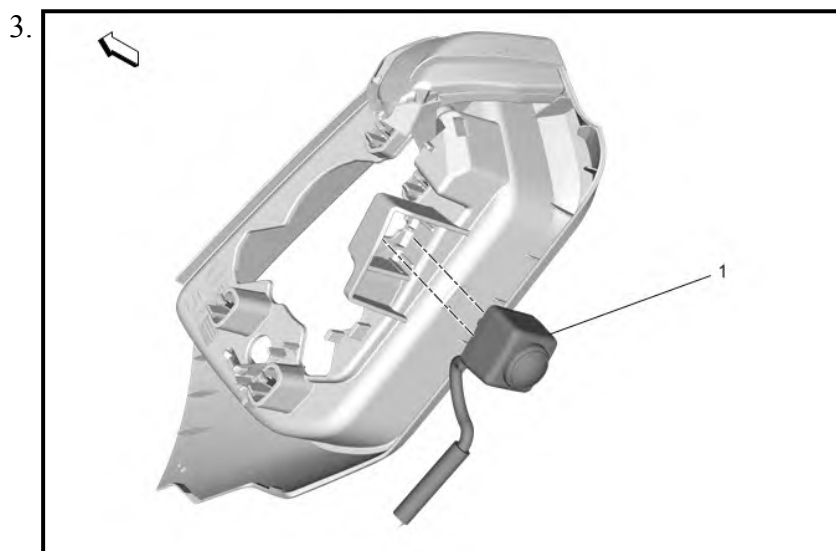




Outside Rearview Mirror Upper Housing Cover (1) - Remove - [Outside Rearview Mirror Housing Upper Cover Replacement](#)



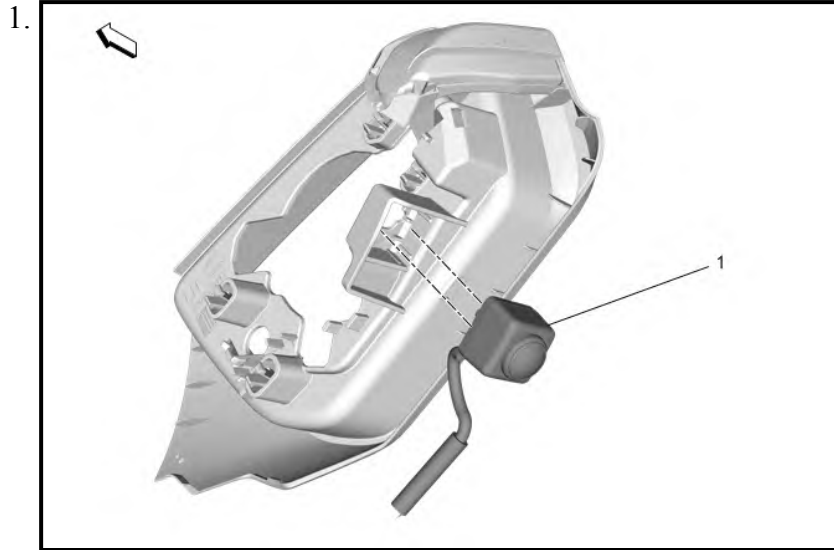
Outside Rearview Mirror Inner Actuator (2) - Remove - [Outside Rearview Mirror Actuator Replacement](#)



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

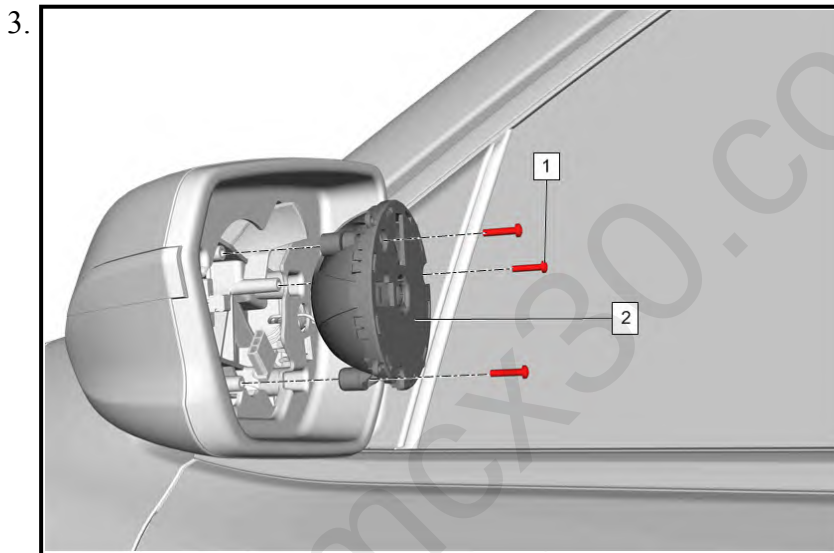
4. Disconnect the electrical connector.

Installation Procedure



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

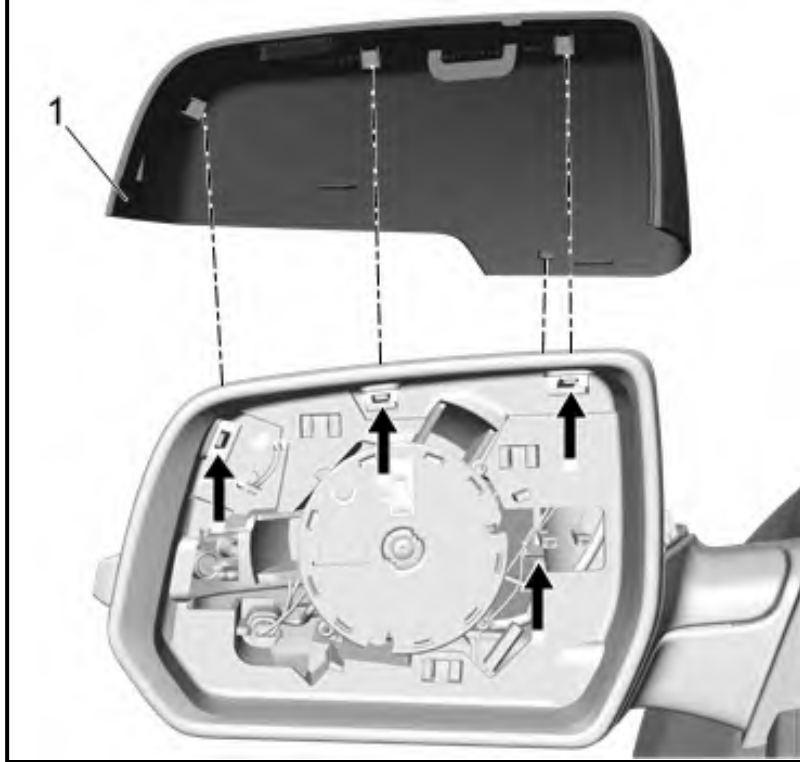
2. Connect the electrical connector.



Outside Rearview Mirror Inner Actuator (2) - Install - [Outside Rearview Mirror Actuator Replacement](#)

4. Connect the electrical connectors.

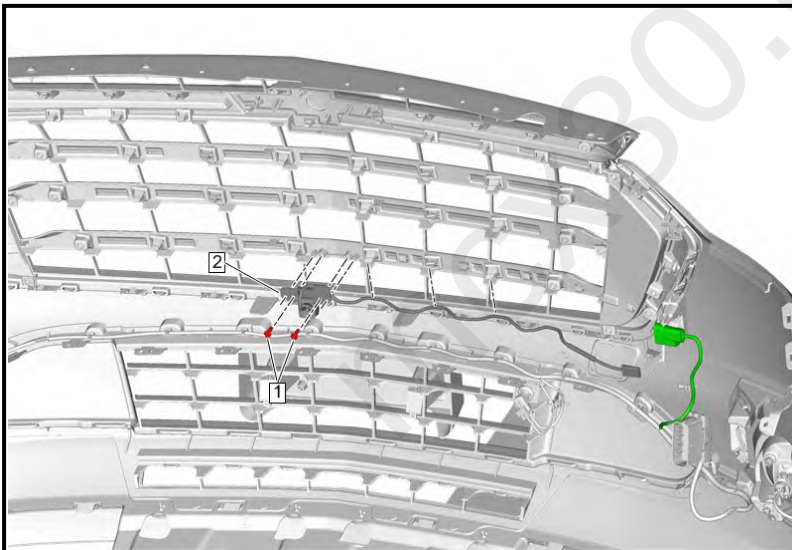




NOTE: Inspect the outside rearview mirror for proper operation.

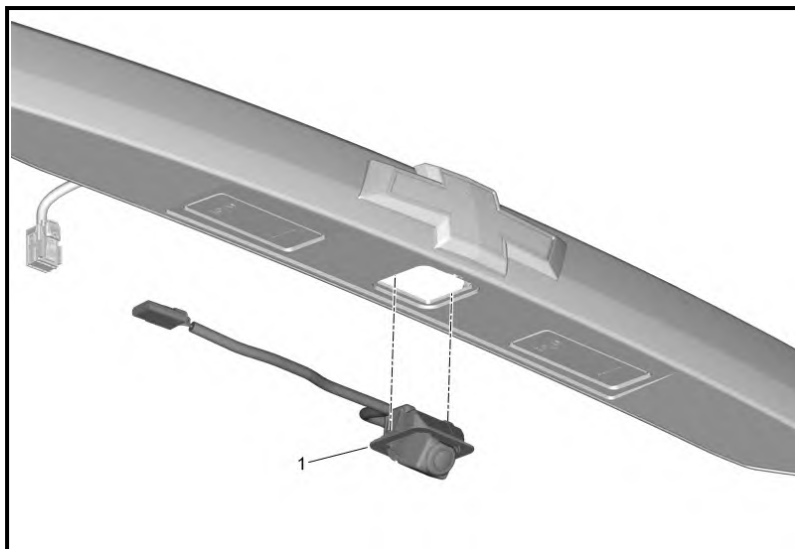
Outside Rearview Mirror Upper Housing Cover (1) - Install - [Outside Rearview Mirror Housing Upper Cover Replacement](#)

FRONT VIEW DRIVER INFORMATION CAMERA REPLACEMENT



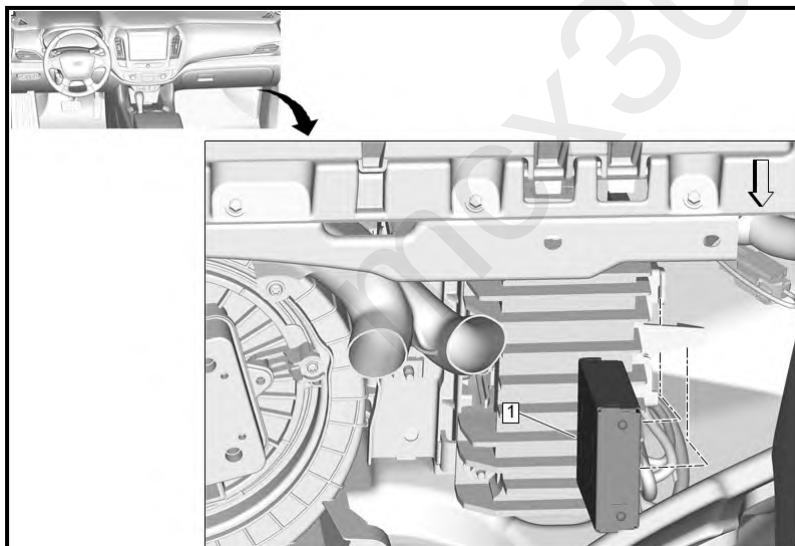
Callout	Component Name
Preliminary Procedure Front Bumper Fascia Energy Absorber Replacement	
1	Front View Camera Bolt [2x] CAUTION: Fastener Caution . Tighten 4.7 N.m (42 lb in)
2	Front View Driver Information Camera Procedure Disconnect the electrical connector.

REARVIEW DRIVER INFORMATION CAMERA REPLACEMENT (WITHOUT DRZ)



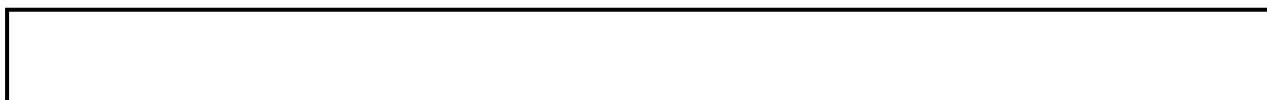
Callout	Component Name
Preliminary Procedure <u>Rear Closure Center Applique Replacement</u>	
1	Rearview Driver Information Camera Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs.

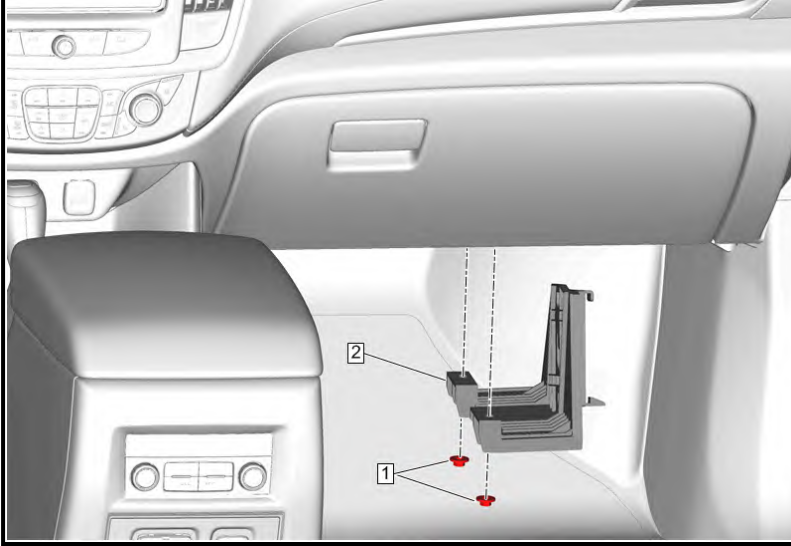
HUMAN MACHINE INTERFACE CONTROL MODULE BYPASS MODULE REPLACEMENT



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

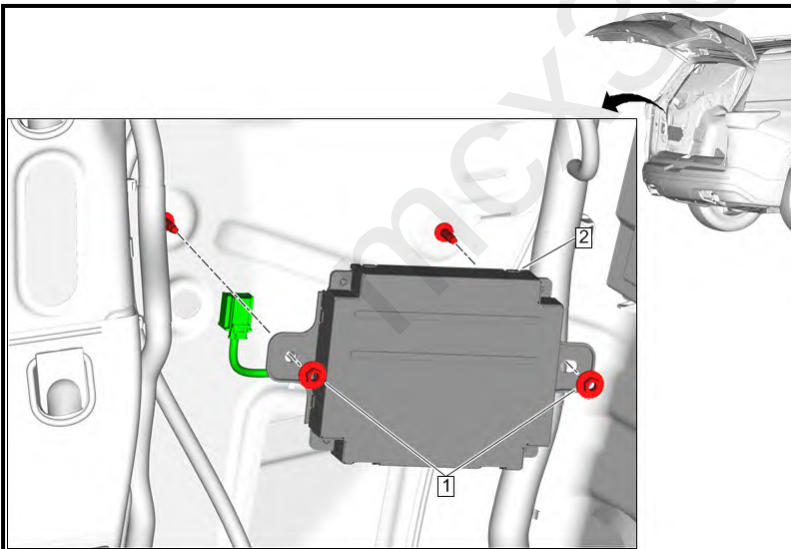
HUMAN MACHINE INTERFACE CONTROL MODULE BYPASS MODULE BRACKET REPLACEMENT





Callout	Component Name
Preliminary Procedure <u>Human Machine Interface Control Module Bypass Module Replacement</u>	
1	Radio Bracket Nut [2x] CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)
2	Human Machine Interface Control Module Bypass Module Bracket

VIDEO PROCESSING MODULE REPLACEMENT



Callout	Component Name
Preliminary Procedure <u>Quarter Lower Rear Trim Panel Replacement (Right Side)</u> <u>Quarter Lower Rear Trim Panel Replacement (Left Side)</u>	
1	Video Processing Module Nut [2x] CAUTION: <u>Fastener Caution</u> Tighten 9 N.m (80 lb in)

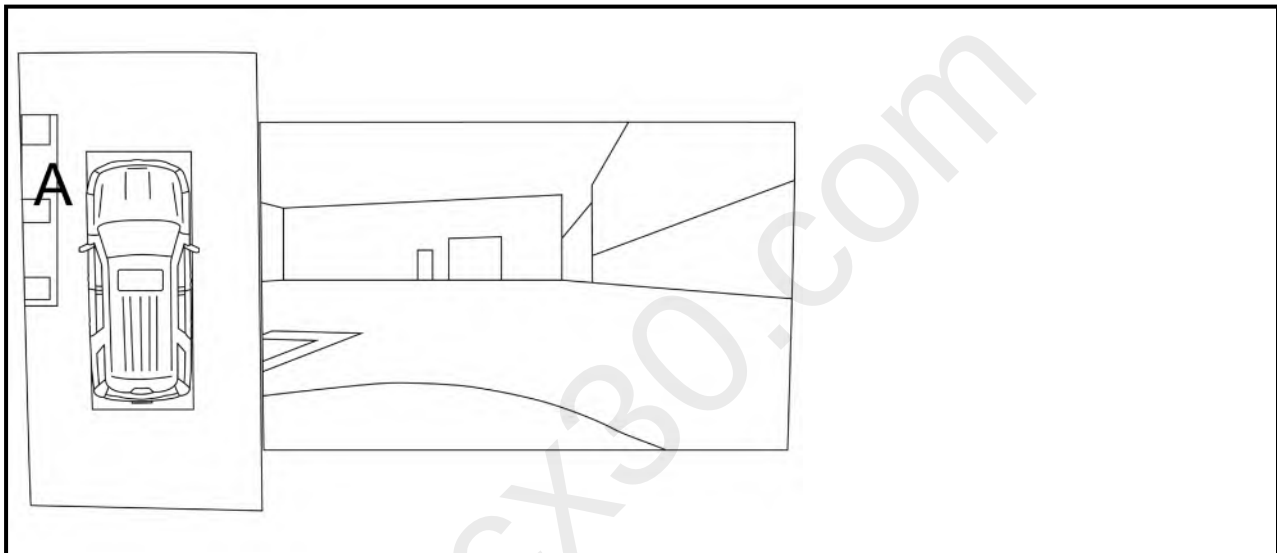
Callout	Component Name
2	Video Processing Module Procedure 1. Disconnect the electrical connectors. 2. Perform the necessary programming and setup procedure: Control Module References

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



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 mat 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

- Go to next step: 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:

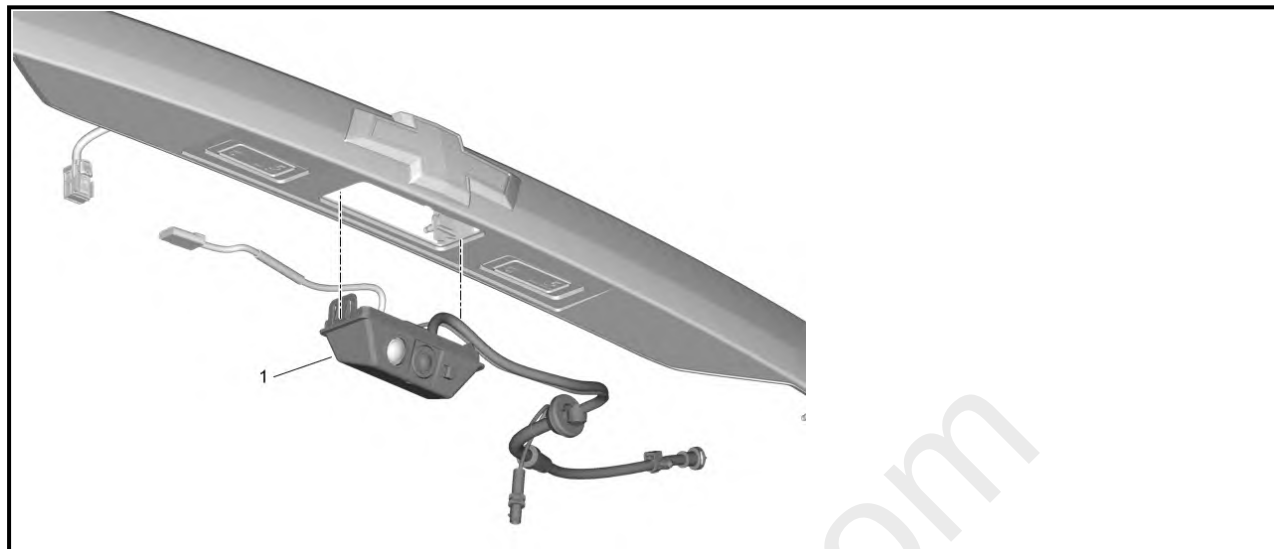
1. Captures an image at Position A
2. Captures an image at Position B
3. Captures an image at Position C
4. Captures an image at Position D

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

Error Code	Cause	Possible Repair
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

VIDEO DISPLAY INSIDE REARVIEW MIRROR CAMERA REPLACEMENT (DRZ)



Callout	Component Name
Preliminary Procedure <u>Rear Closure Center Applique Replacement</u>	
1	Video Display Inside Rearview Mirror Camera Procedure Release the retaining tabs.

DESCRIPTION AND OPERATION

REARVIEW CAMERA FULL DISPLAY MIRROR DESCRIPTION AND OPERATION

If equipped, full display mirror provides a wider field of view than normally seen from the inside rearview mirror to assist when driving and changing lanes. When the tab under the inside rearview mirror is pulled rearward, a view of the area behind the vehicle displays on the mirror. The inside rearview camera full display mirror is connected to the outside rearview camera via a shielded coaxial cable.

When the tab under the inside rearview mirror is pulled rearward, a view of the area behind the vehicle displays on the mirror.

Adjust the rearview mirror for a clear view of the area behind the vehicle before turning on full display mirror. Use the three buttons on the bottom of the mirror to adjust the brightness, zoom, and tilt of the display. Make sure the light sensor is not covered when adjusting the brightness.

The inside rearview camera full display mirror may not work properly or display a clear image if:

- It is dark.
- The sun or the beam of headlamps are shining directly into the camera lens.
- Ice, snow, mud, or anything else builds up on the camera lens. Clean the lens, rinse it with water, and wipe it with a soft cloth.

When the mirror detects that the camera is not sending a valid video signal, it "blue screens" with a "no video" decal for 3 seconds, then reverts back to the mirror.

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.

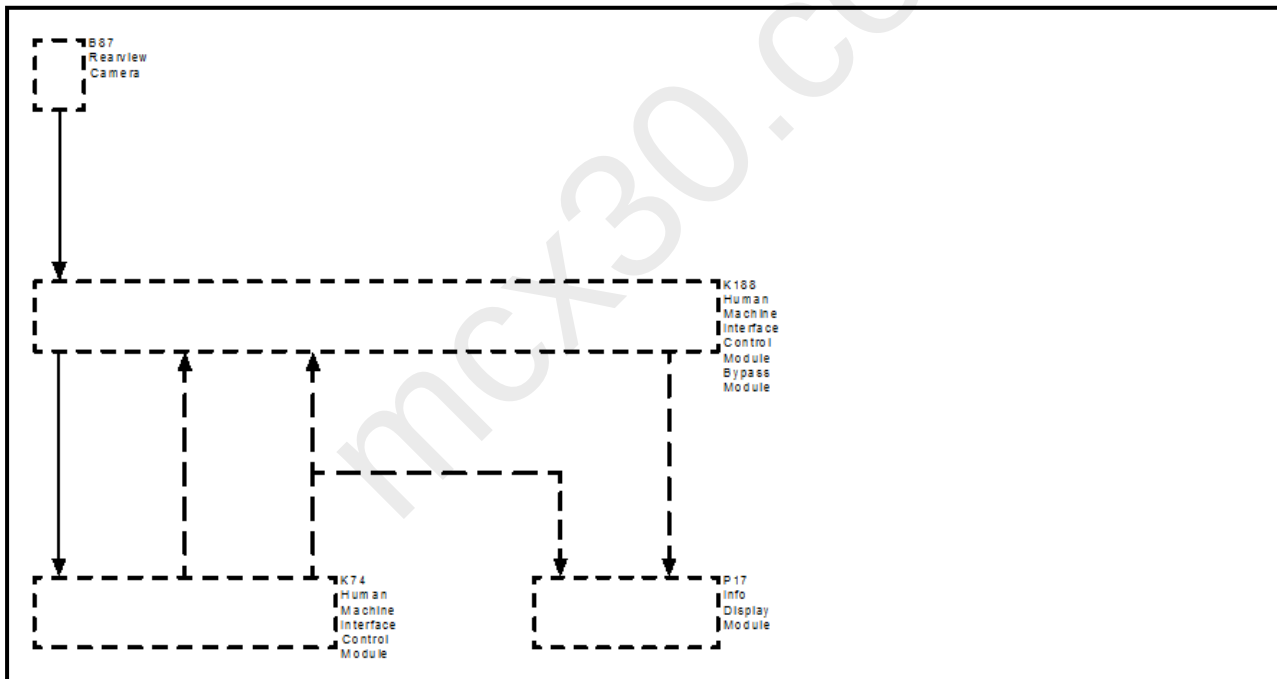
When the transmission is placed into REVERSE, a signal indicates to the Radio that the vehicle is in reverse and image display is requested. The rear vision camera receives ignition voltage and a constant ground to power the camera. Video signal + and video signal - circuits carry the video image from 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)



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:

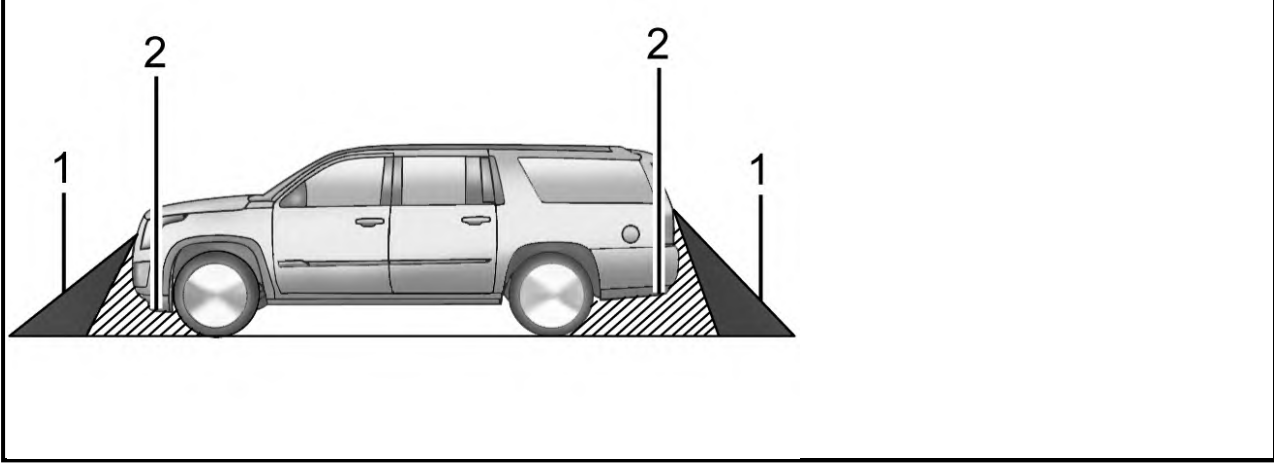
- Ice, snow, or mud has built up on the rear vision camera
- Dark conditions
- Extreme light conditions, such as glare from the sun or the headlights of another vehicle
- Damage to the rear of the vehicle
- Extreme high temperatures or extreme temperature changes

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.

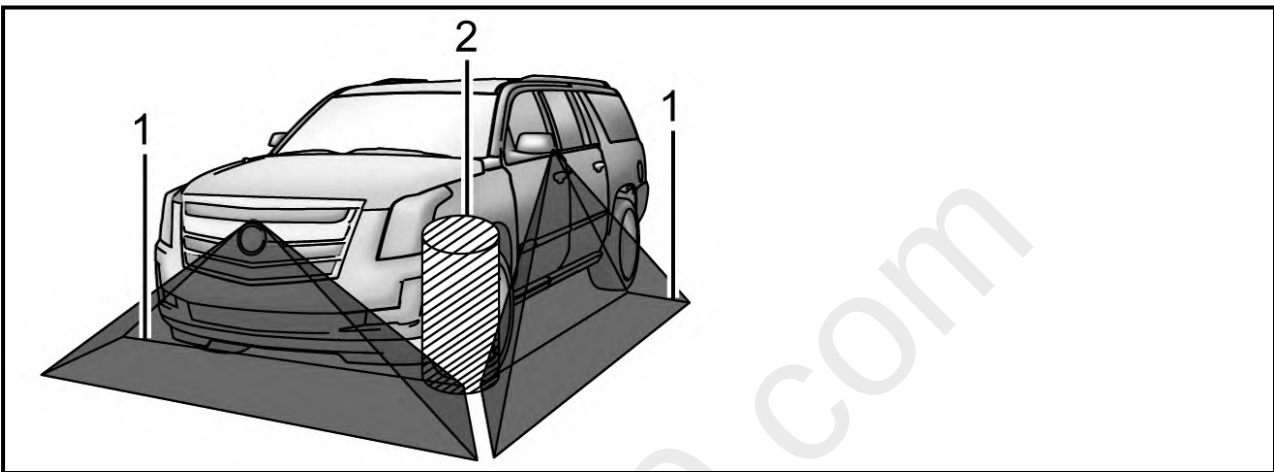
SURROUND VISION CAMERA DESCRIPTION AND OPERATION

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.





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



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
- X20 Memory Card Receptacle

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.

SD Card and Video Recorder Function

In Full Speed mode (12Mbps) and High Speed (480 Mbps), the frame rate is decided by writing speed (USB cable, SD card, software) to SD card reader. The video processing control module supports only mass storage class (8 to 32 GB SDHC card with FAT32 file system, Class 4 and Over). The 5V output of video processing control module is used to switch on/off read/write device.

The recorder feature continuously records single camera views from the 360 cameras. There are two operating modes for image recording: security mode and normal mode. Security mode records images in a round robin sequence using all cameras when the module wakes up until the ignition is in accessory or run mode. Normal mode records images from front and rear cameras in ACC or RUN power mode.

The video processing control module shall stop recording and close this file when Ignition OFF or trunk is opened and start a new recording onto a new file. This is to avoid corrupting the entire drive cycle file when SD card is removed abruptly. **Disable recording before removing SD card**.

Video playback allowed in **PARK** gear only. During playback, Recording is not possible. Playback screen must be closed to allow recording.
