

2017 ACCESSORIES & EQUIPMENT

Sunroof - Encore, Trax

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

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

Application	Specification
	Metric (English)
Sunroof Module Bolt	9 N.m (80 lb in)
Sunroof Module Bracket Screw	9 N.m (80 lb in)
Sunroof Window Bolt	4 N.m (36 lb in)
Sunroof Window Motor Bolt	4 N.m (36 lb in)

SCHEMATIC WIRING DIAGRAMS

SUNROOF WIRING SCHEMATICS (BUICK)

Power Sunroof (Buick)

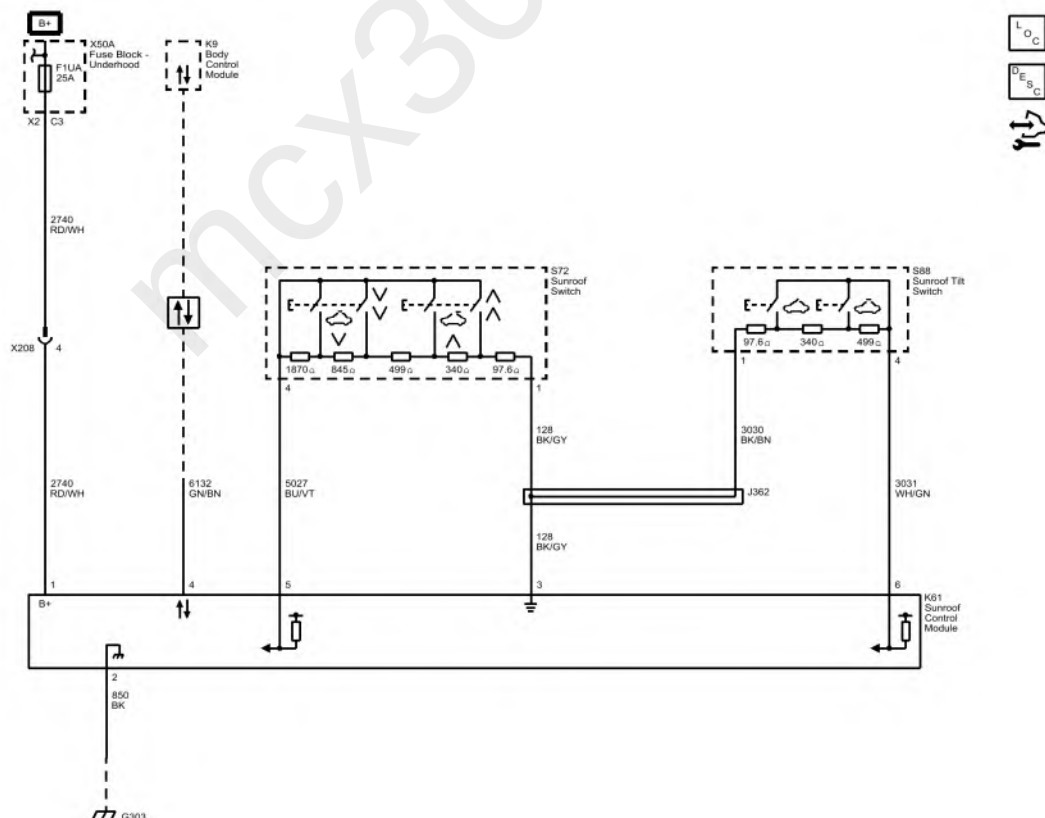


Fig. 1: Power Sunroof (Buick)

Courtesy of GENERAL MOTORS COMPANY

SUNROOF WIRING SCHEMATICS (CHEVROLET)

Power Sunroof (Chevrolet with CF5)

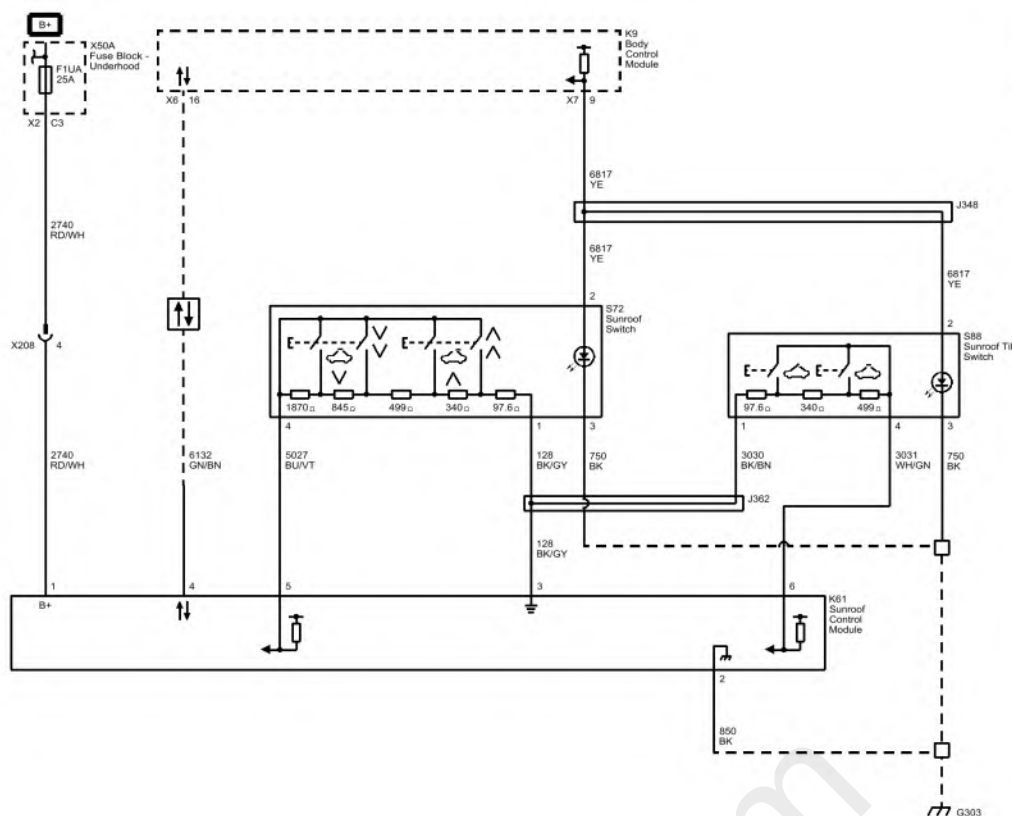


Fig. 2: Power Sunroof (Chevrolet with CF5)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B3664: SUNROOF POSITION SELECT SWITCH HIGH SIGNAL

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 B3664 02

Sunroof Position Select Switch High Signal Circuit Short to Ground

DTC B3664 05

Sunroof Position Select Switch High Signal Circuit High Voltage/Open

DTC B3664 59

Sunroof Position Select Switch High Signal Circuit Protection Time-Out

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B3664 02	B3664 05	B3664 05	-
Low Reference	-	1	1	-
1. Power Sunroof Slide Malfunction				

Circuit/System Description

The sunroof switch is connected directly to the sunroof control module and provides detent positions for open, express open, off, close, and express close. The sunroof switch completes the circuit between two signals provided by the sunroof control module, a reference ground input and a pull-up voltage provided by an analog to digital switch input. The sunroof switch places a different resistor ladder network in the circuit depending on the function selected.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B3664 02

The sunroof control module has detected and reported via serial data that the sunroof switch signal is shorted to ground.

B3664 05

The sunroof control module has detected and reported via serial data that the sunroof switch signal is open or shorted to voltage.

B3664 59

The sunroof control module has detected and reported via serial data that the sunroof switch has been in the same active position for 20 seconds after the glass has stopped moving in the requested direction due to reaching the end of the allowable motion.

Action Taken When the DTC Sets

DTC B3664 is stored in the body control module (BCM) memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof switch signal circuit.

Reference Information

Schematic Reference

Sunroof Schematics (Buick)Sunroof Schematics (Chevrolet)

Connector End View Reference

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

Description and Operation

Sunroof 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 and all vehicle systems OFF, disconnect the harness connector at the S72 Sunroof Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof 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 , test or replace the K61 Sunroof Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify the scan tool Slide Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition Off, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K61 Sunroof Control Module.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Slide Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K61 Sunroof Control Module.
 - **If Short to Ground**
7. All OK.

Component Testing

Sunroof Switch

Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3-4.0k Ω between the control terminal 4 and the low reference terminal 1.
 - **If not between 3.3-4.0k Ω**

Replace the S72 Sunroof Switch.
 - **If between 3.3-4.0k Ω**
3. Test for 390-480 Ω between the control terminal 4 and the low reference terminal 1 while pressing the open switch.
 - **If not between 390-480 Ω**

Replace the S72 Sunroof Switch.
 - **If between 390-480 Ω**
4. Test for 88-120 Ω between the control terminal 4 and the low reference terminal 1 while pressing the express open switch.
 - **If not between 88-120 Ω**

Replace the S72 Sunroof Switch.

- **If between 88-120 Ω**

5. Test for 1.6-2.0k Ω between the control terminal 4 and the low reference terminal 1 while pressing the close switch.

- **If not between 1.6-2.0k Ω**

Replace the S72 Sunroof Switch.

- **If between 1.6-2.0k Ω**

6. Test for 830-1030 Ω between the control terminal 4 and the low reference terminal 1 while pressing the express close switch.

- **If not between 830-1030 Ω**

Replace the S72 Sunroof Switch.

- **If between 830-1030 Ω**

7. All OK

Repair Instructions

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

- [Sunroof Switch Replacement](#)
- [Sunroof Module Assembly Replacement](#)
- [Control Module References](#) for sunroof control module replacement, programming and setup

DTC B3697: SUNROOF ACTUATOR

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 B3697 00

Sunroof Actuator Malfunction

DTC B3697 39

Sunroof Actuator Internal Malfunction

DTC B3697 42

Sunroof Actuator Calibration Not Programmed

DTC B3697 4B

Sunroof Actuator Calibration Not Learned

Circuit/System Description

The sunroof glass is controlled by its own integrated motor/controller containing the necessary electronics, motor, hall effect position sensors, as well as the interface to the driver control switches. The motor/controller is capable of controlling motion based on control switch activation and serial data message commands from the body control module (BCM).

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B3697 00

The sunroof control module has detected and reported via serial data that the sunroof actuator has a malfunction.

B3697 39

The sunroof control module has detected and reported via serial data that the sunroof actuator has an internal malfunction.

B3697 42

The sunroof control module has detected and reported via serial data that the sunroof actuator is not programmed.

B3697 4B

The sunroof control module has detected and reported via serial data that the sunroof actuator calibration is not learned.

Action Taken When the DTC Sets

DTC B3697 is stored in the BCM memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof actuator.

Reference Information

Schematic Reference

[Sunroof Schematics \(Buick\)](#)[Sunroof Schematics \(Chevrolet\)](#)

Connector End View Reference

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

Description and Operation

[Sunroof 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 B3697 42 or DTC B3697 4B is not set.
 - **If DTC B3697 42 or DTC B3697 4B is set**
 1. Calibrate the K61 Sunroof Control Module. Refer to [Sunroof Motor/Actuator Initialization/Teach Process](#).

2. Verify DTC B3697 42 or DTC B3697 4B does not set while operating the sunroof.

- If DTC B3697 42 or DTC B3697 4B sets, replace the K61 Sunroof Control Module.
- If DTC B3697 42 or DTC B3697 4B does not set

3. All OK.

- **If DTC B3697 42 or DTC B3697 4B is not set**

3. Verify DTC B3697 00 or DTC B3697 39 is not set

- If DTC B3697 00 or DTC B3697 39 is set, replace the K61 Sunroof Control Module.
- If DTC B3697 00 or DTC B3697 39 is not set

4. All OK.

Repair Instructions

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

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

DTC B369C: SUNROOF TILT POSITION SELECT SWITCH

Diagnostic Instructions

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

DTC Descriptors

DTC B369C 02

Sunroof Tilt Position Select Switch Circuit Short to Ground

DTC B369C 05

Sunroof Tilt Position Select Switch Circuit High Voltage/Open

DTC B369C 59

Sunroof Tilt Position Select Switch Circuit Protection Time-Out

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B369C 02	B369C 05	B369C 05	-
Low Reference	-	1	1	-
1. Power Sunroof Tilt Malfunction				

Circuit/System Description

The sunroof tilt switch is connected directly to the sunroof control module and provides detent positions for open, off and close. The sunroof tilt switch completes the circuit between two signals provided by the control module, a reference ground input and a pull-up voltage provided by the analog to digital switch input. The sunroof tilt switch places a different resistor ladder network in the circuit depending on the function selected. The controllers analog to digital switch input reads the resulting voltage range and determines the function.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

B369C 02

The sunroof control module has detected and reported via serial data that the sunroof tilt switch circuit is shorted to ground.

B369C 05

The sunroof control module has detected and reported via serial data that the sunroof tilt select switch circuit is open or shorted to voltage.

B369C 59

The sunroof control module has detected and reported via serial data that the sunroof tilt switch has been the same active position for 20 seconds after the glass has stopped moving in the requested direction due to reaching the end of the allowable motion.

Action Taken When the DTC Sets

DTC B369C is stored in the body control module (BCM) memory.

Conditions for Clearing the DTC

The BCM no longer detects a malfunction in the sunroof tilt switch circuit.

Reference Information

Schematic Reference

Sunroof Schematics (Buick)Sunroof Schematics (Chevrolet)

Connector End View Reference

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

Description and Operation

Sunroof 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 and all vehicle systems OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch. 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 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof 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 , test or replace the K61 Sunroof Control Module.
 - **If less than 10 Ω**
3. Ignition ON.

4. Verify the scan tool Sunroof Tilt Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K61 Sunroof Control Module.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Sunroof Tilt Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K61 Sunroof Control Module.
 - **If Short to Ground**
7. All OK.

Component Testing

Sunroof Ventilation Switch

Static Test

1. Ignition OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch.
2. Test for 830-1030 Ω between the control terminal 4 and the low reference terminal 1.
 - **If not between 830-1030 Ω**

Replace the S88 Sunroof Tilt Switch.
 - **If between 830-1030 Ω**
3. Test for 88-120 Ω between the control terminal 4 and the low reference terminal 1 while pressing the open switch.
 - **If not between 88-120 Ω**

Replace the S88 Sunroof Tilt Switch.
 - **If between 88-120 Ω**
4. Test for 390-480 Ω between the control terminal 4 and the ground terminal 1 while pressing the close switch.
 - **If not between 390-480 Ω**

Replace the S88 Sunroof Tilt Switch.
 - **If between 390-480 Ω**
5. All OK.

Repair Instructions

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

- [Sunroof Switch Replacement](#)
- [Sunroof Module Assembly Replacement](#)

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

SYMPTOMS - ROOF

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

1. Perform the [Diagnostic System Check - Vehicle](#) before using the symptom tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data links.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Sunroof Description and Operation](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the systems. Refer to [Checking Aftermarket Accessories](#).
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

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

Symptom List

Refer to [Power Sunroof Malfunction](#) in order to diagnose the symptom.

POWER SUNROOF MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	1	1	-	-
Sunroof Switch Signal	B3664 02	B3664 05	B3664 05	-
Sunroof Tilt Switch Signal	B369C 02, 2	B369C 05, 2	B369C 05, 2	-
Sunroof Switch Low Reference	-	1	-	-
Sunroof Control Module Ground	-	1	-	-
1. Power Sunroof Malfunction 2. Sunroof Tilt Malfunction				

Circuit/System Description

The sunroof electrical system uses a master/slave configuration utilizing a serial data based system for communication. The body control module (BCM) is designated as the master, while the sunroof control modules is configured as the slave.

As the system master, the BCM uses the serial data communication bus to enable or disable sunroof operation, communicate vehicle information to each controller, and request sunroof movement. The sunroof control module provides system status and diagnostic information to the BCM for diagnostic reporting and operational purposes. The control switches places a different resistor ladder network in the

circuit depending on the function selected. The controllers analog to digital switch input reads the resulting voltage range and determines the function.

Diagnostic Aids

- The sunroof glass is controlled by an integrated motor/controller containing the motor, electronics, and position sensors. If the motor and sunroof mechanism get out of sync the sunroof may operate erratically. To re-synchronize the motor and sunroof mechanism, perform the [Sunroof Motor/Actuator Initialization/Teach Process](#).
- The sunroof control module provides obstacle/blockage detection. If the [Sunroof Motor/Actuator Initialization/Teach Process](#) is not carried out completely, the sunroof may stop and reverse slightly when it gets to the location where it needs to push down the windscreen. Make sure to complete the process.

Reference Information

Schematic Reference

[Sunroof Schematics \(Buick\)](#)[Sunroof Schematics \(Chevrolet\)](#)

Connector End View Reference

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

Description and Operation

[Sunroof Description and Operation](#)

Electrical Information Reference

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

Scan Tool Reference

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

Circuit/System Verification

1. Ignition ON.
2. Verify the sunroof opens and closes when pressing the open and close sunroof switch.
 - **If the sunroof does not open or close**
Refer to Circuit/System Testing.
 - **If the sunroof opens and closes**
3. Verify the sunroof opens and closes to the vent position when pressing the open and close sunroof vent switch.
 - **If the sunroof does not open or close to the vent position**
Refer to Circuit/System Testing - Vent Malfunction.
 - **If the sunroof opens and closes to the vent position**
4. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K61 Sunroof Control Module. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 2 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for less than 2 Ω in the ground circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , repair the open/high resistance in the ground connection.
 - **If less than 10 Ω**
3. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K61 Sunroof Control Module.
 - **If the test lamp illuminates**
4. Ignition ON.
5. Test for less than 1 V between the signal circuit terminals listed below and ground:
 - Terminal 3 - K61 Sunroof Control Module
 - Terminal 5 - K61 Sunroof Control Module
 - Terminal 6 - K61 Sunroof Control Module
 - **If 1 V or greater**

Repair the short to voltage on the signal circuit.
 - **If less than 1 V**
6. Ignition OFF.
7. Test for infinite resistance between the signal circuit terminals listed below and ground:
 - Terminal 3 - K61 Sunroof Control Module
 - Terminal 5 - K61 Sunroof Control Module
 - Terminal 6 - K61 Sunroof Control Module
 - **If less than infinite resistance**

Repair the short to ground on the signal circuit
 - **If infinite resistance**
8. Disconnect the harness connector at the S72 Sunroof Switch and the S88 Sunroof Tilt Switch.
9. Test for less than 5 Ω between the circuit terminals listed below:
 - S72 Sunroof Switch terminal 1 and K61 Sunroof Control Module terminal 3
 - S72 Sunroof Switch terminal 4 and K61 Sunroof Control Module terminal 5
 - S88 Sunroof Tilt Switch terminal 1 and K61 Sunroof Control Module terminal 3
 - S88 Sunroof Tilt Switch terminal 4 and K61 Sunroof Control Module terminal 6
 - **If greater than 5 Ω**

Repair the open/high resistance in the circuit.
 - **If less than 5 Ω**
10. Test or replace the K61 Sunroof Control Module.

Tilt Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof 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 , test or replace the K61 Sunroof Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Verify the scan tool Sunroof Tilt Switch parameter is Short to Battery.
 - **If not Short to Battery**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for infinite resistance between the signal circuit terminal 4 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K61 Sunroof Control Module.
 - **If Short to Battery**
5. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 1.
6. Verify the scan tool Sunroof Tilt Switch parameter is Short to Ground.
 - **If not Short to Ground**
 1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
 2. Test for less than 1 V between the signal circuit terminal 4 and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K61 Sunroof Control Module.
 - **If Short to Ground**
7. All OK.

Component Testing

Sunroof Switch - Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3-4.0k Ω between the control terminal 4 and the low reference terminal 1.
 - **If not between 3.3-4.0k Ω**

Replace the S72 Sunroof Switch.
 - **If between 3.3-4.0k Ω**
3. Test for 390-480 Ω between the control terminal 4 and the low reference terminal 1 while pressing the open switch.
 - **If not between 390-480 Ω**

Replace the S72 Sunroof Switch.
 - **If between 390-480 Ω**
4. Test for 88-120 Ω between the control terminal 4 and the low reference terminal 1 while pressing the express open switch.
 - **If not between 88-120 Ω**

Replace the S72 Sunroof Switch.

- **If between 88-120 Ω**

5. Test for 1.6-2.0k Ω between the control terminal 4 and the low reference terminal 1 while pressing the close switch.

- **If not between 1.6-2.0k Ω**

Replace the S72 Sunroof Switch.

- **If between 1.6-2.0k Ω**

6. Test for 830-1030 Ω between the control terminal 4 and the low reference terminal 1 while pressing the express close switch.

- **If not between 830-1030 Ω**

Replace the S72 Sunroof Switch.

- **If between 830-1030 Ω**

7. All OK

Sunroof Tilt Switch - Static Test

1. Ignition OFF, disconnect the harness connector at the S88 Sunroof Tilt Switch.

2. Test for 830-1030 Ω between the control terminal 4 and the low reference terminal 1.

- **If not between 830-1030 Ω**

Replace the S88 Sunroof Tilt Switch.

- **If between 830-1030 Ω**

3. Test for 88-120 Ω between the control terminal 4 and the low reference terminal 1 while pressing the open switch.

- **If not between 88-120 Ω**

Replace the S88 Sunroof Tilt Switch.

- **If between 88-120 Ω**

4. Test for 390-480 Ω between the control terminal 4 and the ground terminal 1 while pressing the close switch.

- **If not between 390-480 Ω**

Replace the S88 Sunroof Tilt Switch.

- **If between 390-480 Ω**

5. All OK

Repair Instructions

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

- [Sunroof Switch Replacement](#)
- [Sunroof Tilt Position Switch Replacement](#)
- [Control Module References](#) for sunroof control module replacement, programming and setup

REPAIR INSTRUCTIONS

SUNROOF AIR DEFLECTOR REPLACEMENT

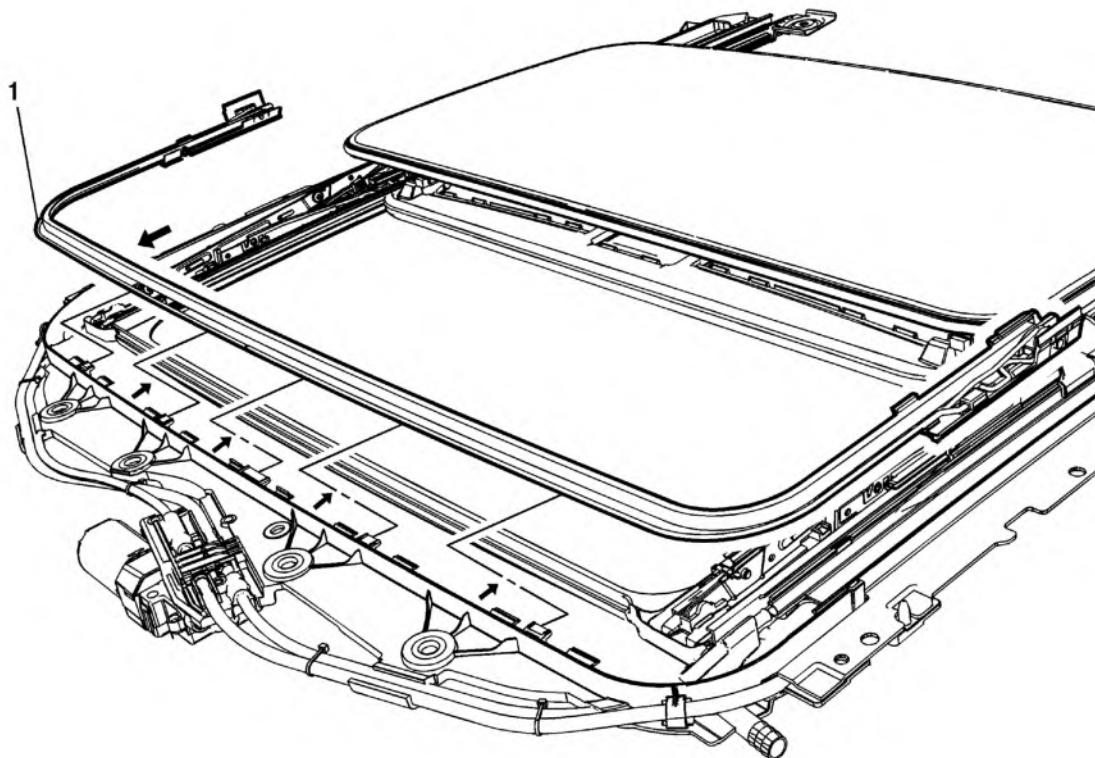


Fig. 3: Sunroof Air Deflector

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Sunroof Air Deflector Procedure 1. Open the sunroof window and sunshade to the full rear position. 2. Use a suitable tool, unhook the front edge of the sunroof air deflector from the sunroof frame retainers. 3. Grasp both left and right front corners of the air deflector wind screen, pull rearward on the wind screen releasing the front lower retainers. 4. Unhook the rear air deflector springs from the frame. 5. Cycle the sunroof window for a proper fit. NOTE: It may be necessary to transfer the louver vents to the new sunshade.

SUNROOF AIR DEFLECTOR COVER REPLACEMENT

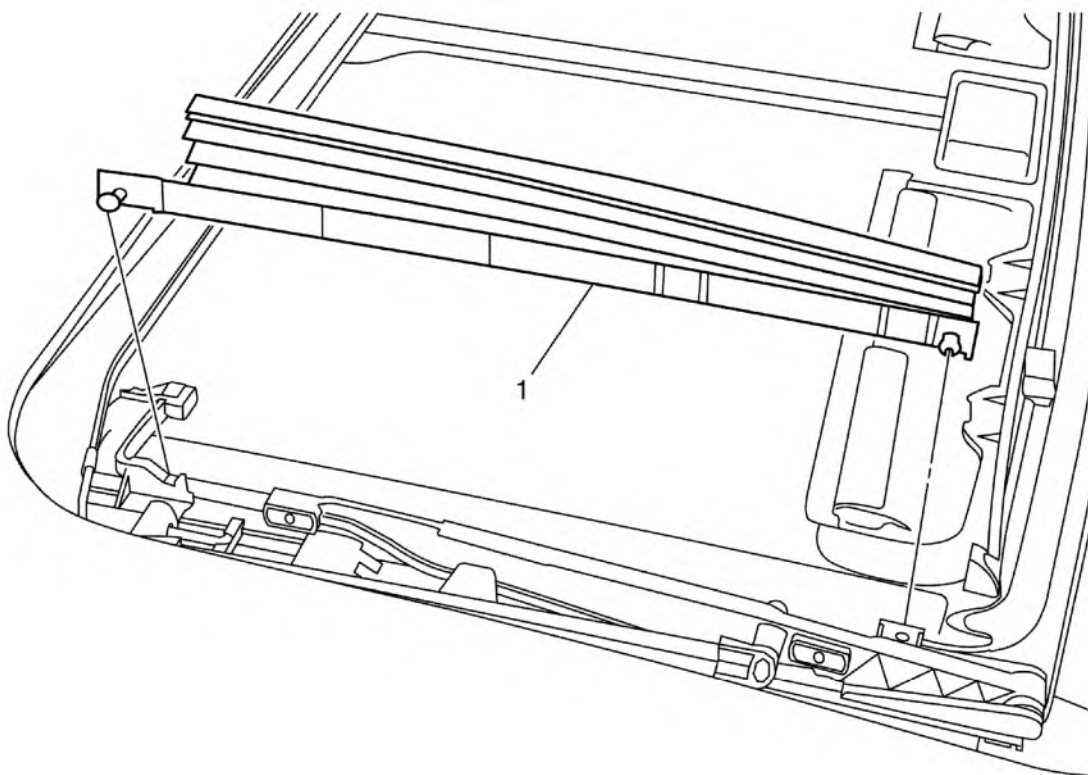


Fig. 4: Sunroof Air Deflector Cover
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Sunroof Air Deflector Cover Procedure 1. Place the sunroof window in the vent position. 2. Move the sunshade to the maximum rear position. 3. Unclip the sunroof air deflector cover in front. 4. Unclip the sunroof air deflector cover in rear. 5. Remove the sunroof air deflector. Refer to Sunroof Air Deflector Replacement.

SUNROOF DRAIN INSPECTION AND CLEANING

Drain Hose Routing

NOTE: If the headliner is wet **DO NOT** remove any interior trim. Do the **Plugged Drain Hose test** first.

A drain trough encircles the sunroof window panel and water is drained off by the drain hoses located at each corner of the housing. A drain channel spans across the sunroof module at the rear of the window panel and directs water into the trough.

1. The front drain hoses are routed out of the left and right corners of the plenum. The front hoses are installed through a rubber grommet that seals the hose tightly in the plenum.
2. The rear drain hoses are routed through the left and right rear lower quarter panel and out of the body. The rear hoses are installed through a rubber grommet that seals the hose tightly in the quarter panel.

Plugged Drain Hose

In some vehicle it may be necessary to clean the sunroof drain hose by applying air from the lower end of the drain hose outlet instead of the upper drain hose outlet.

If a waterleak has occurred check for a plugged sunroof module drain hose at each corner of drainage system by doing the following:

1. Open the sunroof window.
2. Locate each sunroof module drain hose outlet area.
3. With a visual look, ensure that all the hoses are attached to the sunroof module drain outlet.
4. Cover all of the interior before air is apply to the drain hose.
5. To test for blockage, pour a small container of water into the module housing drain trough. Check each corner to confirm the drain hose is draining water if not go to step number 6.

WARNING: Wear safety glasses in order to avoid eye damage.

6. Use compressed air, 241 kPa (35 psi) or less to blow out any drain hose that is plugged.
7. Test the system again.
8. If remain plugged remove the blockage using the following steps.
 1. Push mechanics wire through the hose to remove the obstruction.
 2. Use compressed air in order to blow out any remaining material.
9. If the hose remains plugged, check to see it is properly routed and does not have a kink. Refer to [Sunroof Housing Front Drain Hose Replacement](#), or [Sunroof Housing Rear Drain Hose Replacement](#).

Disconnected Drain Hose

Inspect the drainage system for disconnected drain hoses. Complete the following steps in order to obtain partial access to drain hoses and check for a disconnected hose.

1. Open the sunroof window panel.
2. Lower the headliner as needed. Refer to [Headlining Trim Panel Replacement \(Without Sunroof, Buick\)](#), [Headlining Trim Panel Replacement \(With Sunroof, Buick\)](#), [Headlining Trim Panel Replacement \(With Sunroof, Chevrolet\)](#), [Headlining Trim Panel Replacement \(Without Sunroof, Chevrolet\)](#).
3. Connect any disconnected hoses. If tie straps are required, connect the hose and apply tie strap.
4. Ensure that the rear drain hoses are properly routed in the metal roof slot and taped in place.

SUNROOF HOUSING FRONT DRAIN HOSE REPLACEMENT

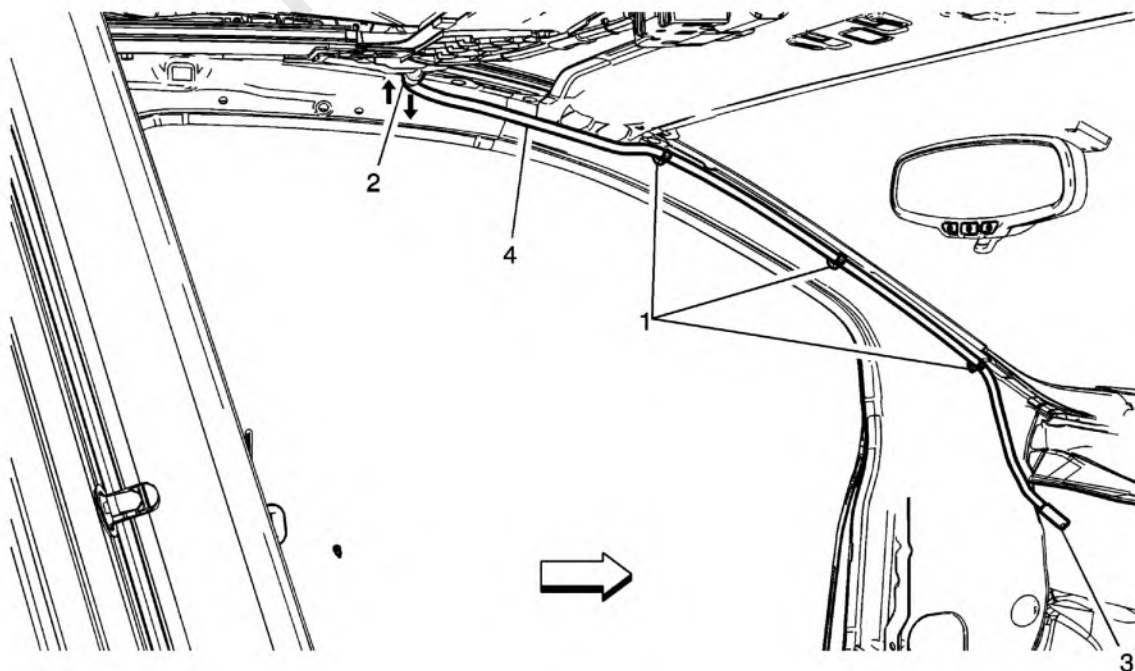


Fig. 5: Sunroof Housing Front Drain Hose
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. It is only necessary to lower the headliner. Only do those step in headliner replacement that will lower the headliner enough to gain access to the part. Refer to Headlining Trim Panel Replacement (Without Sunroof, Buick), Headlining Trim Panel Replacement (With Sunroof, Buick), Headlining Trim Panel Replacement (With Sunroof, Chevrolet), Headlining Trim Panel Replacement (Without Sunroof, Chevrolet). 2. Remove the instrument panel assembly. Refer to Instrument Panel Assembly Replacement (Buick), Instrument Panel Assembly Replacement (Chevrolet).	
1	Sunroof Housing Front Drain Hose Retainers (Qty: 3) NOTE: Disengage the retaining clips on the A-pillar
2	Sunroof Housing Front Drain Hose Tie Strap to Sunroof Frame Procedure Disconnect the sunroof drain hose from the sunroof frame spigot. NOTE: If the drain hose is retained with a tie strap it will be necessary to replace it.
3	Sunroof Housing Front Drain Hose Grommet NOTE: Reposition the fabric insulator pad in the location of the grommet. Grasp the lower part of the grommet pull rearward releasing the grommet and drain hose as one from the cowl panel.
4	Sunroof Housing Front Drain Hose Procedure 1. When installing the drain hose, ensure that the routing of the end of the drain hose and grommet are installed through the access hole in the cowl panel to prevent interior water leaks. Water test the sunroof before installing instrument panel carrier. 2. Water test vehicle to ensure No leaks.

SUNROOF HOUSING REAR DRAIN HOSE REPLACEMENT

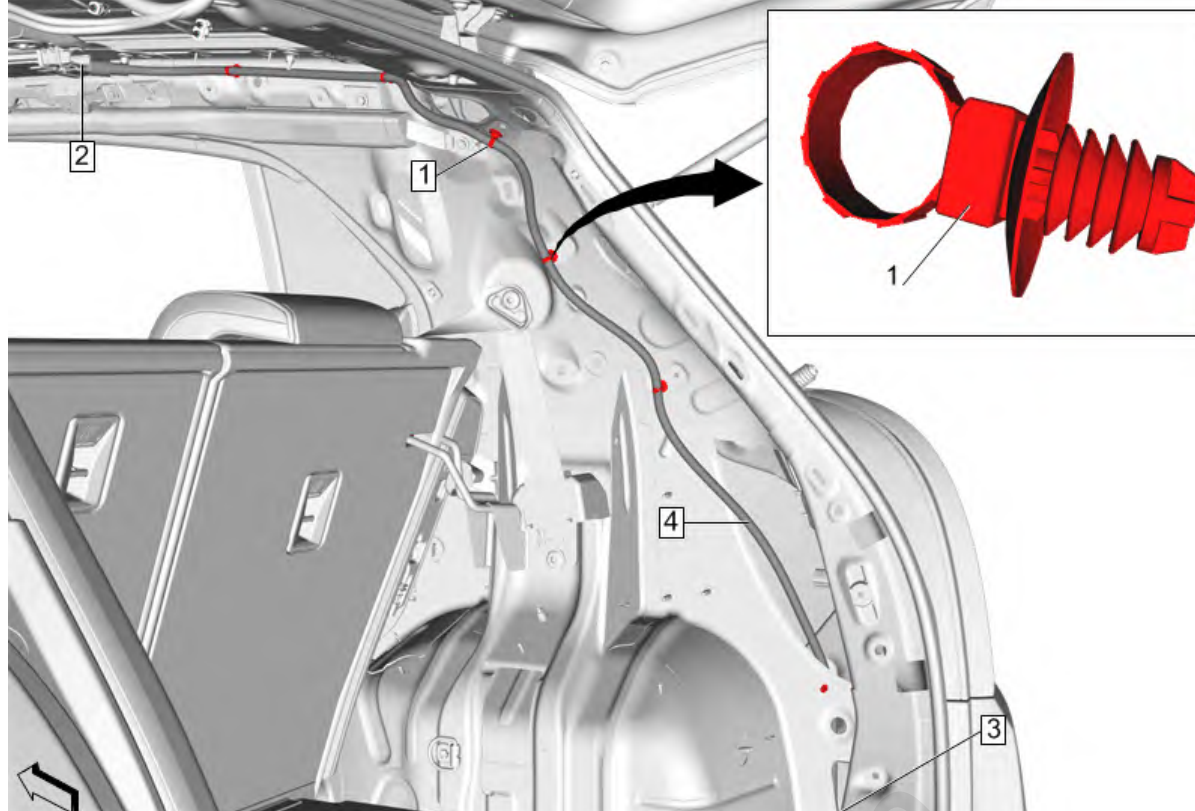


Fig. 6: Sunroof Housing Rear Drain Hose
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. It is only necessary to loosen the part. Only do those steps in the quarter lower rear trim panel procedure that will allow access to the component being removed. Quarter Lower Rear Trim Panel Replacement 2. It is only necessary to lower the headlining. Only do those steps in the headlining procedure that will allow access to the component being removed. Headlining Trim Panel Replacement (Without Sunroof, Buick) Headlining Trim Panel Replacement (With Sunroof, Buick) Headlining Trim Panel Replacement (With Sunroof, Chevrolet) Headlining Trim Panel Replacement (Without Sunroof, Chevrolet)	
1	Sunroof Housing Rear Drain Hose Retainer (Qty: 6)
2	Sunroof Housing Rear Drain Hose to Sunroof Frame Spigot Procedure Disconnect the sunroof drain hose from the sunroof frame spigot.
3	Sunroof Housing Rear Drain Hose Grommet NOTE: Grasp the grommet and pull rearward to release it from the quarter panel.
4	Sunroof Housing Rear Drain Hose Procedure 1. Ensure the drain hose and grommet are installed through the access hole in the quarter panel to prevent rear compartment water leaks. 2. Install the retainers that secure the drain hose to the upper sill panel and rear compartment. 3. Water test the sunroof before installing trim.

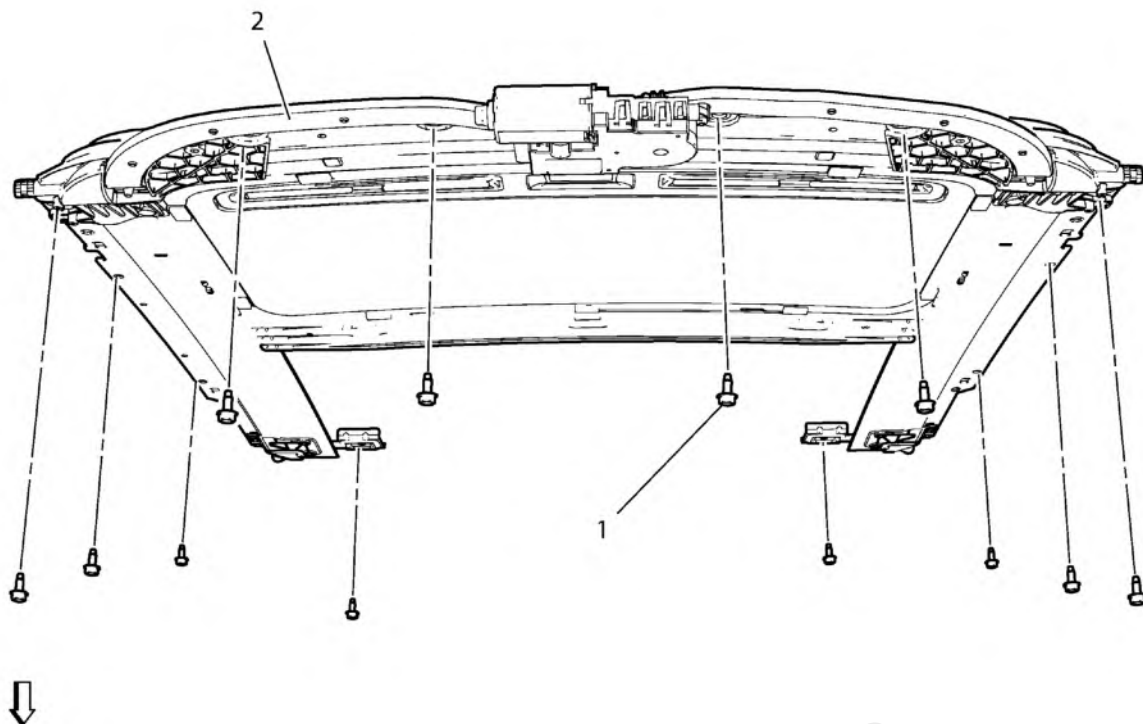


Fig. 7: Sunroof Module assembly.

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Remove the front sunroof window. Refer to Sunroof Window Replacement. 2. It is only necessary to lower the headliner. Only do those steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to Headlining Trim Panel Replacement (Without Sunroof, Buick), Headlining Trim Panel Replacement (With Sunroof, Buick), Headlining Trim Panel Replacement (With Sunroof, Chevrolet), Headlining Trim Panel Replacement (Without Sunroof, Chevrolet). 3. Disconnect the sunroof harness electrical connectors. 4. Disconnect the drain hoses from the sunroof frame. Do not remove the drain hoses from the vehicle, disconnect the drain hoses at all the corners of the sunroof frame spigot only. Refer to Sunroof Housing Front Drain Hose Replacement, and Sunroof Housing Rear Drain Hose Replacement.	
1	Sunroof Module Bolt (Qty: 12) CAUTION: Refer to Fastener Caution . Procedure With an assistant, remove the sunroof frame from the vehicle and place it on a clean and dry prepared surface. Tighten 9 N.m (80 lb in)

Callout	Component Name
2	Sunroof Module Assembly Procedure 1. Transfer all necessary components. 2. Verify the sunroof motor initialization operation. Refer to Sunroof Control Module Programming and Setup . 3. Water test vehicle before installing the trim to ensure No leaks. NOTE: A new sunroof module assembly does not include the sunroof window, motor, sunshade, or the finishing lace components. You must install the old components to the new sunroof module assembly.

SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS

NOTE: Perform the initialization/teach procedure on a reinstall motor or a new motor. Ensure the electrical harness on the headliner is connected to the sunroof motor, battery power is applied, and the ignition switch is ON.

Initialization/Teach Procedure

1. The sunroof switch must be held during the initialization/teach procedure.
2. Press and hold the "manual open switch" for more than 15 seconds after closing the sunroof window fully and until the sunroof window has automatically reached the tilt-up position.
3. Open the sunroof window/sunshade with the "express or manual open switch" to the full open position, then release the switch.
4. Press the "manual open switch" for more than 20 seconds until the sunroof window is automatically closed and the tilt-up/down is reached.

If the initialization/teach procedure is not carried out completely, the sunroof motor will not work normally and the procedure must be restarted.

SUNROOF ACTUATOR MOTOR REPLACEMENT

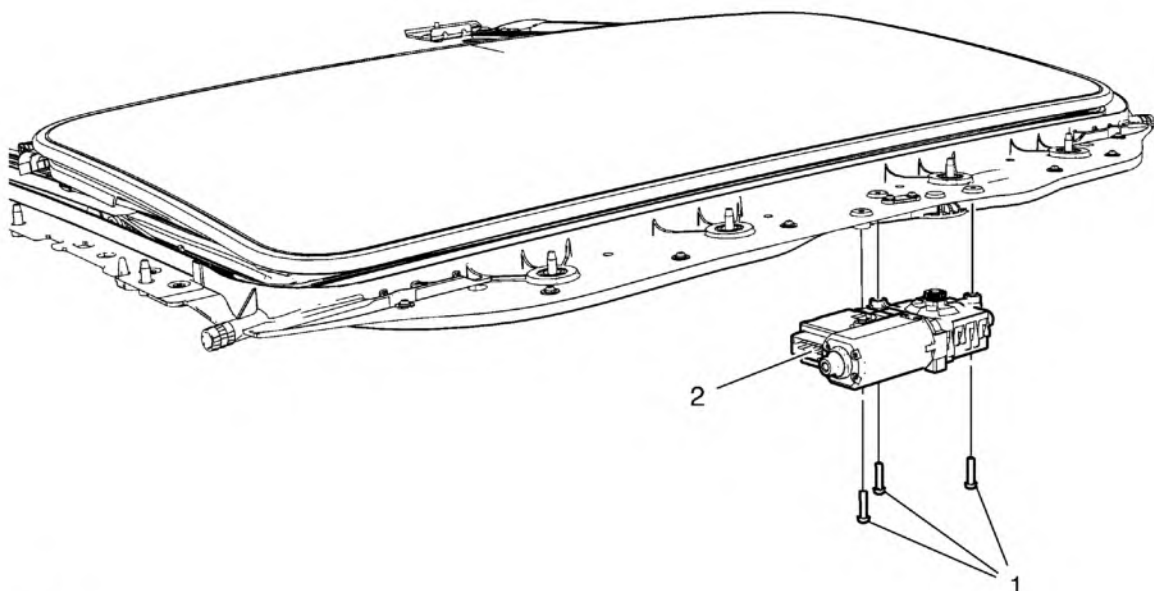


Fig. 8: Sunroof Window Motor
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Remove the roof console. Refer to Roof Console Replacement .	
1	Sunroof Window Motor Bolt (Qty: 3) CAUTION: Refer to Fastener Caution . Procedure Disconnect the electrical connector. Tighten 4 N.m (36 lb in)
2	Sunroof Window Motor Procedure After repairs or replacement, the sunroof motor needs to be initialization/teach process. Refer to Sunroof Motor/Actuator Initialization/Teach Process . NOTE: Verify the operation of the sunroof motor before installing the roof console.

SUNROOF SUNSHADE REPLACEMENT

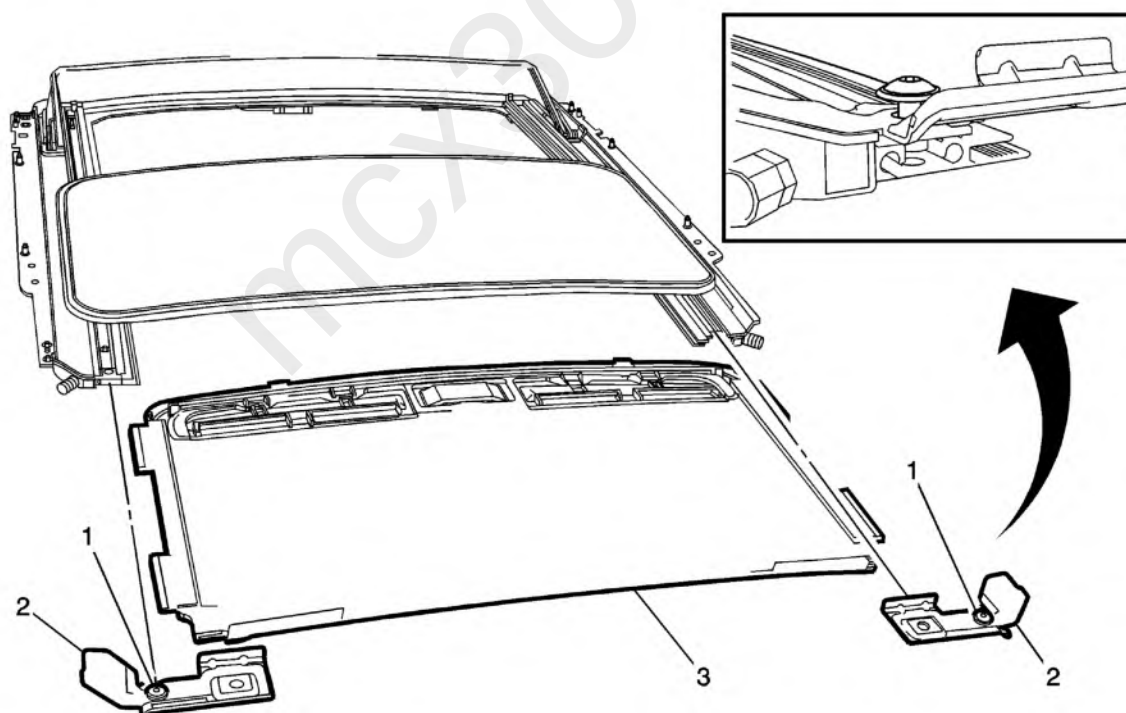


Fig. 9: Sunroof Sunshade
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the sunroof module. Refer to Sunroof Module Assembly Replacement .	

Callout	Component Name
1	Sunroof Module Bracket Screw (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Sunroof Module Bracket
3	Sunroof Sunshade Procedure 1. The sunshade must be removed from the rear of the sunroof module. 2. Slide the sunshade rearward releasing it from the module assembly.

SUNROOF TILT POSITION SWITCH REPLACEMENT

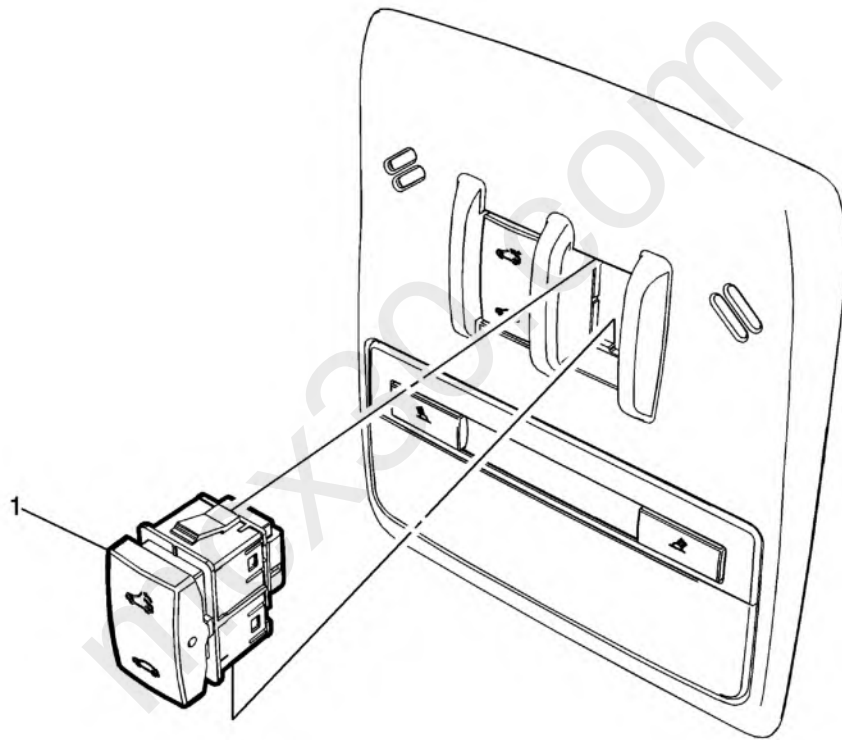


Fig. 10: Sunroof Tilt Position Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to Roof Console Replacement .	
1	Sunroof Tilt Position Switch Procedure Depress the tabs on the switch to remove from the roof console.

SUNROOF SWITCH REPLACEMENT

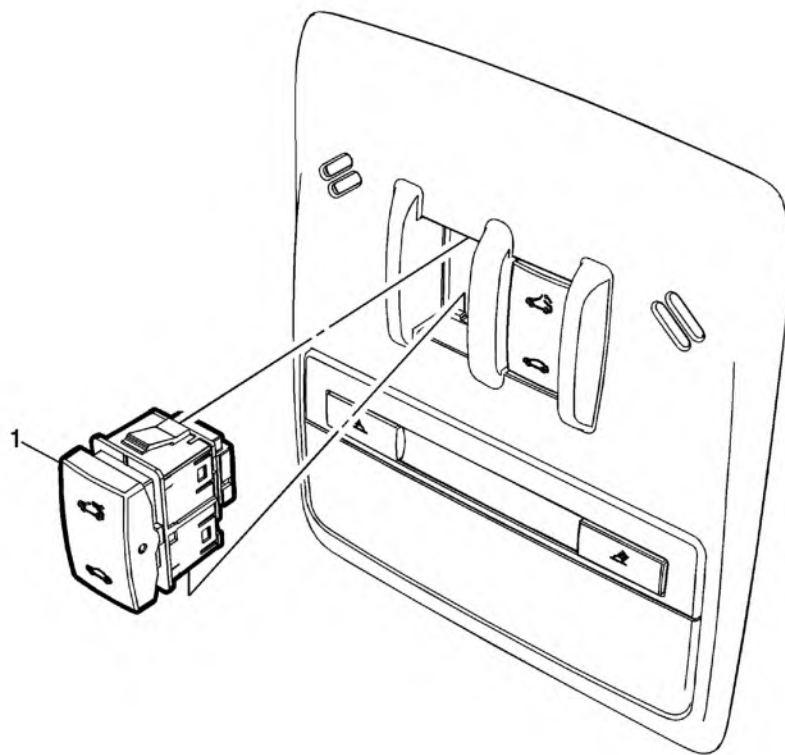


Fig. 11: Sunroof Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the roof console. Refer to Roof Console Replacement .	
1	Sunroof Switch Procedure Depress the tabs on the switch to remove from the roof console.

SUNROOF WINDOW HEIGHT AND OPENING FIT ADJUSTMENT

NOTE: Correct adjustment cannot be achieved if the sunroof window is closed from vent position.

1. Cycle the sunroof window from full open to closed position.

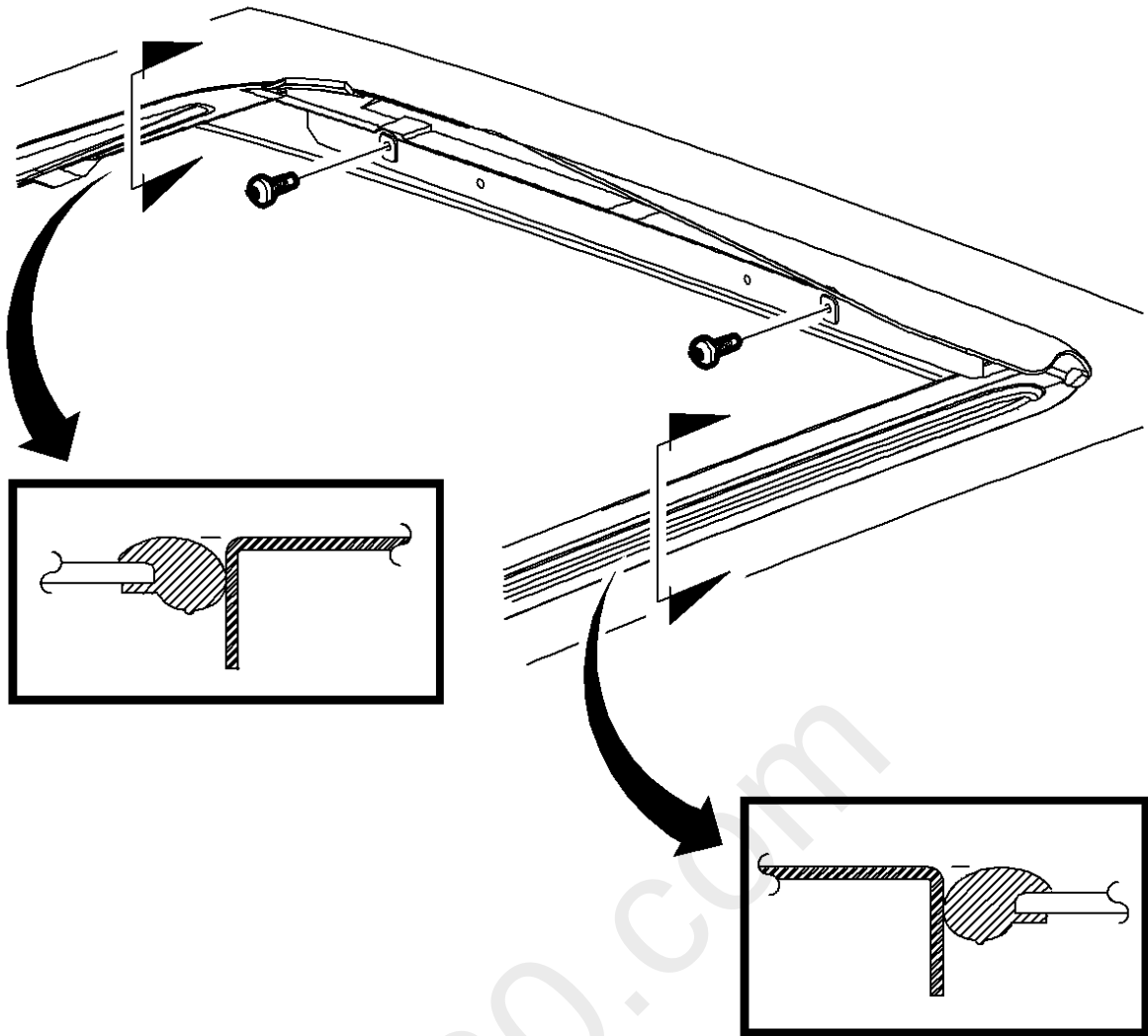


Fig. 12: View Of Sunroof Window & Opening Fit
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Do Not remove or lower headliner to access sunroof window screws.

2. Loosen the adjusting screws on the window.
3. Adjust the corners of the front window panel using the following guidelines:
 - Adjust the front of the sunroof window to 0.0 mm - 1.0 mm (0.0 in - 0.04 in) below the top surface of the roof panel.
 - Adjust the rear center line of the sunroof window to 2 mm to 3 mm (0.08 in to 0.12 in) below the top surface of the roof panel.

CAUTION: Refer to **Fastener Caution** .

4. Tighten the sunroof window adjustment bolts to 4 N.m (36 lb in).
5. Cycle sunroof window through all positions.
6. Inspect the sunroof window adjustment. Adjust if necessary.

SUNROOF WINDOW REPLACEMENT

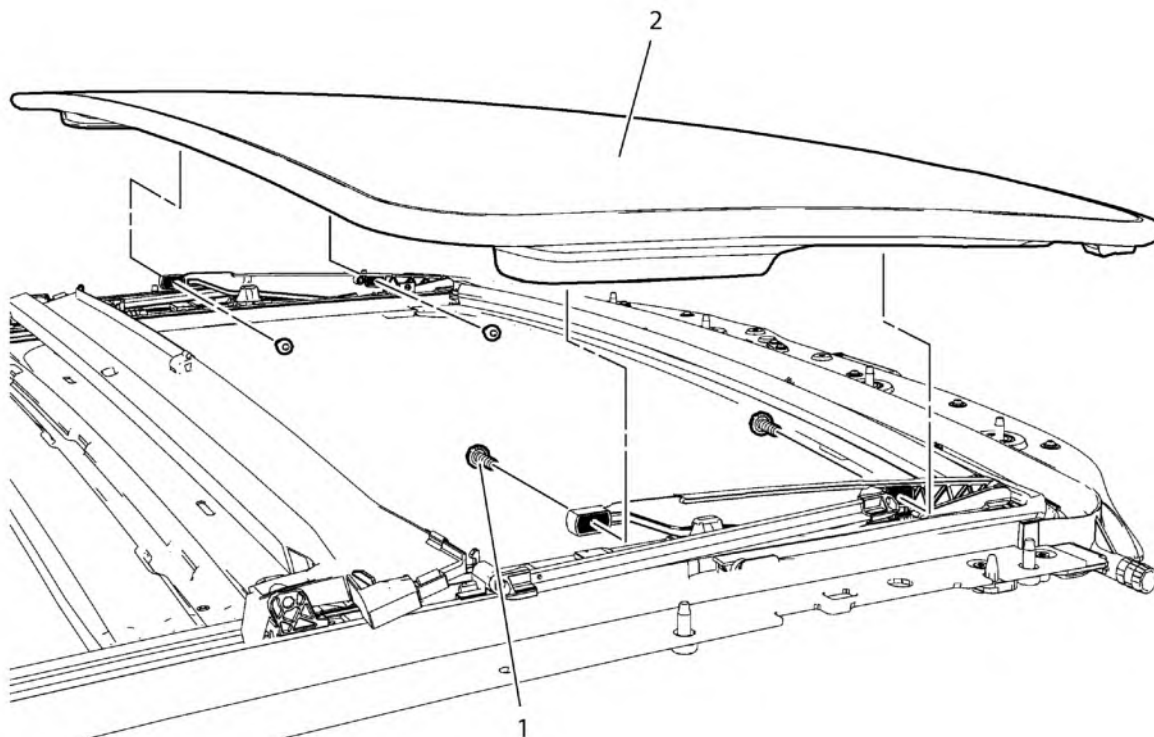


Fig. 13: Sunroof Window

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures Remove the sunroof air deflector cover. Refer to Sunroof Air Deflector Cover Replacement .	
1	Sunroof Window Bolt (Qty: 4) CAUTION: Refer to Fastener Caution . Tighten 4 N.m (36 lb in)
2	Sunroof Window Procedure 1. Turn the ignition on. 2. Lift up the sunroof window to the vent position. 3. Slide the sunshade to the full rearward position. 4. After the installation adjust the sunroof window. Refer to Sunroof Window Height and Opening Fit Adjustment.

DESCRIPTION AND OPERATION

SUNROOF DESCRIPTION AND OPERATION

The tilt/slide sunroof consists of a moving glass panel and a manual sunshade. In the tilt/slide sunroof system the rear of the glass tilts up for venting and slides between the head liner and roof panel as it slides open. The glass is controlled by an integrated motor/controller. The sunshade has a mechanical connection to the glass causing it to open with the glass and keeping it from closing more than the glass.

The electrical portion of the tilt/slide sunroof system consists of:

- Body control module (BCM)

- Sunroof glass control module
- Sunroof control switch assembly
- Vent control switch assembly
- Serial Data Bus

The sunroof electrical system uses a master/slave configuration utilizing a serial data based system for communication. The BCM is designated as the master, while the sunroof control module is configured as the slave.

As the system master, the BCM uses the serial data communication bus to enable or disable sunroof operation, communicate vehicle information to the sunroof controller, and request sunroof movement. The sunroof controller provides system status and diagnostic information to the BCM for diagnostic reporting and operational purposes.

The sunroof glass is controlled by a integrated motor/controller containing the necessary electronics, motor, hall effect position sensors, as well as the interface to the driver control switches. The motor/controller is capable of controlling motion based on control switch activation and serial data message commands from the system master.

The operational calibrations for the sunroof integrated motor/controller are loaded over the serial data communication bus by the sunroof system master, the BCM.

Sunroof Control Switches

The sunroof control switches are connected directly to the controller. The sliding glass switches provide detent positions for open, express open, off, close, and express close. The vent switches provide detent positions for open, off, and close. The control switch completes the circuit between two signals provided by the control module, a reference ground input and a pull-up voltage provided by an analog to digital switch input. The control switches place a different resistor ladder network in the circuit depending on the function selected. The controller's analog to digital switch input reads the resulting voltage range and determines the function as indicated in the included charts.

System Protection Functions

Normal operation of the sunroof system may be altered by one of the following events.

Obstacle or Blockage Detection

When enabled, obstacle detection is active only while the sunroof opening is approximately 4-200 mm (0.16-7.87 in) when moving in the closing direction. When an obstacle is detected in this range, the motion in the closing direction will stop and the sunroof will reverse direction for a short distance. The reversal shall complete regardless of operating Mode. If the travel is outside the range defined above, the sunroof will try to continue closing until it detects a motor stall condition or the system is at one of it's defined stops.

Motor Stall

If the sunroof is moving in the open or close direction and stops moving for 350 ms while the switch or serial data command is active, and no obstacle has been detected, the motor shall be turned off to prevent overheating.

Sunroof System Thermal Protection

The sunroof controllers have a thermal protection algorithm to protect the sunroof controller and motor from damage due to overheating conditions resulting from immoderately switch actuations. The thermal protection algorithm will cause any new sunroof open commands to be ignored until the motor is allowed to cool. A number of close requests during an over temperature condition will be allowed. If the thermal protection is triggered during an obstacle detection event, the sunroof reversal shall be finished.

Sunroof Operation

Open to Vent Position

When the sunroof is closed or in a partial vent position and the sunroof vent open switch becomes active, the sunroof shall begin to express open to the vent position. Sunroof motion shall cease when the sunroof reaches the vent position or if the sunroof sliding glass switch becomes active.

Close from Vent

When the sunroof is in the vent position and the sunroof vent switch enters the Close state, the sunroof will begin to express close the sunroof. Motion will continue until the sunroof has reached its fully closed position or if the sunroof sliding glass switch becomes active.

Normal Open (Non-Express)

When the sunroof is not in a vent position and the sunroof sliding glass switch is held in the Open position, the sunroof will begin opening. Motion will continue until the switch returns to the Off state or the vent switch transitions to any active state.

Sunroof Express Open

When the sunroof control switch transitions to the Express Open state and the sunroof is not in a vent position, the sunroof will express open until the controller determines the sunroof has reached the comfort stop position or the fully Open position, the switch transitions to another state after first returning to the Off position, or the vent switch transitions to an active state.

Normal Close (Non-Express)

When the sunroof switch is in the Close state and the sunroof is not in the vent position, the controller will begin moving the sunroof in the close direction. If the vent switch becomes active the motor will be turned off.

Sunroof Express Close

When the sunroof switch is in the Express Close state and the sunroof is not in a vent position, the sunroof will express close until the controller determines the sunroof has reached the fully closed position, or the switch transitions to another state after first returning to the Off position. The sunroof motion will cease if the switch transitions back to the Close or Express Close state after returning to the Off position first or the vent switch transitions to any active state.
