

## Sunroof - Impala

## SPECIFICATIONS

## FASTENER SPECIFICATIONS

## Reusable Threaded Fastener Tightening Specifications

**NOTE:**

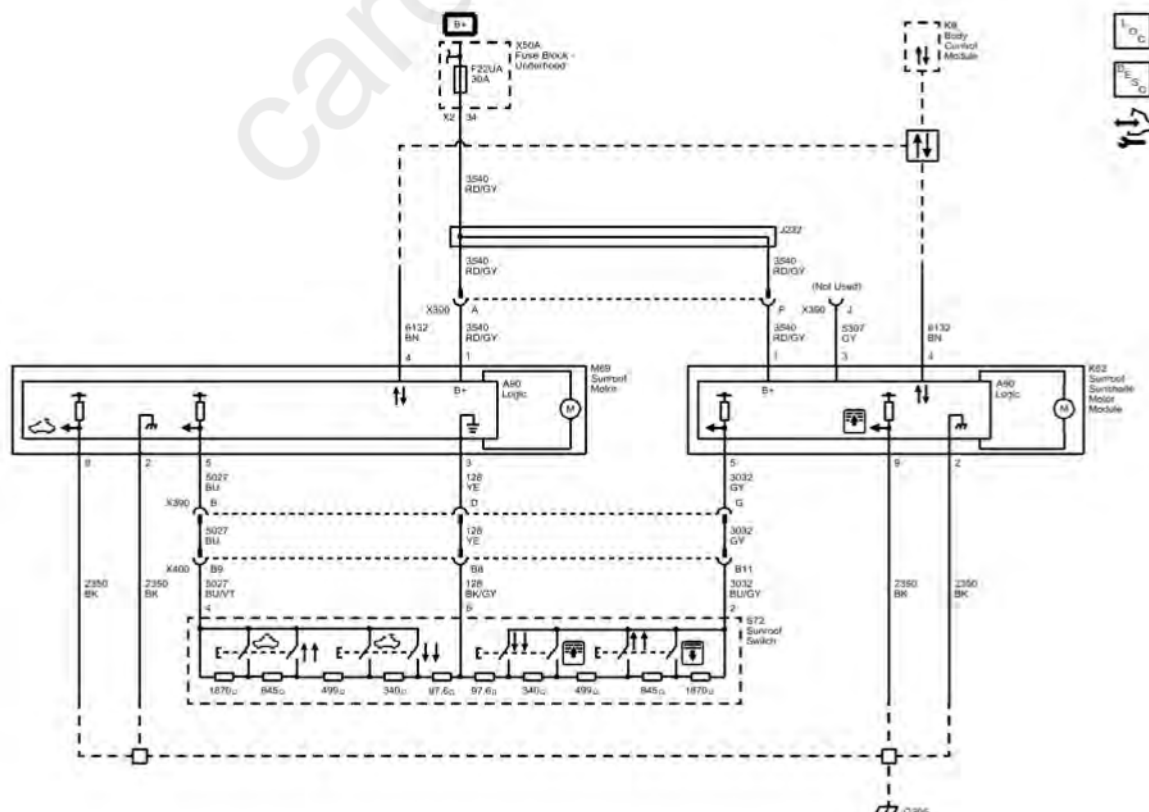
***All fasteners listed in this table can be reused after removal.***

| Application                     | Specification      |
|---------------------------------|--------------------|
|                                 | Metric (English)   |
| Front Sunroof Window Screw      | 4 N.m (35 lb in)   |
| Rear Sunroof Window Screw       | 4 N.m (35 lb in)   |
| Sunroof Deflector Fastener      | 4 N.m (35 lb in)   |
| Sunroof Housing Bolt            | 9 N.m (80 lb in)   |
| Sunroof Sunshade Motor Fastener | 4 N.m (35 lb in)   |
| Sunroof Sunshade Screw          | 2.5 N.m (22 lb in) |
| Sunroof Switch Fastener         | 1.5 N.m (13 lb in) |
| Sunroof Window Motor Fastener   | 4 N.m (35 lb in)   |

## SCHEMATIC WIRING DIAGRAMS

## SUNROOF WIRING SCHEMATICS

### Sunroof (C3U)



## DIAGNOSTIC INFORMATION AND PROCEDURES

### DTC B3664: SUNROOF POSITION SELECT SWITCH HIGH SIGNAL CIRCUIT SHORT TO GROUND

#### Diagnostic Instructions

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

#### DTC 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 |
|----------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Sunroof Position Select Switch Control       | B3664 02        | B3664 05             | B3664 05         | -                  |
| Sunroof Position Select Switch Low Reference | -               | 1                    | 1                | -                  |
| 1. Power Sunroof/Sunshade Malfunction        |                 |                      |                  |                    |

#### Circuit/System Description

The sunroof position select switch is connected directly to the controller. The sliding glass switch provide detent positions for open, express open, off, close, and express close. The sunroof position select 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 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 module has detected and reported via serial data that the sunroof position select switch high signal circuit is shorted to ground.

##### B3664 05

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

##### B3664 59

The sunroof module has detected and reported via the serial data that the sunroof position select switch high signal 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 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 position select switch high signal circuit.

### Reference Information

Schematic Reference

### Sunroof Schematics

Connector End View Reference

### COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

### Sunroof Description and Operation (Spoiler System)

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

**NOTE:** Because of the accessibility of the sunroof switch, perform the component testing before beginning the 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  $\Omega$  between the low reference circuit terminal 5 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , test or replace the M69 Sunroof Motor.
  - **If less than 10  $\Omega$**
3. Ignition ON.
4. Test for 4.5 - 5.5 V between the 5 V reference circuit terminal 4 and ground.
  - **If less than 4.5 V**
    1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
    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.
      - If infinite resistance
    3. Test for less than 2  $\Omega$  in the 5 V reference circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the M69 Sunroof Motor.
  - **If greater than 5.5 V**
    1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor, 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 M69 Sunroof Motor.
  - **If between 4.5 - 5.5 V**
5. Test or replace the S72 Sunroof Switch.

## Component Testing

### Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3 - 4.0k  $\Omega$  between the control terminal 4 and the low reference terminal 5.
  - **If not between 3.3 - 4.0k  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 3.3 - 4.0k  $\Omega$**
3. Test for 390 - 480  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the open switch while pressing the open switch.
  - **If not between 390 - 480  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 390 - 480  $\Omega$**
4. Test for 88 - 107  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the express open switch.
  - **If not between 88 - 107  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 88 - 107  $\Omega$**
5. Test for 1.6 - 2.0k  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the close switch.
  - **If not between 1.6 - 2.0k  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 1.6 - 2.0k  $\Omega$**
6. Test for 840 - 1030  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the express close switch.
  - **If not between 840 - 1030  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 840 - 1030  $\Omega$**
7. All OK

## Repair Instructions

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

- [Sunroof Switch Replacement](#)
- [Sunroof Window Motor Replacement](#)

## **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 module has detected and reported via serial data that the sunroof actuator has a malfunction.

#### **B3697 39**

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

#### **B3697 42**

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

#### **B3697 4B**

The sunroof 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

Connector End View Reference

## COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

## Sunroof Description and Operation (Spoiler System)

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 M69 Sunroof Motor. 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 M69 Sunroof Motor.
      - 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 M69 Sunroof Motor.
  - 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.

## Sunroof Window Motor Replacement

## **DTC B369B: SUNROOF SUNSHADE 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 B369B 02**

**DTC B369B 05**

Sunroof Sunshade Position Select Switch Circuit High Voltage/Open

**DTC B369B 59**

Sunroof Sunshade Position Select Switch Circuit Protection Time-Out

**Diagnostic Fault Information**

| Circuit                                               | Short to Ground | Open/High Resistance | Short to Voltage | Signal Performance |
|-------------------------------------------------------|-----------------|----------------------|------------------|--------------------|
| Sunroof Sunshade Position Select Switch Control       | B369B 02        | B369B 05             | B369B 05         | -                  |
| Sunroof Sunshade Position Select Switch Low Reference | -               | 1                    | 1                | -                  |
| 1. Power Sunroof/Sunshade Malfunction                 |                 |                      |                  |                    |

**Circuit/System Description**

The sunshade control switch is connected directly to the controller and provide detent positions for open, express open, off, close, and express 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 the analog to digital switch input. The control 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****B369B 02**

The sunshade module has detected and reported via serial data that the sunroof sunshade position select switch circuit is shorted to ground.

**B369B 05**

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

**B369B 59**

The sunshade module has detected and reported via serial data that the sunroof sunshade position select switch has been the same active position for 20 s 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 B369B is stored in the body control module (BCM) memory.

**Conditions for Clearing the DTC**

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

**Reference Information**

Schematic Reference

**Sunroof Schematics**

## COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

### Sunroof Description and Operation (Spoiler System)

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

**NOTE:** Because of the accessibility of the sunshade switch, perform the component testing before beginning the 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  $\Omega$  between the low reference circuit terminal 5 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor Module.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , test or replace the K62 Sunroof Sunshade Motor Module.
  - **If less than 10  $\Omega$**
3. Ignition ON.
4. Test for 4.5 - 5.5 V between the 5 V reference circuit terminal 2 and ground.
  - **If less than 4.5 V**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor 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.
      - If infinite resistance
    3. Test for less than 2  $\Omega$  in the 5 V reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the K62 Sunroof Sunshade Motor Module.
  - **If greater than 5.5 V**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor 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 K62 Sunroof Sunshade Motor Module.
  - **If between 4.5 - 5.5 V**
5. Test or replace the S72 Sunroof Switch.

### Component Testing

## Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3 - 4.0k  $\Omega$  between the control terminal 2 and the low reference terminal 5.
  - **If not between 3.3 - 4.0k  $\Omega$**   
  
Replace the S90 Sunroof Sunshade Switch.
  - **If between 3.3 - 4.0k  $\Omega$**
3. Test for 390 - 480  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the open switch while pressing the sunshade open switch.
  - **If not between 390 - 480  $\Omega$**   
  
Replace the S90 Sunroof Sunshade Switch.
  - **If between 390 - 480  $\Omega$**
4. Test for 88 - 107  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the sunshade express open switch.
  - **If not between 88 - 107  $\Omega$**   
  
Replace the S90 Sunroof Sunshade Switch.
  - **If between 88 - 107  $\Omega$**
5. Test for 1.6 - 2.0k  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the sunshade close switch.
  - **If not between 1.6 - 2.0k  $\Omega$**   
  
Replace the S90 Sunroof Sunshade Switch.
  - **If between 1.6 - 2.0k  $\Omega$**
6. Test for 840 - 1030  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the sunshade express close switch.
  - **If not between 840 - 1030  $\Omega$**   
  
Replace the S90 Sunroof Sunshade Switch.
  - **If between 840 - 1030  $\Omega$**
7. All OK

## Repair Instructions

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

- [Sunroof Sunshade Motor Replacement](#)
- [Sunroof Switch Replacement](#)

## DTC B369D: SUNROOF SUNSHADE 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 B369D 00

Sunroof Sunshade Actuator Malfunction

#### DTC B369D 39

## **DTC B369D 42**

Sunroof Sunshade Actuator Calibration Not Programmed

## **DTC B369D 4B**

Sunroof Sunshade Actuator Calibration Not Learned

### **Circuit/System Description**

The sunshade 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**

#### **B369D 00**

The sunshade module has detected and reported via serial data that the sunshade actuator has an malfunction.

#### **B369D 39**

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

#### **B369D 42**

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

#### **B369D 4B**

The sunshade module has detected and reported via the LIN-Bus that the sunshade actuator calibration is not learned.

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

DTC B369D is stored in the BCM memory.

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

The BCM no longer detects a malfunction in the sunshade actuator circuit.

### **Reference Information**

Schematic Reference

### **Sunroof Schematics**

Connector End View Reference

## **COMPONENT CONNECTOR END VIEWS - INDEX**

Description and Operation

### **Sunroof Description and Operation (Spoiler System)**

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 B369D 42 or DTC B369D 4B is not set.
  - **If DTC B369D 42 or DTC B369D 4B is set**
    1. Calibrate the K62 Sunroof Sunshade Motor Module. Refer to [Sunroof Motor/Actuator Initialization/Teach Process](#).
    2. Verify DTC B369D 42 or DTC B369D 4B does not set while operating the sunroof.
      - If DTC B369D 42 or DTC B369D 4B sets, replace the K62 Sunroof Sunshade Motor Module.
      - If DTC B369D 42 or DTC B369D 4B does not set
3. All OK.
  - **If DTC B369D 42 or DTC B369D 4B is not set**
3. Verify DTC B369D 00 or DTC B369D 39 is not set
  - If DTC B369D 00 or DTC B369D 39 is set, replace the K62 Sunroof Sunshade Motor Module.
  - If DTC B369D 00 or DTC B369D 39 is not set
4. All OK.

### [Repair Instructions](#)

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

### [Sunroof Sunshade Motor Replacement](#)

### **SYMPTOMS - ROOF**

**NOTE:** Complete the following procedures before using the symptom tables.

1. Perform the [Diagnostic System Check - Vehicle](#) in order to verify that all of the following conditions are true:
  - There are no DTCs set.
  - The control modules can communicate via the serial data link.
2. Review the system description and operation in order to learn the system functions. Refer to [Sunroof Description and Operation \(Spoiler System\)](#).

### [Visual/Physical Inspection](#)

- Inspect for aftermarket devices which may affect the operation of the power sunroof system. Refer to [Checking Aftermarket Accessories](#).
- Inspect the accessible system components for obvious damage or for conditions which can 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](#)

## Power Sunroof/Sunshade Malfunction

### **POWER SUNROOF/SUNSHADE 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**

| <b>Circuit</b>                                                | <b>Short to Ground</b> | <b>Open/High Resistance</b> | <b>Short to Voltage</b> | <b>Signal Performance</b> |
|---------------------------------------------------------------|------------------------|-----------------------------|-------------------------|---------------------------|
| B+ Sunroof Motor                                              | U151B 00, 1            | U151B 00, 1                 | -                       | -                         |
| B+ Sunroof/Sunshade Motor Module                              | U1517 00, 2            | U1517 00, 2                 | -                       | -                         |
| Sunroof Switch Signal                                         | B3664 02               | B3664 05                    | B3664 05                | -                         |
| Sunshade Switch Signal                                        | B369B 02               | B369B 05                    | B369B 05                | -                         |
| Sunroof Switch Low Reference                                  | -                      | 1                           | -                       | -                         |
| Sunshade Switch Low Reference                                 | -                      | 2                           | -                       | -                         |
| Sunroof Motor Ground Term 2                                   | -                      | U151B 00, 1,<br>B369B 05    | -                       | -                         |
| Sunroof Motor Ground Term 8                                   | -                      | B3697 42,<br>B369C 05, 1    | -                       | -                         |
| Sunroof Sunshade Motor Module Ground Term 2                   | -                      | U1517 00, 2                 | -                       | -                         |
| Sunroof Sunshade Motor Module Ground Term 9                   | -                      | U1517 00, 2                 | -                       | -                         |
| 1. Power Sunroof Malfunction<br>2. Power Sunshade 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 and sunshade control modules are configured as the slaves.

As the system master, the BCM uses the serial data communication bus to enable or disable sunroof and sunshade operation, communicate vehicle information to each controller, and request sunroof or sunshade movement. The sunroof/sunshade controllers provide 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.

#### **Reference Information**

Schematic Reference

#### **Sunroof Schematics**

Connector End View Reference

### **COMPONENT CONNECTOR END VIEWS - INDEX**

Description and Operation

#### **Sunroof Description and Operation (Spoiler System)**

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 - Power Sunroof Malfunction.
  - **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 - Power Sunroof Malfunction.
  - **If the sunroof opens and closes to the vent position**
4. Verify the sunshade opens and closes when pressing the open and close sunshade switch.
  - **If the sunshade does not open or close**  
Refer to Circuit/System Testing - Power Sunshade Malfunction.
  - **If the sunshade opens and closes**
5. Verify the sunshade opens pressing the open sunroof switch.
  - **If the sunshade does not open**  
Refer to Circuit/System Testing - Power Sunshade Malfunction.
  - **If the sunshade opens**
6. Verify the sunshade opens pressing the open sunroof vent switch.
  - **If the sunshade does not open**  
Refer to Circuit/System Testing - Power Sunshade Malfunction.
  - **If the sunshade opens**
7. All OK.

### Circuit/System Testing

#### Power Sunroof Malfunction

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the M69 Sunroof Motor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Test for less than 10  $\Omega$  between the ground circuit terminal 8 and ground.

- **If 10  $\Omega$  or greater**

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

- **If less than 10  $\Omega$**

4. 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  $\Omega$  in the B+ circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , verify the fuse is not open and there is voltage at the fuse.

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

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 M69 Sunroof Motor.

- **If the test lamp illuminates**

5. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
6. Connect the harness connector at the M69 Sunroof Motor. Disconnect the harness connector at the S72 Sunroof Switch
7. Test for less than 10  $\Omega$  between the low reference circuit terminal 5 and ground.

- **If 10  $\Omega$  or greater**

1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
  - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
  - If less than 2  $\Omega$ , replace the M69 Sunroof Motor.

- **If less than 10  $\Omega$**

8. Ignition ON.

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

- **If less than 4.8 V**

1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
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.
  - If infinite resistance

3. Test for less than 2  $\Omega$  in the 5 V reference circuit end to end.

- If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
- If less than 2  $\Omega$ , replace the M69 Sunroof Motor.

- **If greater than 5.2 V**

1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor, 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 M69 Sunroof Motor.

- **If between 4.8 - 5.2 V**

10. Test or replace the M69 Sunroof Motor.

## Power Sunshade Malfunction

**NOTE:** Because of the accessibility of the switch, perform the switch

## **component testing before beginning the circuit/system testing.**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10  $\Omega$  between the ground circuit terminal 2 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor Module.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
3. Test for less than 10  $\Omega$  between the ground circuit terminal 9 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor Module.
    2. Test for less than 2  $\Omega$  in the ground circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , repair the open/high resistance in the ground connection.
  - **If less than 10  $\Omega$**
4. 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  $\Omega$  in the B+ circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , verify the fuse is not open and there is voltage at the fuse.
  - **If the test lamp does not illuminate and the circuit fuse is open**
    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 K62 Sunroof Sunshade Motor Module.
  - **If the test lamp illuminates**
5. Ignition OFF and all vehicle systems OFF. It may take up to 2 minutes for all vehicle systems to power down.
6. Connect the harness connector at the M69 Sunroof Motor. Disconnect the harness connector at the S72 Sunroof Switch.
7. Test for less than 10  $\Omega$  between the low reference circuit terminal 5 and ground.
  - **If 10  $\Omega$  or greater**
    1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor.
    2. Test for less than 2  $\Omega$  in the low reference circuit end to end.
      - If 2  $\Omega$  or greater, repair the open/high resistance in the circuit.
      - If less than 2  $\Omega$ , replace the M69 Sunroof Motor.
  - **If less than 10  $\Omega$**
8. Ignition ON.
9. Test for 4.8 - 5.2 V between the 5 V reference circuit terminal 2 and ground.
  - **If less than 4.8 V**
    1. Ignition OFF, disconnect the harness connector at the K62 Sunroof Sunshade Motor 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.

- If infinite resistance
3. Test for less than  $2\ \Omega$  in the 5 V reference circuit end to end.
    - If  $2\ \Omega$  or greater, repair the open/high resistance in the circuit.
    - If less than  $2\ \Omega$ , replace the K62 Sunroof Sunshade Motor Module.
  - **If greater than 5.2 V**
    1. Ignition OFF, disconnect the harness connector at the M69 Sunroof Motor, 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 K62 Sunroof Sunshade Motor Module.
10. Test or replace the K62 Sunroof Sunshade Motor Module.

## Component Testing

### Sunroof/Sunshade Switch Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.3 - 4.0k  $\Omega$  between the control terminal 4 and the low reference terminal 5.
  - **If not between 3.3 - 4.0k  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 3.3 - 4.0k  $\Omega$**
3. Test for 390 - 480  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the open switch while pressing the open switch.
  - **If not between 390 - 480  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 390 - 480  $\Omega$**
4. Test for 88 - 107  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the express open switch.
  - **If not between 88 - 107  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 88 - 107  $\Omega$**
5. Test for 1.6 - 2.0k  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the close switch.
  - **If not between 1.6 - 2.0k  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 1.6 - 2.0k  $\Omega$**
6. Test for 840 - 1030  $\Omega$  between the control terminal 4 and the low reference terminal 5 while pressing the express close switch.
  - **If not between 840 - 1030  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 840 - 1030  $\Omega$**
7. Test for 3.3 - 4.0k  $\Omega$  between the control terminal 2 and the low reference terminal 5.
  - **If not between 3.3 - 4.0k  $\Omega$**   
Replace the S72 Sunroof Switch.
  - **If between 3.3 - 4.0k  $\Omega$**

8. Test for 390 - 480  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the open switch while pressing the open switch.

- **If not between 390 - 480  $\Omega$**

Replace the S72 Sunroof Switch.

- **If between 390 - 480  $\Omega$**

9. Test for 88 - 107  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the express open switch.

- **If not between 88 - 107  $\Omega$**

Replace the S72 Sunroof Switch.

- **If between 88 - 107  $\Omega$**

10. Test for 1.6 - 2.0k  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the close switch.

- **If not between 1.6 - 2.0k  $\Omega$**

Replace the S72 Sunroof Switch.

- **If between 1.6 - 2.0k  $\Omega$**

11. Test for 840 - 1030  $\Omega$  between the control terminal 2 and the low reference terminal 5 while pressing the express close switch.

- **If not between 840 - 1030  $\Omega$**

Replace the S72 Sunroof Switch.

- **If between 840 - 1030  $\Omega$**

12. All OK

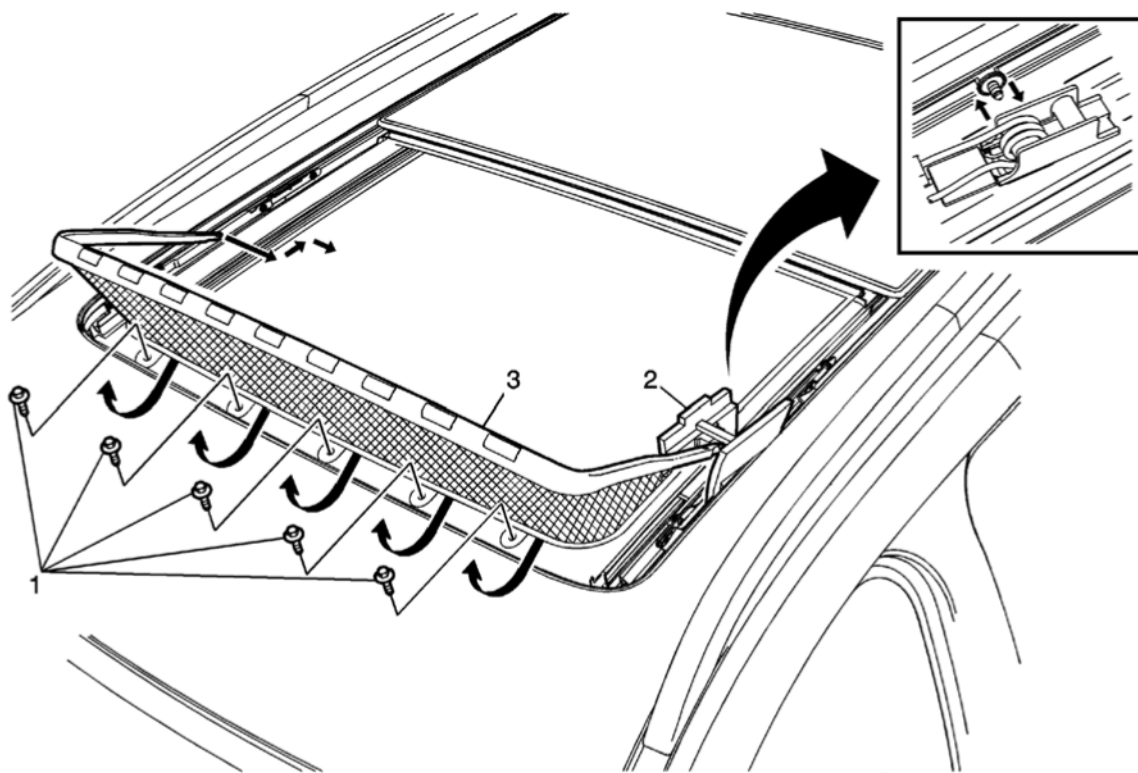
### Repair Instructions

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

- [Sunroof Sunshade Motor Replacement](#)
- [Sunroof Switch Replacement](#)
- [Sunroof Window Motor Replacement](#)

## REPAIR INSTRUCTIONS

### SUNROOF AIR DEFLECTOR REPLACEMENT



**Fig. 2: Sunroof Air Deflector, Brackets & Fasteners**

Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                                                                                                                                                     |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Sunroof Deflector Fastener (Qty: 5)</p> <p><b>CAUTION:</b><br/>Refer to <a href="#">Fastener Caution</a> .</p> <p><b>Procedure</b><br/>Open the front sunroof window.<br/><b>Tighten</b><br/>4 N.m (35 lb in)</p>                                                                                               |
| 2       | <p>Sunroof Deflector Rear Bracket (Qty: 2)</p> <p><b>Procedure</b><br/>Position the deflector over and rearward. Lift up on the front tab of the bracket and slide forward to remove from frame. After the front fasteners are removed, the deflector must be rolled rearward in order to access the brackets.</p> |
| 3       | <p>Sunroof Deflector</p> <p><b>Procedure</b><br/>Install the deflector rear brackets on each side first. Then install the front part of the deflector and fasteners.</p> <p><b>NOTE:</b><br/><b>Verify the operation of the sunroof window to the deflector to ensure no binding.</b></p>                          |

## 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 down the windshield pillars and out the front of the pillar into the wheelhouse area of through the for cowl panel by the wipers. The front hoses are installed in a rubber grommet and retained by clips located in the side of the windshield pillar.
2. The rear drain hoses are routed either through the side pillars and out of the body side outer panel extension or through the rear quarter lower panel. The rear hoses are installed in a rubber grommet and retained by clips.

### 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 water leak 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 7.

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

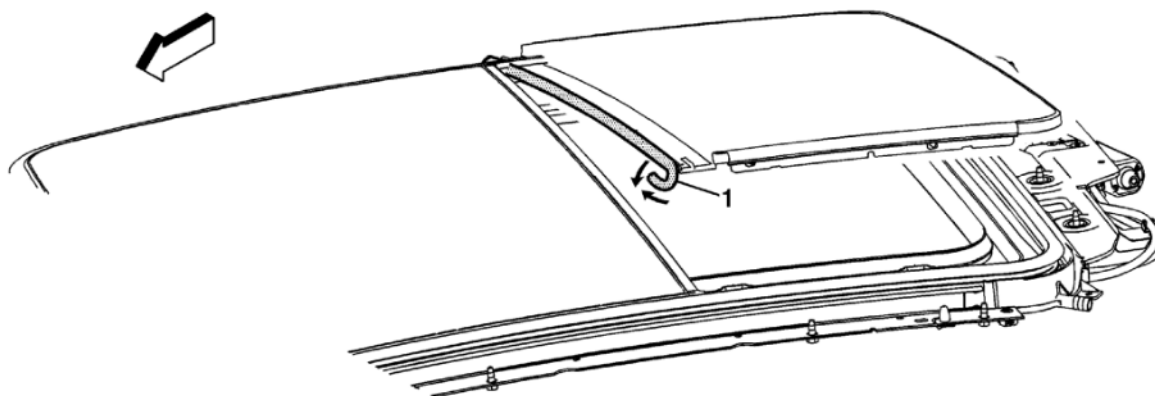
6. Use compressed air, 241 kPa (35 psi) or less to blow out any drain hose that is plugged.
7. Test the system again.
8. If remain plugged remove the blockage using the following steps.
  1. Push mechanics wire through the hose to remove the obstruction.
  2. Use compressed air in order to blow out any 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 \(With Sunroof\)](#) [Headlining Trim Panel Replacement \(Without Sunroof\)](#) .
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.

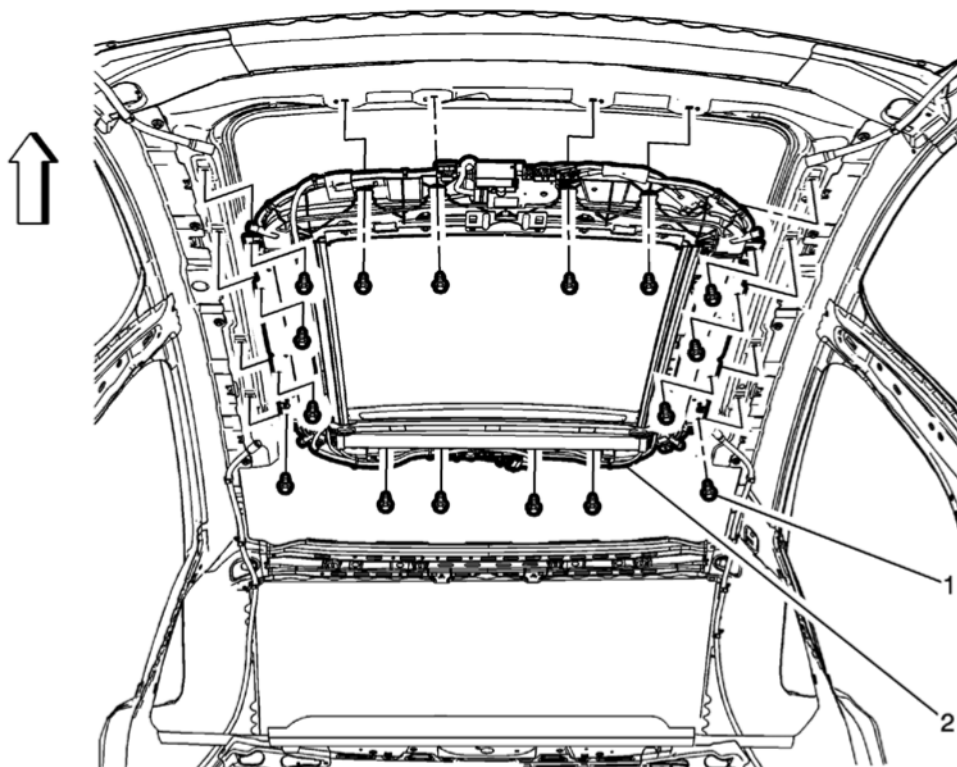
## SUNROOF HOUSING DRAIN GUTTER REPLACEMENT



**Fig. 3: Sunroof Housing Drain Gutter**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Sunroof Housing Drain Gutter Weatherstrip</p> <p><b>Procedures</b></p> <ol style="list-style-type: none"> <li>1. Remove the rear window. Refer to <a href="#">Sunroof Window Replacement - Rear</a>.</li> <li>2. Clean any left over tape residue with a 50/50 mixture by volume of isopropyl alcohol and clean drinkable water.</li> <li>3. Wipe the panel surface using a clean cloth while the solvent is still wet. Allow the panel surface to dry.</li> <li>4. Partially peel the adhesive tape liner from the backside of the weatherstrip when applying to the gutter.</li> <li>5. Apply the weatherstrip to the panel positioning on the edge of the gutter.</li> <li>6. Working from the center to both ends.</li> <li>7. Press firmly to obtain a good bond.</li> </ol> <p><b>NOTE:</b><br/>           Verify the operation of the sunroof before installing the headliner trim.</p> |

## **SUNROOF HOUSING REPLACEMENT**



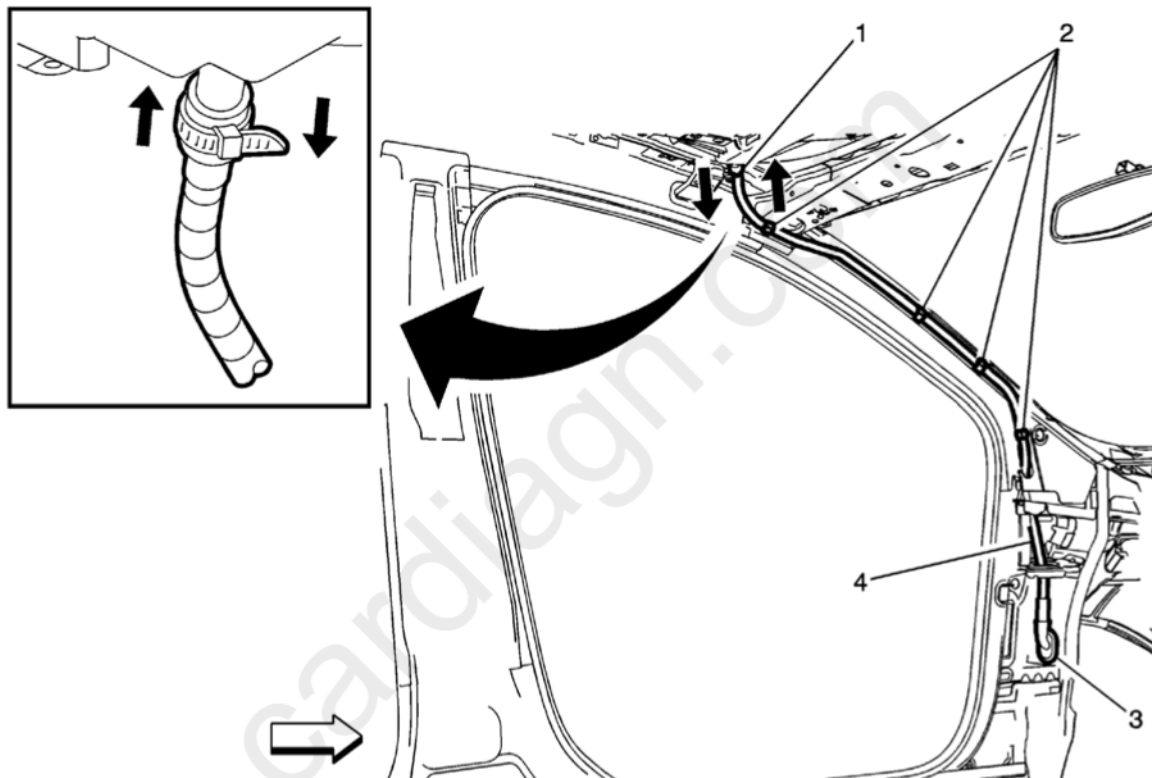
**Fig. 4: Sunroof Housing**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b> <ol style="list-style-type: none"> <li>1. Remove the sunroof windows front and rear. Refer to <a href="#">Sunroof Window Replacement - Front</a>, and <a href="#">Sunroof Window Replacement - Rear</a>.</li> <li>2. It is only necessary to lower the headliner. Only perform the steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to <a href="#">Headlining Trim Panel Replacement (With Sunroof)</a> <a href="#">Headlining Trim Panel Replacement (Without Sunroof)</a> .</li> <li>3. Disconnect both front and rear water drain hoses from the sunroof frame spigot. Refer to <a href="#">Sunroof Housing Front Drain Hose Replacement</a>, and <a href="#">Sunroof Housing Rear Drain Hose Replacement</a>.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sunroof Housing Bolt (Qty: 16)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1               <ol style="list-style-type: none"> <li>1. Place a cover around the outside of the roof opening to protect the outside finish.</li> <li>2. With an assistant, remove the sunroof through the opening in the roof.</li> <li>3. Disconnect the electrical wiring harness connector.</li> </ol> </li> </ol> <p><b>Tighten</b><br/>           9 N.m (80 lb in)</p> |

| Callout | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2       | <p>Sunroof Housing</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. Transfers all parts as necessary.</li> <li>2. Insert the sunroof housing assembly to the gauge pin location in the opening.</li> <li>3. Install the both front and rear water drain hoses to the sunroof frame spigot, apply tie straps if required.</li> </ol> <p><b>NOTE:</b><br/>Before installing the headliner, verify the operation of the sunroof windows and water test to ensure no leaks before installing the headliner trim.</p> |

### SUNROOF HOUSING FRONT DRAIN HOSE REPLACEMENT



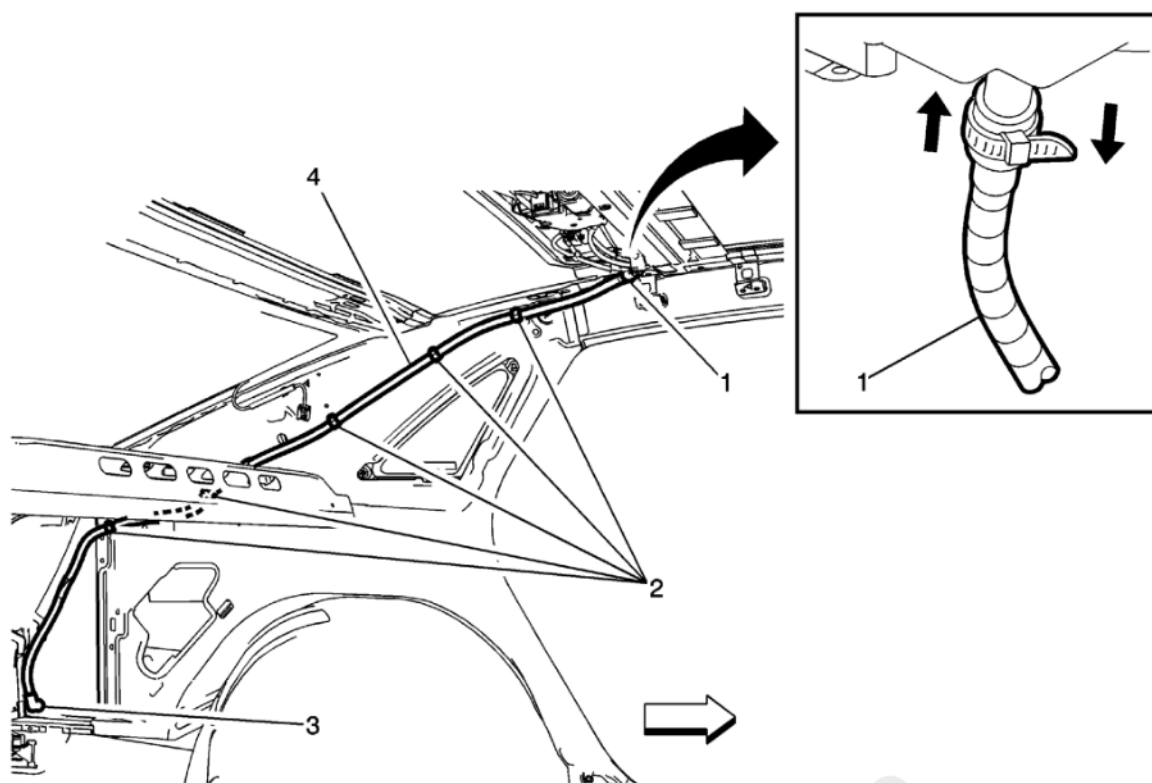
**Fig. 5: Sunroof Housing Front Drain Hose Components**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Component Name |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <p><b>Preliminary Procedure</b></p> <ol style="list-style-type: none"> <li>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 <a href="#">Headlining Trim Panel Replacement (With Sunroof)</a> <a href="#">Headlining Trim Panel Replacement (Without Sunroof)</a> .</li> <li>2. Remove the radio front speaker grille. Refer to <a href="#">Radio Front Speaker Grille Replacement</a> .</li> <li>3. It is only necessary to reposition the front wheelhouse liner. Only do those step in front wheelhouse liner replacement that will remove the liner enough to gain access to the part. Remove the front wheelhouse liner. Refer to <a href="#">Front Wheelhouse Liner Replacement</a> .</li> </ol> |                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |

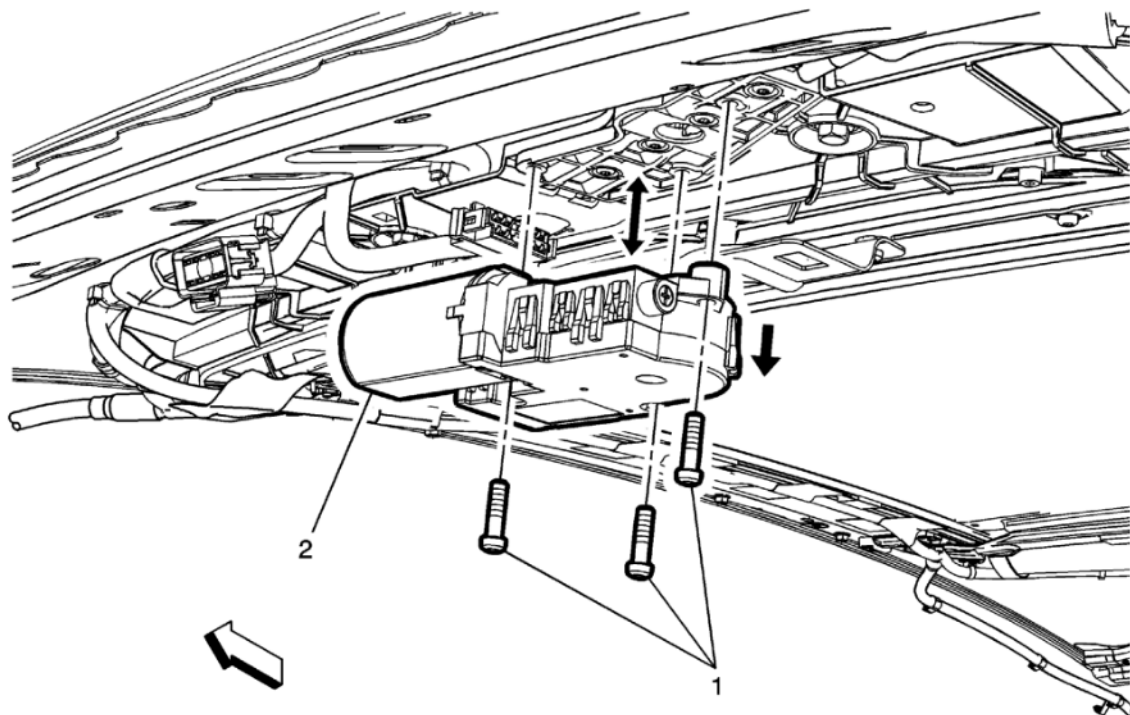
| Callout | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <p>Sunroof Front Drain Hose to Spigot</p> <p><b>Procedure</b></p> <p>Disconnect the sunroof front drain hose (1) from the sunroof housing spigot, remove the tie strap if equipped.</p> <p><b>NOTE:</b></p> <p><b>If the drain hoses are retained with a tie strap it will be necessary to replace them when reinstalling.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2       | <p>Sunroof Front Drain Hose Retainers to Pillar (Qty: 4)</p> <p><b>NOTE:</b></p> <p><b>Unclip the hose from the retainers.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3       | <p>Sunroof Front Drain Hose and Grommet</p> <p><b>NOTE:</b></p> <p><b>Release the drain hose grommet from the body through the wheelhouse opening.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 4       | <p>Sunroof Front Drain Hose</p> <p><b>Procedure</b></p> <ol style="list-style-type: none"> <li>1. When install the front drain hose, ensure that the end of the drain hose grommet is fully seated in the access hole of the side pillar to prevent water leaks in the interior.</li> <li>2. Install the sunroof front drain hose to the sunroof housing spigot, apply tie strap if required.</li> <li>3. Water test vehicle to ensure No leaks.</li> </ol> <p><b>NOTE:</b></p> <p><b>Attach a piece of mechanics wire to the sunroof spigot end of the hose prior to pulling the hose out of the pillar through the wheelhouse opening. Attach the NEW hose to the mechanics wire to assist in guiding the NEW hose through the pillar passage.</b></p> |

## **SUNROOF HOUSING REAR DRAIN HOSE REPLACEMENT**



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

| Callout                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b> <ol style="list-style-type: none"> <li>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 <a href="#">Headlining Trim Panel Replacement (With Sunroof)</a> <a href="#">Headlining Trim Panel Replacement (Without Sunroof)</a> .</li> <li>2. Remove the rear compartment side trim for the side that is being serviced only. Refer to <a href="#">Rear Compartment Side Trim Replacement - Right Side</a> , and <a href="#">Rear Compartment Side Trim Replacement - Left Side</a> .</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sunroof Rear Drain Hose to Spigot<br><b>Procedure</b><br>Disconnect the sunroof rear drain hose (1) from the sunroof housing spigot, remove the tie strap if equipped.                                                                                                                                                                                                                                                                                                                                     |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sunroof Rear Drain Hose Retainers to Upper Inner Quarter Panel (Qty: 5)                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sunroof Rear Drain Hose and Grommet<br><b>Procedure</b><br>Remove the grommet and hose as one from the lower quarter panel.                                                                                                                                                                                                                                                                                                                                                                                |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sunroof Rear Drain Hose<br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. When install the rear drain hose, ensure that the end of the drain hose grommet is fully seated in the access hole of the side lower quarter panel to prevent water leaks in the rear compartment.</li> <li>2. Install the sunroof housing drain hose to the sunroof housing spigot, apply tie strap if required.</li> </ol> <p><b>NOTE:</b><br/>Before installing the headliner, water test to verify no leaks.</p> |



**Fig. 7: Sunroof Window Motor & Fasteners**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                      | Component Name                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the roof console. Refer to <a href="#">Roof Console Replacement</a> . |                                                                                                                                                                                                                                                                                                         |
| 1                                                                                                            | Sunroof Window Motor Fastener (Qty: 3)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Procedure</b><br>Disconnect the electrical wiring harness connector.<br><b>Tighten</b><br>4 N.m (35 lb in)                                                                       |
| 2                                                                                                            | Sunroof Window Motor<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. When replacing the sunroof motor, refer to <a href="#">Sunroof Motor/Actuator Initialization/Teach Process</a>.</li> <li>2. Verify the operation of the sunroof before installing the headliner trim.</li> </ol> |

## SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS

**NOTE:** Perform the Initialization/Teach Process for both sunroof window and sunshade any time a new sunroof window or sunshade motor actuator is installed in the vehicle.

If the sunroof motor is new Initialize it first before doing the sunshade.

"Manual" indicates the first switch detent.

"Express" indicates the second switch detent.

1. Ensure that the electrical harness on the headliner is connected to the sunroof motor.

2. Put the ignition in the RUN position.
3. Ensure that the sunroof window is in the fully closed position if relearning a used sunroof motor.
4. Press the "Sunroof Manual Close Switch" and hold for more than 10 seconds. Do Not release the switch until the window finds the hard stop and moves slightly back.

**NOTE:** A slight clunk noise will be heard when this occurs. Rearward movement of sunroof is very slight and may not be noticed.

5. Open the sunroof with the sunroof switch in either the manual or express open position. Hold the switch until the sunroof is in the full open position and then release the switch.
6. Press "Sunroof Manual Open Switch" and hold it for more than 10 seconds. DO NOT release the sunroof switch. At this time the sunroof window will automatically begin to move to the fully Closed position.

**NOTE:** During this time it is necessary to keep the switch active until the process completes.

7. Verify the operation of the sunroof window.

#### **Sunshade Motor/Actuator initialization/Teach Process**

1. Ensure that the sunroof window is in the fully closed position before relearning the sunshade motor.
2. Ensure that the electrical harness on the headliner is connected to the sunshade motor.
3. Put the ignition in the RUN position.
4. Ensure that the sunshade window is in the fully closed position if relearning a used sunshade motor.
5. Press the "Sunshade Manual Close Switch" and hold for more than 10 seconds. Do Not release the switch until the window finds the hard stop and moves slightly back.

**NOTE:** A slight clunk noise will be heard when this occurs. Rearward movement of sunshade is very slight and may not be noticed.

6. Open the sunshade with the sunshade switch in either the manual or express open position. Hold the switch until the sunshade is in the full open position and then release the switch.
7. Press "Sunshade Manual Open Switch" and hold it for more than 10 seconds. DO NOT release the sunshade switch. At this time the sunshade window will automatically begin to move to the fully Closed position.

**NOTE:** During this time it is necessary to keep the switch active until the process completes.

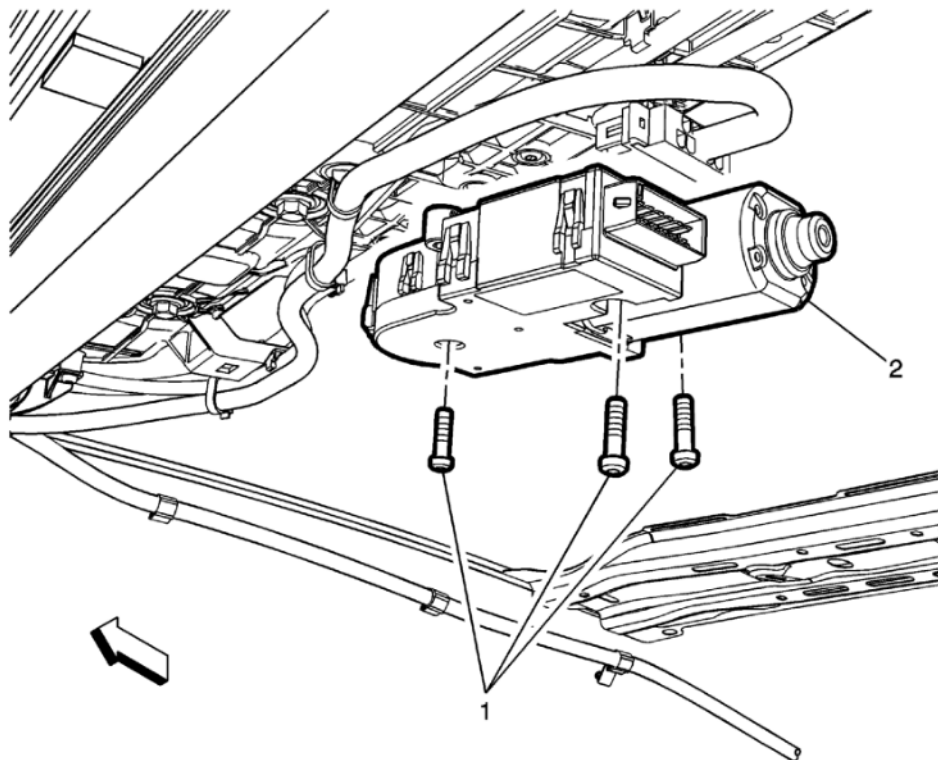
8. Verify the operation of the sunshade.

**NOTE:** The Initialization/Teach Process is not complete if any of the following actions take place before the initialization cycle is done:

- The sunroof window / sunshade switch is not held in the close position.
- The ignition and/or battery power has been removed.
- The window panel has not reached the closed position.

The Initialization/Teach Process must be restarted if the procedure is not carried out completely.

#### **SUNROOF SUNSHADE MOTOR REPLACEMENT**



**Fig. 8: Sunroof Sunshade Motor**

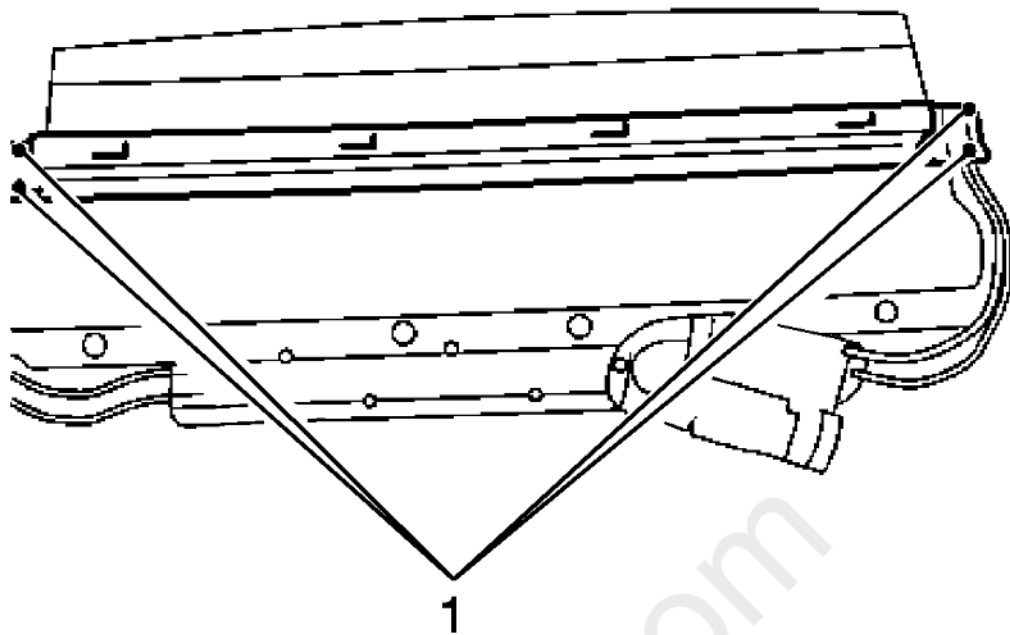
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                                                                                                                                                                                                                                   | Component Name                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>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 <a href="#">Headlining Trim Panel Replacement (With Sunroof)</a> <a href="#">Headlining Trim Panel Replacement (Without Sunroof)</a> . |                                                                                                                                                                                                                                                                                                                    |
| 1                                                                                                                                                                                                                                                                                                                                         | Sunroof Sunshade Motor Fastener (Qty: 3)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Procedure</b><br>Disconnect the electrical wiring harness connector.<br><b>Tighten</b><br>4 N.m (35 lb in)                                                                                |
| 2                                                                                                                                                                                                                                                                                                                                         | Sunroof Sunshade Motor<br><br><b>Procedure</b> <ol style="list-style-type: none"> <li>1. When replacing the sunroof sunshade motor, refer to <a href="#">Sunroof Motor/Actuator Initialization/Teach Process</a>.</li> <li>2. Verify the operation of the sunroof before installing the headliner trim.</li> </ol> |

## SUNROOF SUNSHADE REPLACEMENT

### Removal Procedure

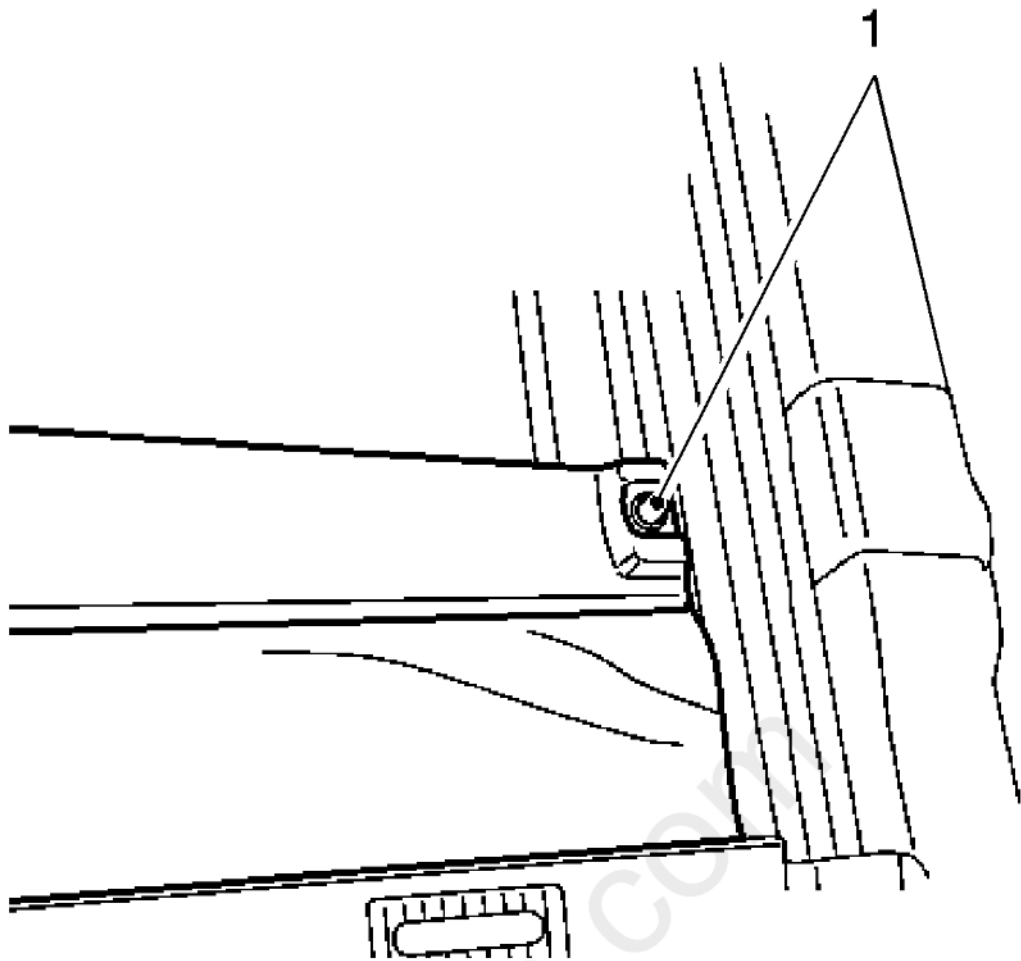
1. Open the sunshade fully.
2. Remove the rear sunroof window from the vehicle. Refer to [Sunroof Window Replacement - Rear](#).
3. It is only necessary to lower the headliner. Only do those steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to [Headlining](#)



**Fig. 9: Rear Crossmember Bolts**

**Courtesy of GENERAL MOTORS COMPANY**

4. Do this from inside the vehicle, remove the rear crossmember screws (1), two are located on each side, Do Not remove the sunshade end cap to module screws yet.
5. Remove the rear crossmember from the vehicle.



**Fig. 10: View Of Sunshade At The Rails Bolts**  
Courtesy of GENERAL MOTORS COMPANY

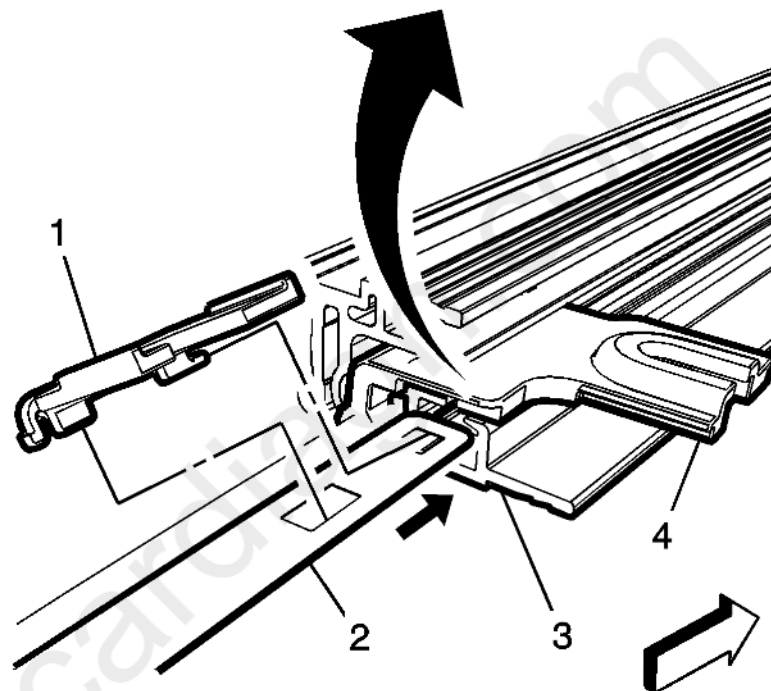
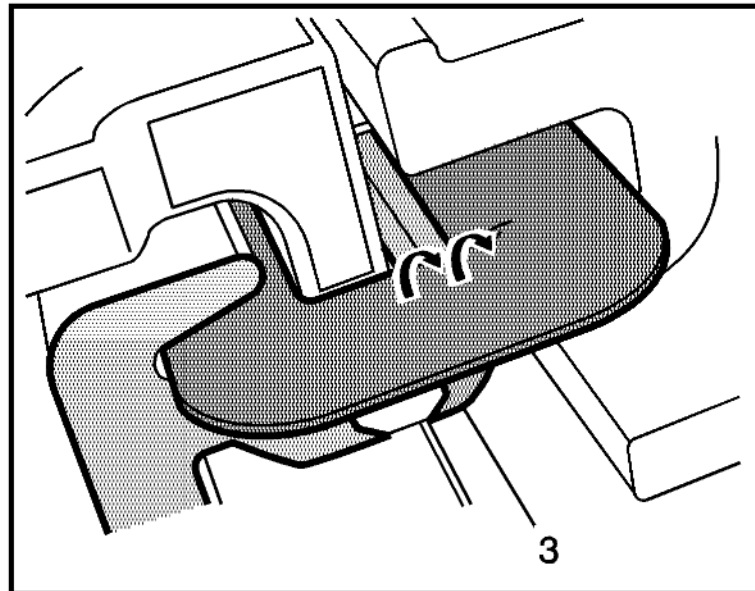
**NOTE:** Place the sunshade in the fully open position before removing the front bar screws (1).

6. Do this from outside the vehicle, through the sunroof opening remove the screw (1) from each side of the sunshade front bar.

**NOTE:** Before removing the sunshade mark both sides of the rail tracks this will assist in reinstalling and prevent the sunshade from binding when operating. Take note that there is an upper and lower rail track.

7. Do this from inside the vehicle, remove the two screws that attach the sunshade end cap to the module on both sides.
8. Remove the sunshade end caps from the sunshade.
9. Remove the sunshade from the rails tracks.
10. Remove the sunshade from the vehicle.

### Installation Procedure



**Fig. 11: Bracket And Sunshade Steel Tape End**

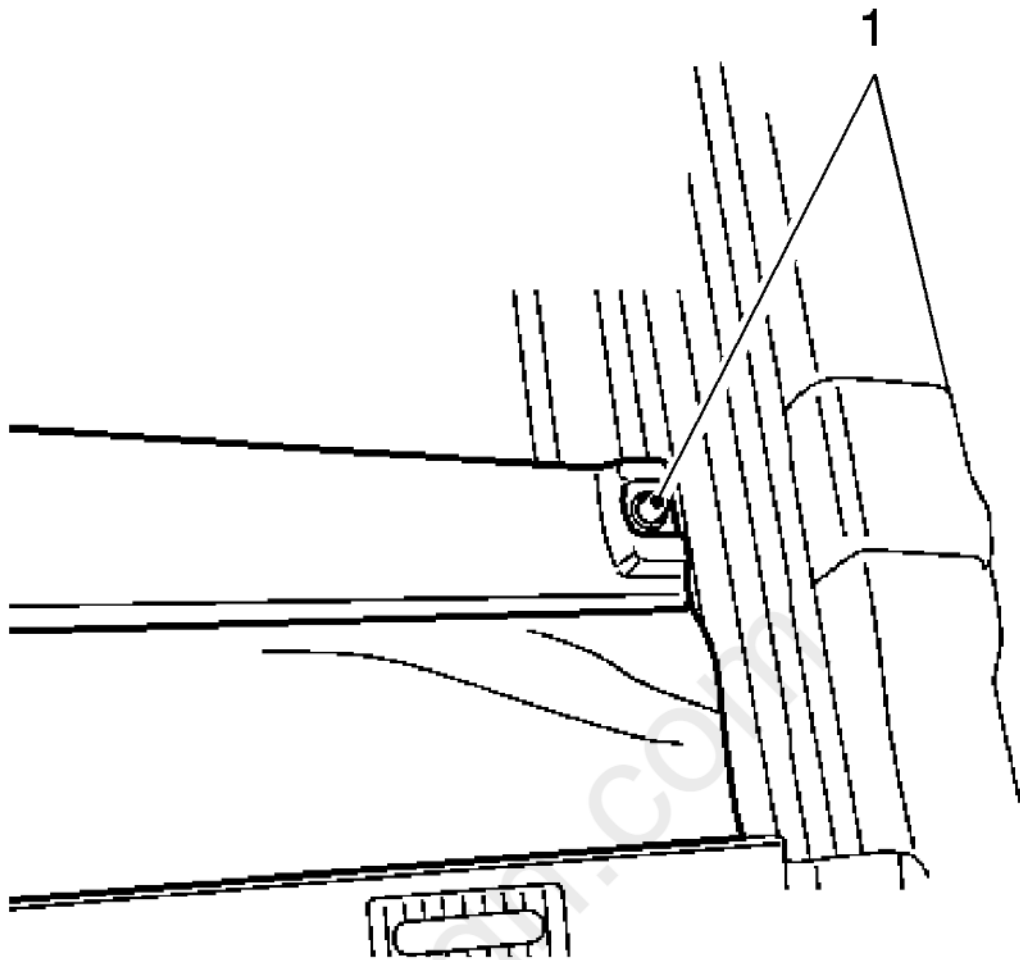
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Installation of the service sunshade is extremely difficult and is a two person operation. Do Not unroll the sunshade prior to installation. The sunshade rewinding assembly is only designed to be unrolled within the sunroof rail track system and can permanently damage if unrolled outside of the sunroof rail track. Refer to step 7 when installing the sunshade to the rail tracks for proper location.

1. Install the bracket (1) to the sunshade steel tape end (2) on each side.

**NOTE:** Ensure that the sunshade steel tape end is fully seated over the inside edge of the rail track (3) before operating the sunshade to prevent binding.

2. Slide the sunshade bracket (1) and steel tape (2) forward in the rail track (3) until it lines up with the sunshade cable ends (4) on each side.

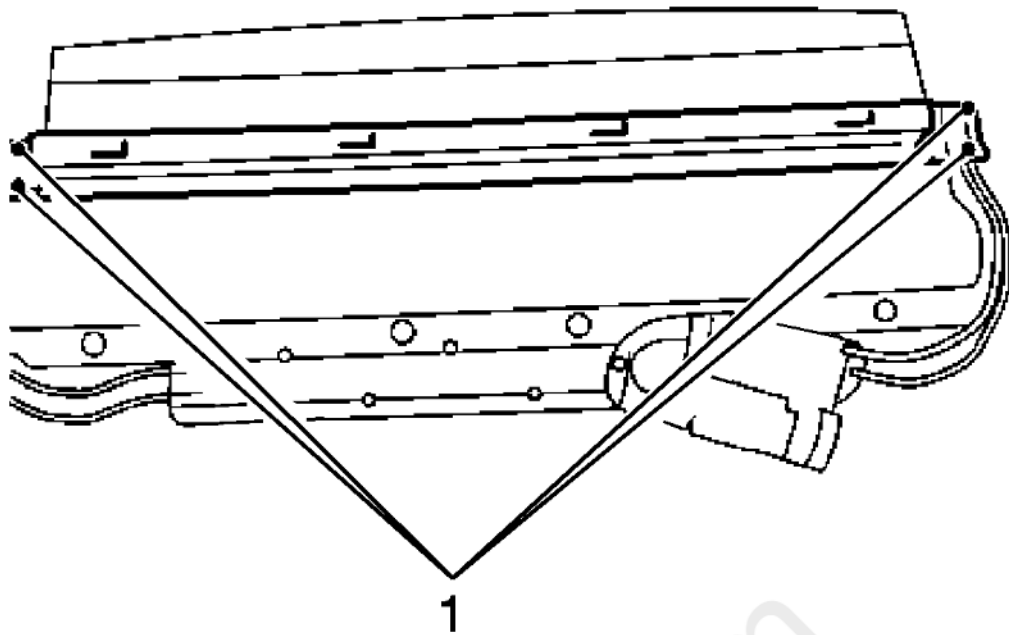


**Fig. 12: Sunshade Rail Bolts**

Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Refer to **Fastener Caution** .

3. Install the screws (1) that retains the sunshade bracket to the cable ends and tighten to 2.5 N.m (22 lb in).
4. Install the sunshade end caps to the sunshade.
5. Install the sunshade end cap to module screws two on each side and tighten to 2.5 N.m (22 lb in).
6. Install the rear crossmember to the vehicle.

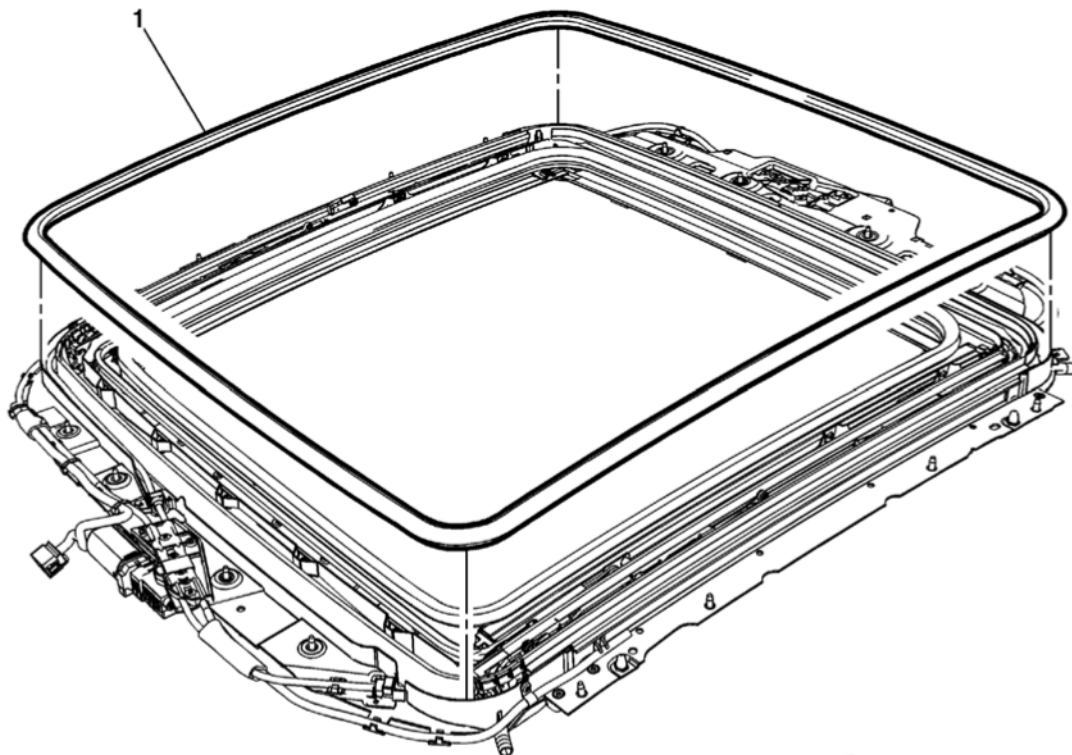


**Fig. 13: Rear Crossmember Bolts**

Courtesy of GENERAL MOTORS COMPANY

7. Install two screws (1) to the rear crossmember located on each side and tighten to 2.5 N.m (22 lb in).
8. Operation the sunshade slowly, inspect the sunshade for binding and to ensure proper operation.
9. Install the rear sunroof window. Refer to [Sunroof Window Replacement - Rear](#).
10. Install the headlining. Refer to [Headlining Trim Panel Replacement \(With Sunroof\)](#) [Headlining Trim Panel Replacement \(Without Sunroof\)](#) .

## **SUNROOF WINDOW SEAL REPLACEMENT - OUTER**



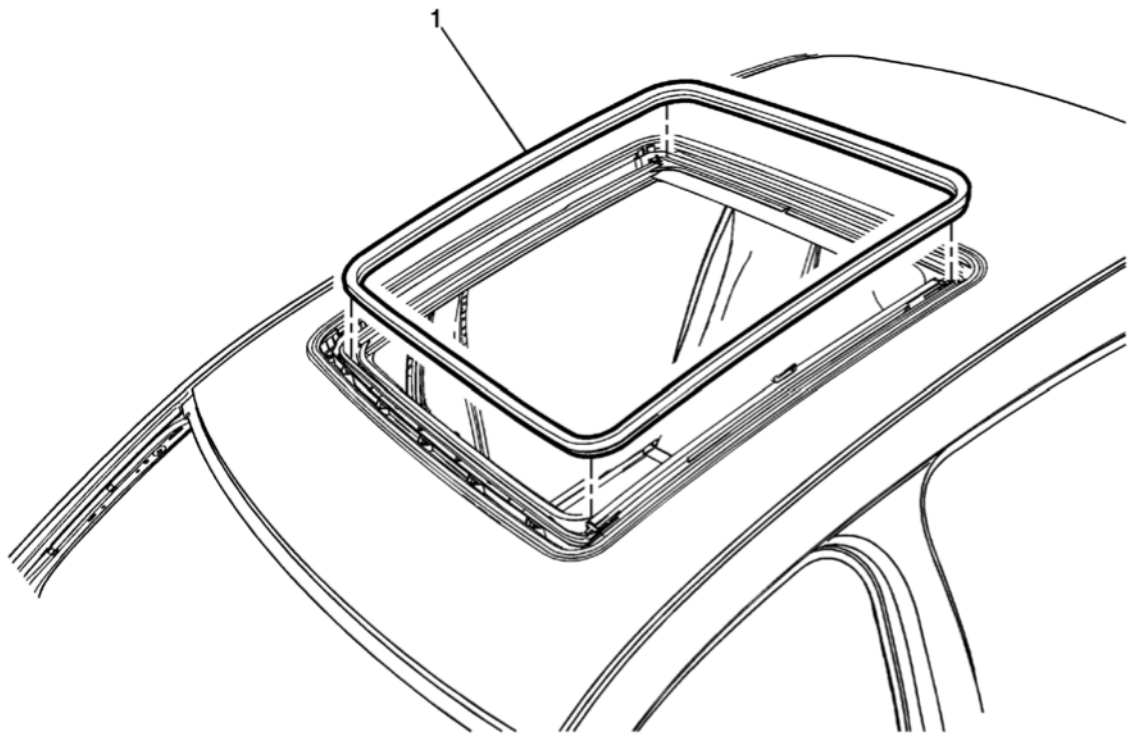
**Fig. 14: Sunroof Window Seal - Outer**  
 Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                     | Component Name                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the sunroof housing assembly. Refer to <a href="#">Sunroof Housing Replacement</a> . |                                                                                                                                              |
| 1                                                                                                                           | Sunroof Window Outer Seal<br><br><b>NOTE:</b><br>Ensure that the outer seal is fitted around the edge of the housing to prevent water leaks. |

## **SUNROOF WINDOW SEAL REPLACEMENT - INNER**

### **Removal Procedure**

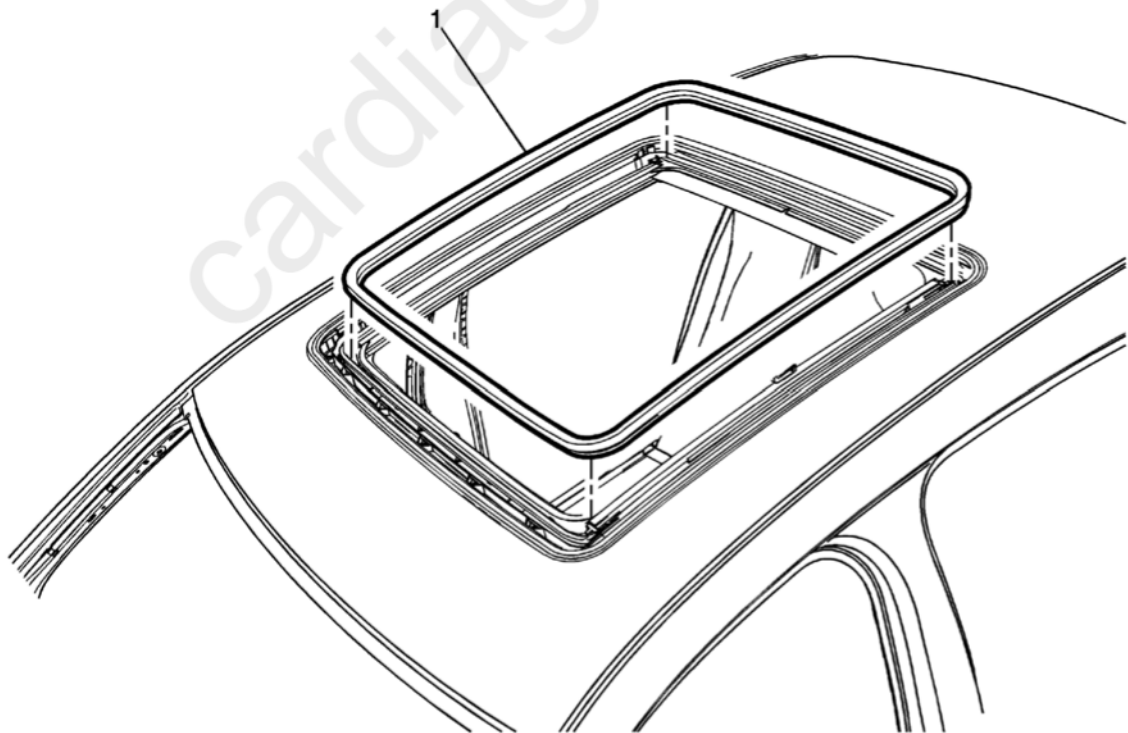
1. Remove the front sunroof window. Refer to [Sunroof Window Replacement - Front](#), and rear sunroof window [Sunroof Window Replacement - Rear](#).



**Fig. 15: Sunroof Window Seal - Inner**  
Courtesy of GENERAL MOTORS COMPANY

2. Start in the front of the vehicle, lift the weatherstrip (1) off the inside edge of the sunroof.
3. Remove the seal from the sunroof housing track.

#### **Installation Procedure**

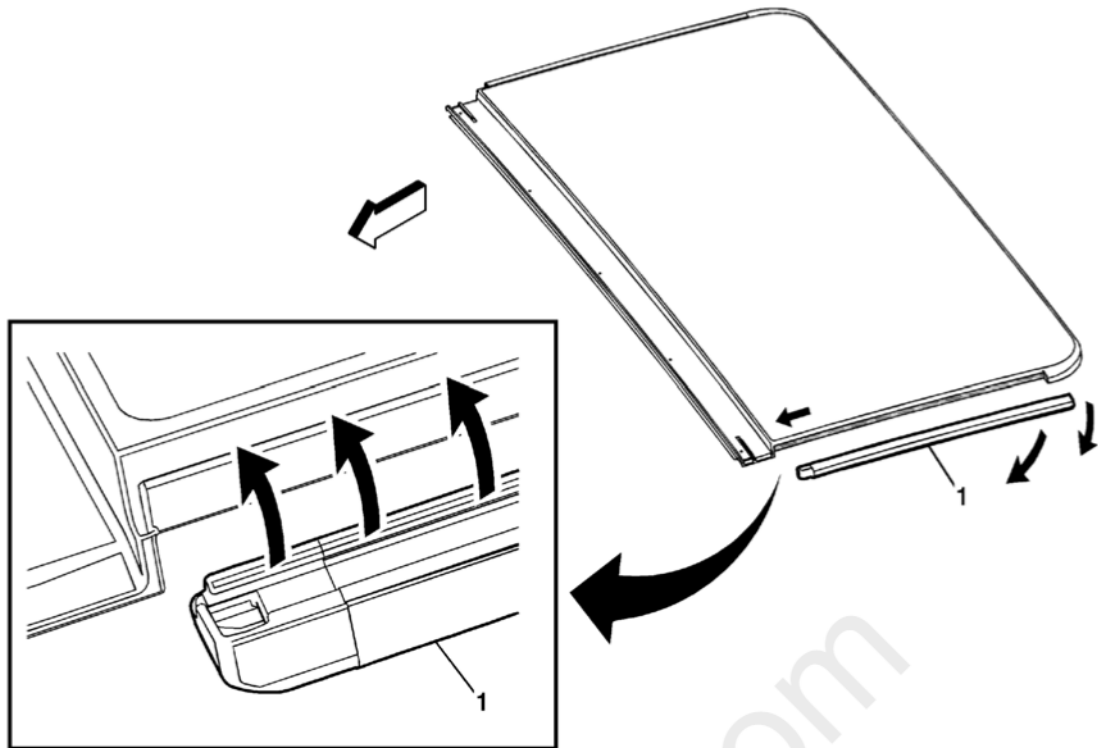


**Fig. 16: Sunroof Window Seal - Inner**  
Courtesy of GENERAL MOTORS COMPANY

1. Install the seal (1) to the sunroof housing track.
2. Using a suitable tool, seat the weatherstrip on the inner edge of the sunroof.
3. Install the front sunroof window. Refer to [Sunroof Window Replacement - Front](#), and rear sunroof window [Sunroof Window Replacement - Rear](#).

4. Water test to verify no leaks.

## SUNROOF WINDOW REAR SEAL REPLACEMENT - REAR WINDOW SIDE

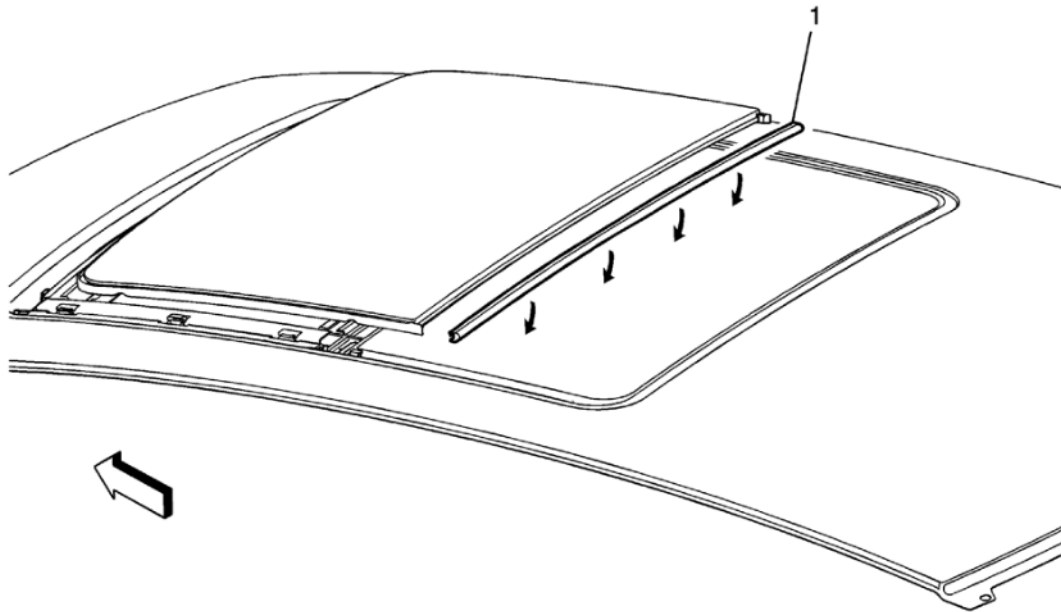


**Fig. 17: Sunroof Window Rear Seal - Rear Window Side**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                    | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>Refer to <a href="#">Glass and Sheet Metal Handling Warning</a> .                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Preliminary Procedures</b> Remove the sunroof window rear. Refer to <a href="#">Sunroof Window Replacement - Rear</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1                                                                                                                          | <p>Sunroof Window Rear Seal Side</p> <p><b>Procedures</b></p> <ol style="list-style-type: none"><li>1. Before removing the sunroof window, apply a double layer of masking tape around the perimeter of the painted surfaces.</li><li>2. Remove the sunroof window weatherstrip by grasping the edge, pull downward to release it from the retainer.</li><li>3. Clean around the inside surface of the window weatherstrip retainer with a 50/50 mixture of isopropyl alcohol and water by volume on a dampened lint free cloth.</li><li>4. Position the sunroof window rear seal side in the center of the window retainer, working outward the entire length.</li><li>5. Ensure the window height. Refer to <a href="#">Sunroof Window Height and Opening Fit Adjustment</a>.</li><li>6. Inspect sunroof for proper operation and water test to ensure no leaks.</li></ol> |

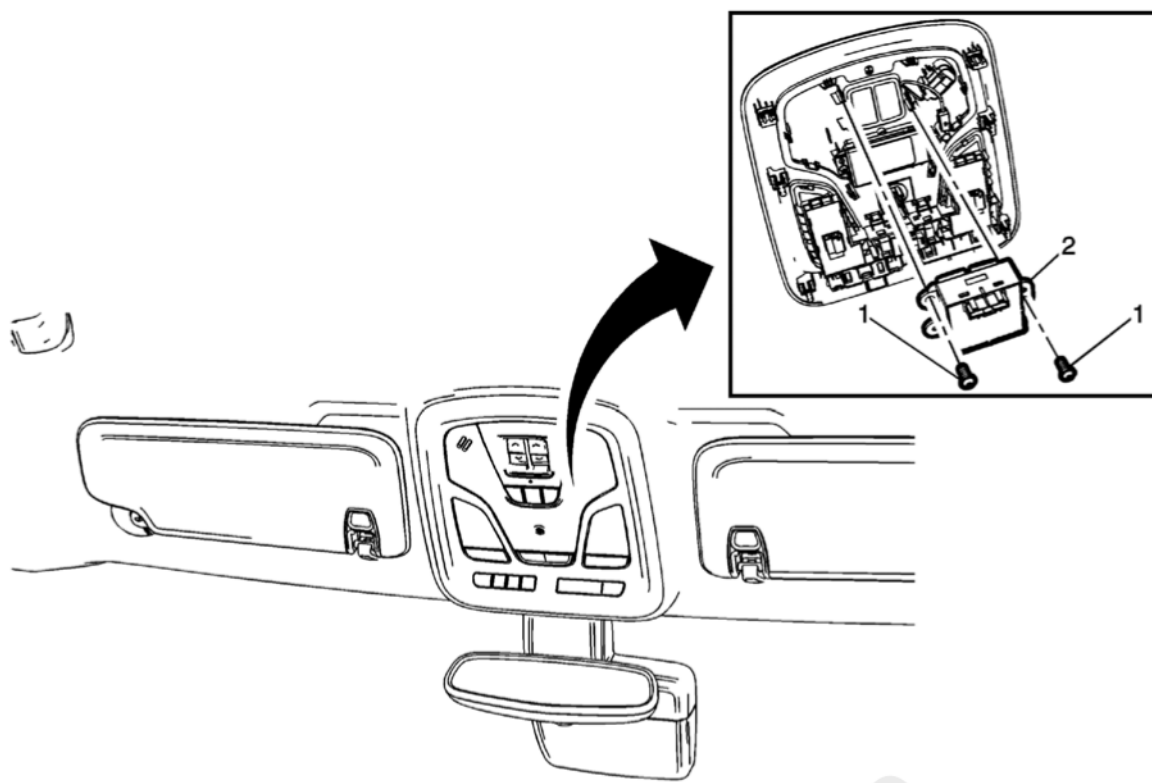
## SUNROOF WINDOW FRONT SEAL REPLACEMENT - FRONT WINDOW REAR



**Fig. 18: Sunroof Window Front Seal - Front Window Rear**  
Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                                      | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>Refer to <a href="#">Glass and Sheet Metal Handling Warning</a> .                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Preliminary Procedures</b> Remove the sunroof window front. Refer to <a href="#">Sunroof Window Replacement - Front</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1                                                                                                                            | Sunroof Window Front Seal Rear<br><br><b>Procedures</b> <ol style="list-style-type: none"> <li>1. Before removing the sunroof window, apply a double layer of masking tape around the perimeter of the painted surfaces.</li> <li>2. Remove the sunroof window weatherstrip by grasping the edge, pull downward to release it from the retainer.</li> <li>3. Clean around the inside surface of the window weatherstrip retainer with a 50/50 mixture of isopropyl alcohol and water by volume on a dampened lint free cloth.</li> <li>4. Position the sunroof window front seal rear in the center of the window retainer working outward the entire length.</li> <li>5. Ensure the window height. Refer to <a href="#">Sunroof Window Height and Opening Fit Adjustment</a>.</li> <li>6. Inspect sunroof for proper operation and water test to ensure no leaks.</li> </ol> |

## SUNROOF SWITCH REPLACEMENT

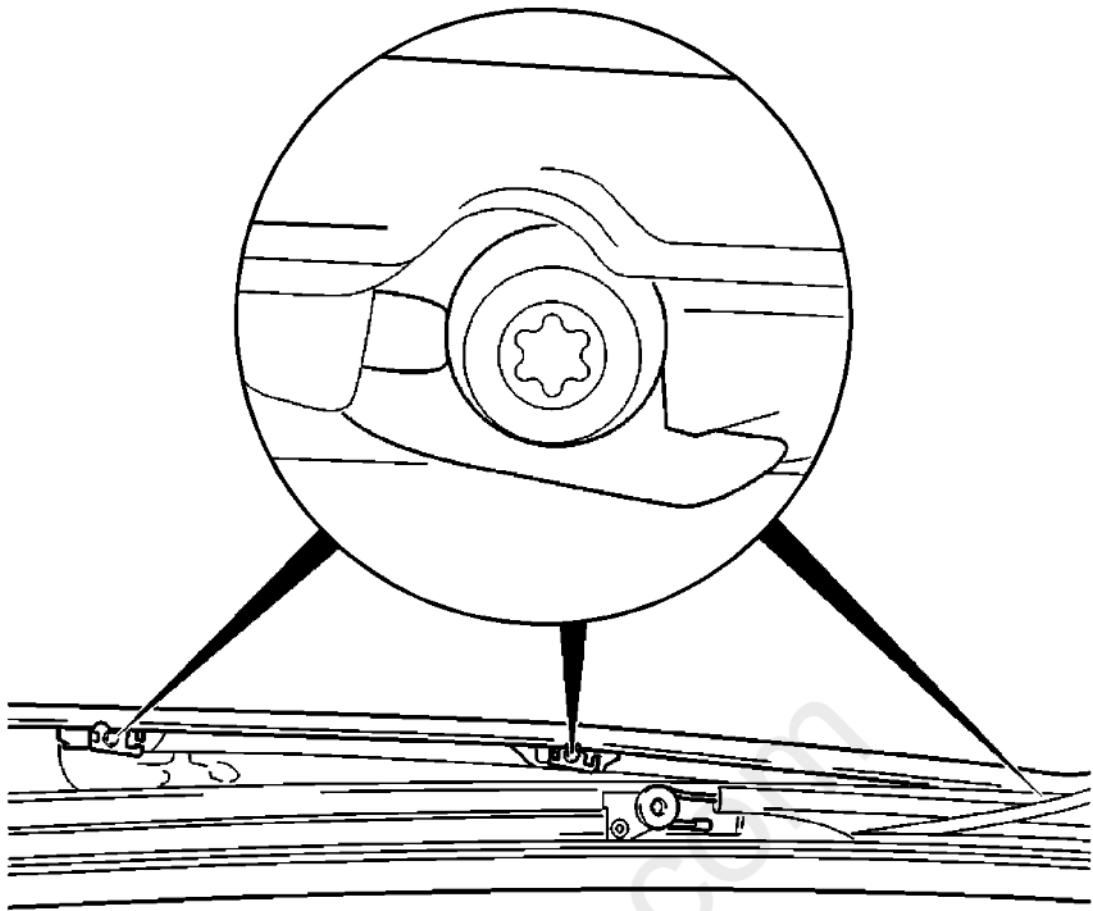


**Fig. 19: Sunroof Switch**

Courtesy of GENERAL MOTORS COMPANY

| Callout                                                                                                      | Component Name                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br>Remove the roof console. Refer to <a href="#">Roof Console Replacement</a> . |                                                                                                                                                     |
| 1                                                                                                            | Sunroof Switch Fasteners (Qty: 2)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>1.5 N.m (13 lb in) |
| 2                                                                                                            | Sunroof Switch                                                                                                                                      |

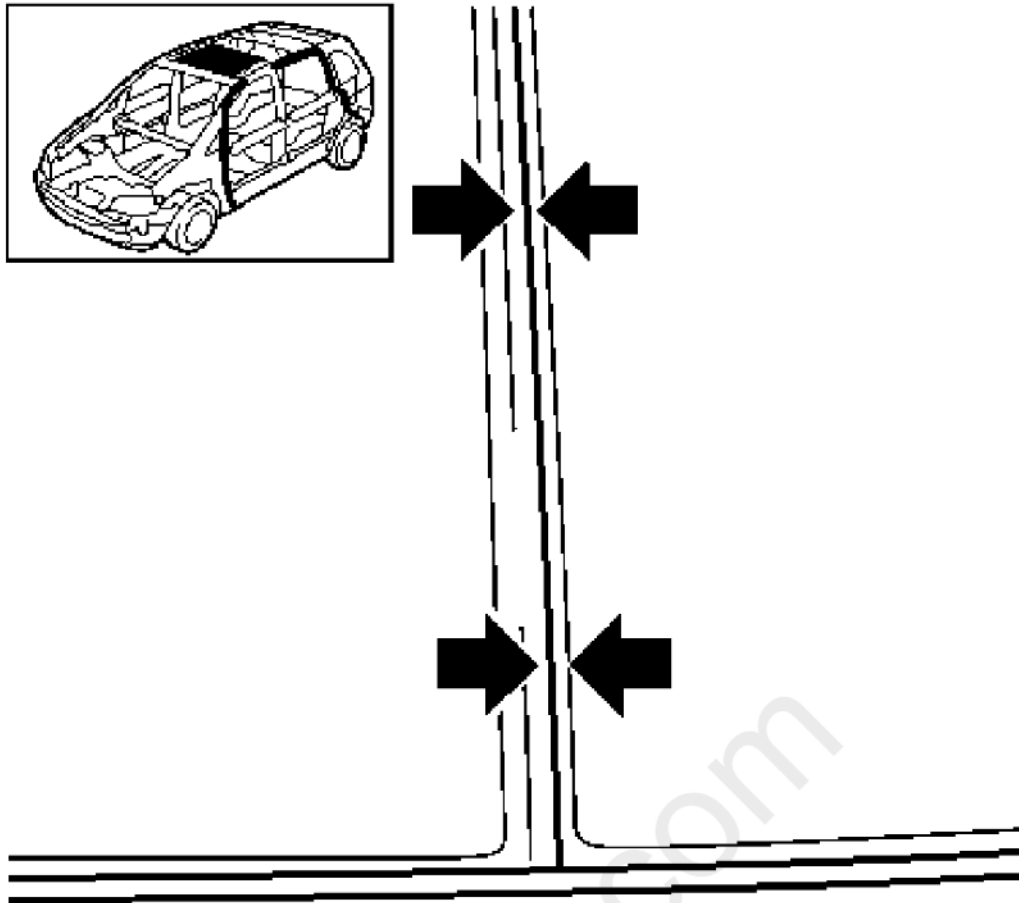
## SUNROOF WINDOW HEIGHT AND OPENING FIT ADJUSTMENT



**Fig. 20: View Of Front Window Screws**

**Courtesy of GENERAL MOTORS COMPANY**

1. Open the front sunroof window to the vent position.
2. Remove the front sunroof side cover to expose the screws. If equipped.
3. Loosen the front sunroof window rear screws, left and right side.
4. Open the front sunroof to the half open position.
5. Loosen the front and middle sunroof window screws, left and right side.
6. Close the front sunroof.



**Fig. 21: Window Gap**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Tighten the sunroof window in the upper position.

7. Adjust the window to the following specs, gap 11.0 + or - 0.3 mm (0.43 in) between the front rear and rear front edges.

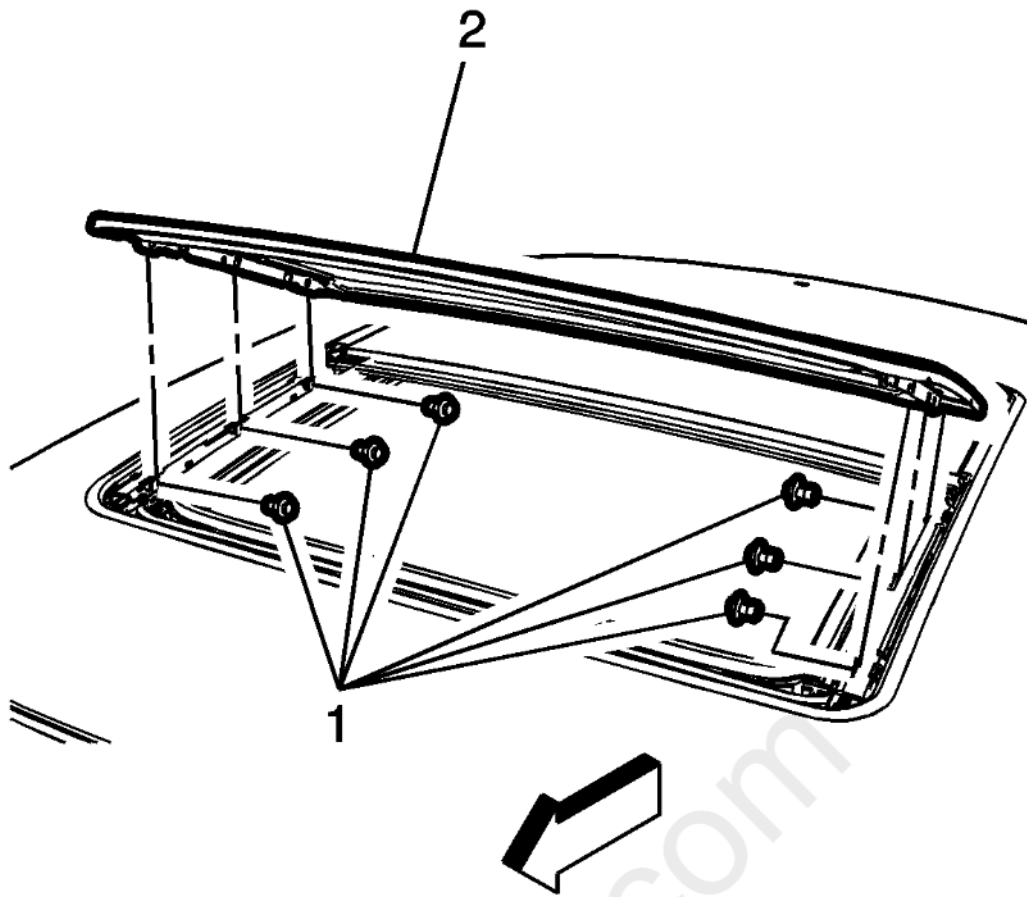
**CAUTION:** Refer to [Fastener Caution](#) .

8. Tighten the front sunroof window rear screws to 4 N.m (35 lb in).
9. Open the front sunroof window until the rear part is in the vent position.
10. Tighten the front and middle sunroof window screws to 4 N.m (35 lb in).
11. Install the front sunroof side covers, if removed.
12. Close the front sunroof.

## **SUNROOF WINDOW REPLACEMENT - FRONT**

### **Removal Procedure**

1. Open the sunshade.
2. Position the front sunroof window in the vent position.



**Fig. 22: Sunroof Window Screws**

Courtesy of GENERAL MOTORS COMPANY

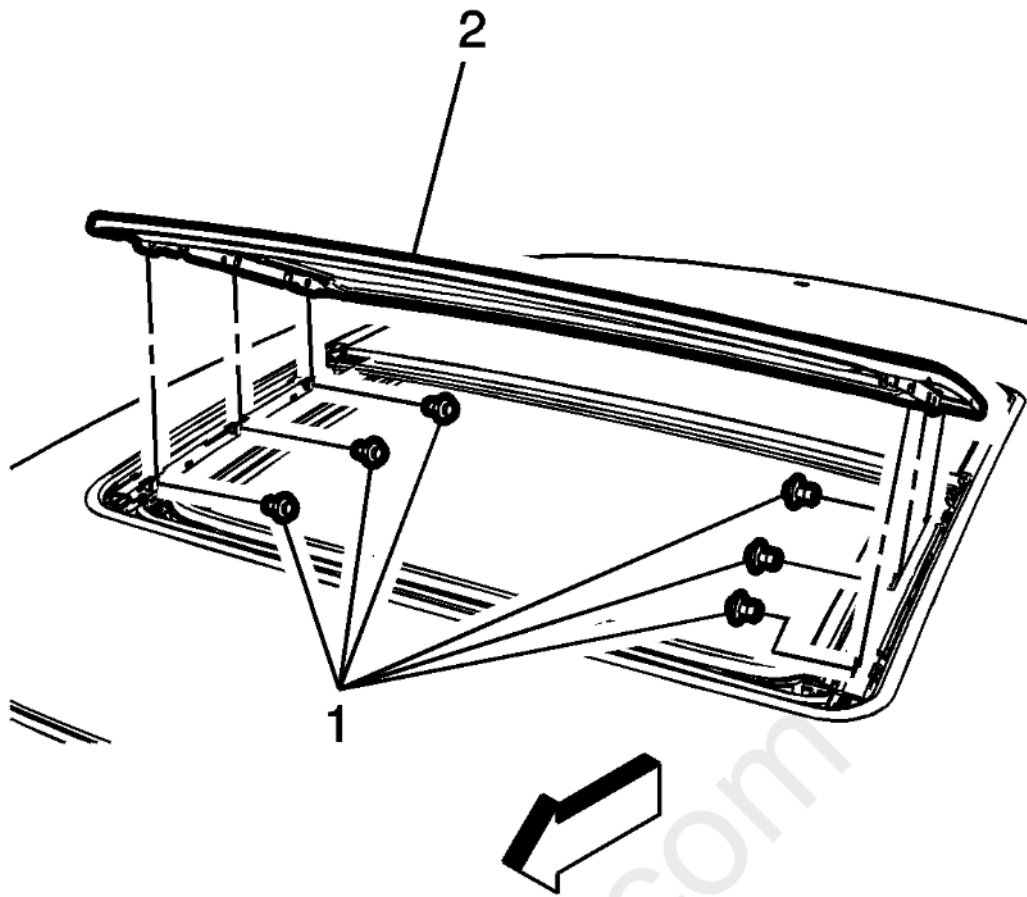
3. Remove the front sunroof window screws (1), three on each side.
4. Remove the front sunroof window (2) from the vehicle.

#### **Installation Procedure**

1. Ensure that the sunroof window is in the vent position, align the side window brackets with the guide holes on left and right side of the frame.

**CAUTION:** Refer to **Fastener Caution** .

2. Install the front sunroof window screws (1), three on the left and right side, tighten to 4 N.m (35 lb in).



**Fig. 23: Sunroof Window Screws**

Courtesy of GENERAL MOTORS COMPANY

3. Close the sunroof.

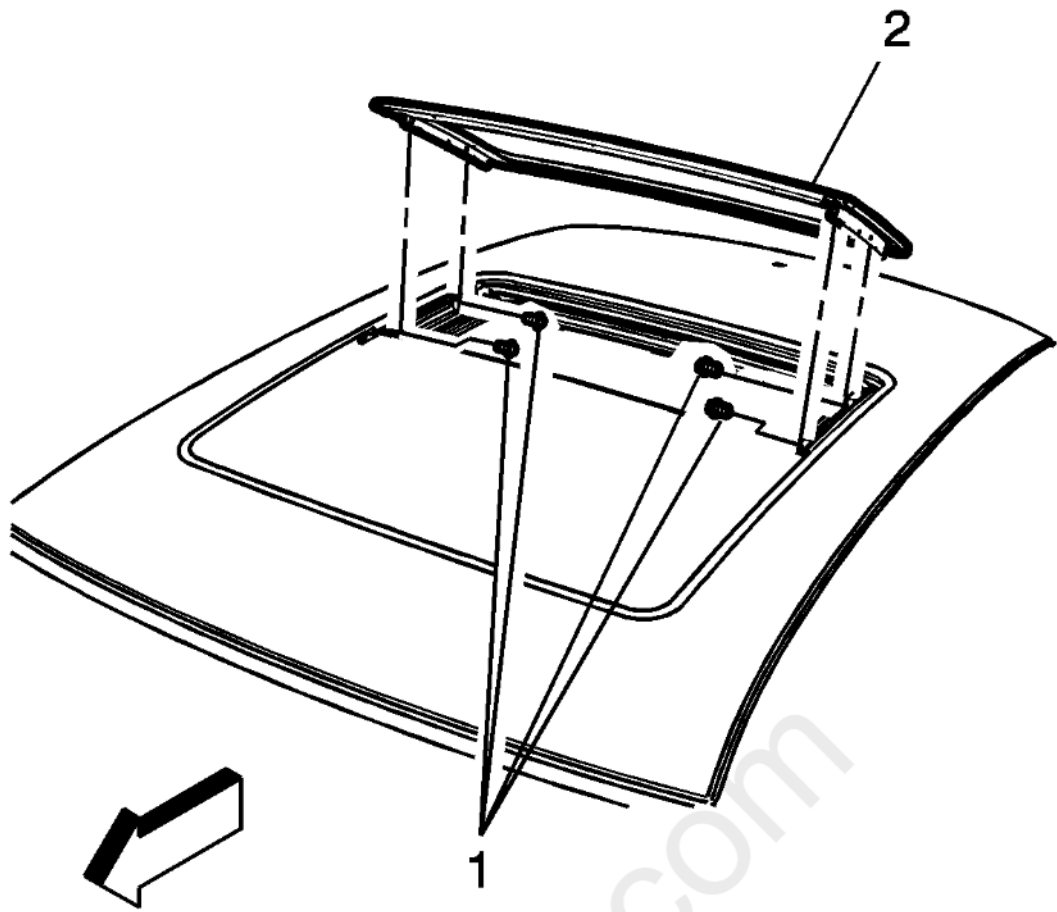
Inspect the gap between the window and roof. Refer to [Sunroof Window Height and Opening Fit Adjustment](#).

4. Close the sunroof.
5. Inspect sunroof for proper operation and water test to ensure no leaks.

## **SUNROOF WINDOW REPLACEMENT - REAR**

### **Removal Procedure**

1. Open the sunshade.
2. Place the sunroof window in the vent position.



**Fig. 24: Sunroof Window & Screws - Rear**  
Courtesy of GENERAL MOTORS COMPANY

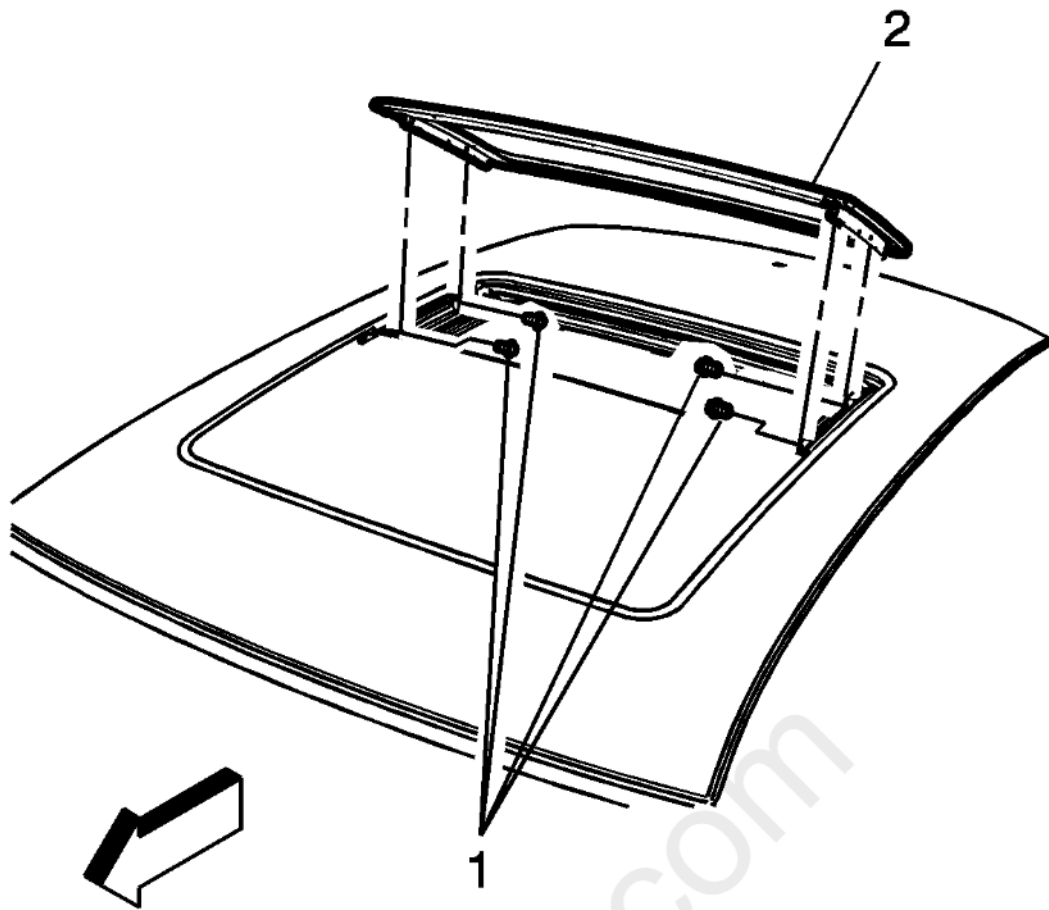
3. Remove the rear window (2).
  1. Push down on the inner seal/weatherstrip to access the screws.
  2. Remove the 4 screws (1).
4. Remove the rear window from the vehicle.

#### **Installation Procedure**

1. Align the side window brackets with the holes on left and right side of the frame.

**CAUTION:** Refer to **Fastener Caution** .

2. Install the rear sunroof window screws (1), two on left and right side, tighten to 4 N.m (35 lb in).



**Fig. 25: Sunroof Window & Screws - Rear**  
Courtesy of GENERAL MOTORS COMPANY

3. Close the sunroof.

Inspect the gap between the window and roof. Refer to [Sunroof Window Height and Opening Fit Adjustment](#).

4. Close the sunroof.

5. Inspect sunroof for proper operation and water test to ensure no leaks.

## DESCRIPTION AND OPERATION

### SUNROOF DESCRIPTION AND OPERATION (SPOILER SYSTEM)

The sunroof spoiler system consists of a moving glass panel and a 2nd fixed glass panel located just behind the moving glass panel. The moving glass component slides over the top of the fixed glass, and the roof panel. There is also a power roller sunshade which covers both glass panels. The electrical portion of the system controls the opening and closing of the sunroof glass and the power roller sunshade.

The electrical portion of the spoiler sunroof system consists of:

- Body control module (BCM)
- Sunroof glass control module
- Sunshade control module
- Sunroof control switch assembly
- Sunshade control switch assembly
- Local interconnected network (LIN-Bus)

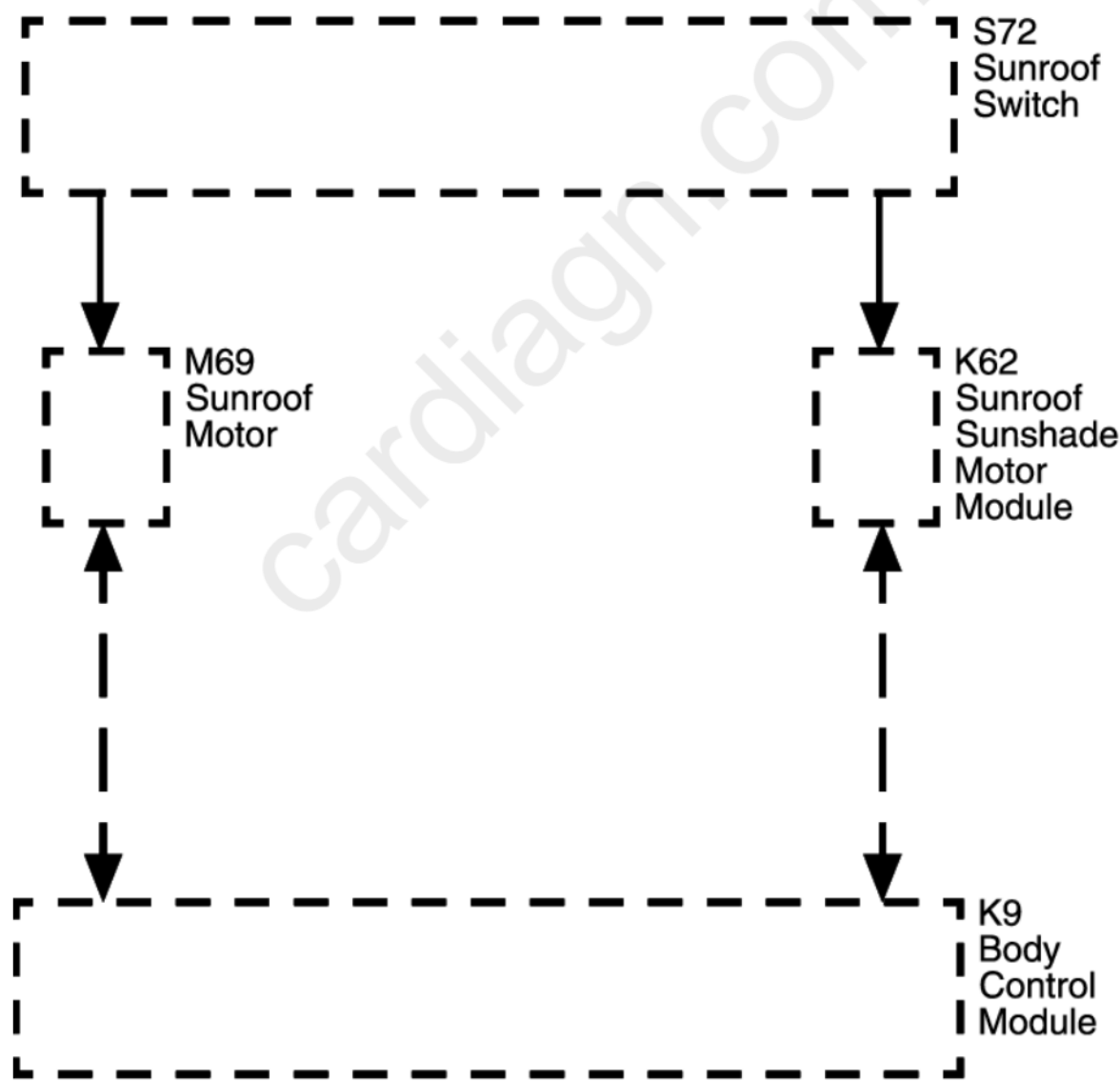
The sunroof electrical system uses a master/slave configuration utilizing a LIN-Bus based system for communication. The BCM is designated as the master, while the sunroof and sunshade control modules are configured as the slaves.

As the system master, the BCM uses the LIN-Bus communication bus to enable or disable sunroof and sunshade operation, communicate vehicle information to each controller, and request sunroof or sunshade movement. The sunroof/sunshade controllers provide system status and diagnostic information to the BCM for diagnostic reporting and operational purposes.

The sunroof glass and power sunshade are each 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. Each motor/controller is capable of controlling motion based on control switch activation and LIN-Bus message commands from the system master.

There are times when the sunshade and sunroof operation are dependent on each other (see below). This dependency is controlled by the BCM because even though the sunroof controller and the sunshade controller reside on the same LIN-Bus they do not communicate directly with each other.

The integrated motor/controller used for glass control and for power sunshade control are actually the same physical part. All the operational software required to perform the glass and sunshade functions are contained in the one part. The function performed is determined by the grounding scheme of two function select input/output pins while the operational calibrations are loaded over the LIN-Bus communication bus by the sunroof system master, the BCM.



**Fig. 26: Sunroof Block Diagram**  
Courtesy of GENERAL MOTORS COMPANY

| Callout | Component Name |
|---------|----------------|
|         |                |

| Callout | Component Name                    |
|---------|-----------------------------------|
| S72     | S72 Sunroof Switch                |
| M69     | M69 Sunroof Motor                 |
| K62     | K62 Sunroof Sunshade Motor Module |
| K9      | K9 Body Control Module            |

### Sunroof Glass and Sunshade Control Switches

The sunroof and sunshade control switches are connected directly to their respective controllers and provide positions for open, express open, off, close, and express 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 the analog to digital switch input. The control 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 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 or sunshade 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/sunshade 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/sunshade will try to continue closing until it detects a motor stall condition or the system is at one of its defined stops.

#### Motor Stall

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

#### Sunroof System Thermal Protection

The sunroof/sunshade controllers have a thermal protection algorithm to protect the sunroof/sunshade controls and motors from damage due to overheating conditions resulting from immoderately switch actuations. The thermal protection algorithm will cause any new sunroof/sunshade open commands to be ignored until the motors are 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/sunshade reversal shall be finished.

### Coordination between Sunshade and Sunroof

There is an interaction between the sunshade and sunroof operation. The system master (BCM) will command the sunshade to open to predefined positions based on the requested sunroof position. This interaction may also prohibit the sunshade from closing past these points depending on the sunroof position.

#### Opening

If the Sunroof is opened anywhere between the fully closed and vent position, the BCM will command the sunshade to a minimum open position provided that the sunshade is opened less than this amount at the time of the sunroof command. If the sunroof receives an Open or Express Open command taking the sunroof past the vent position, the BCM will command the sunshade to open approximately half-way if the sunshade is opened less than this amount at the time of the sunroof command. This position corresponds to a point behind the leading edge of a fully opened sunroof glass.

#### Closing

Only if the sunroof is fully closed will the sunshade be allowed to fully close with a normal close or express close command. If the sunroof is opened past the vent position, the sunshade will not be allowed

to close past the half way point mentioned above with either a normal close or express close command. If the sunroof is not fully closed but is open less than or at the vent position, the sunshade will not close past the minimum open position mentioned above with either a normal close or express close.

### **Sunroof Disabled with Sunshade Faults**

When there is interaction between the sunroof and sunshade the sunroof shall be disabled if the sunroof is fully closed and any of the following sunshade faults are reported:

- Motor fault
- Sensor fault
- Thermal protection is active
- Sunshade not normalized
- Sunshade not configured
- Application failed

### **Service Tool Commanded Open**

When a service tool commands the sunshade open, it results in the Sunshade going to half way point mentioned above or to the fully open depending on the calibration. If the half way point is calibrated on, this position is as far as the sunshade can be opened with the service tool. To go beyond this point a switch activation must be used.

### **Sunroof Operation**

#### **Open to Vent Position**

When the position of the sunroof is less than the defined vent position, activating the sunroof Open switch for less than 500 ms results in the sunroof moving until it reaches the vent position.

#### **Normal Open (Non-Express)**

When the sunroof switch is held in the Open position, the sunroof begins opening. As long as the switch is continuously held in the Open state the sunroof will not stop in the vent position.

#### **Sunroof Express Open**

When the sunroof control switch transitions to the Express Open state, the Sunroof will Express Open until the controller determines the Sunroof has reached the Comfort Stop position or the Fully Open position, or the switch transitions to another state after first returning to the Off position.

#### **Normal Close (Non-Express)**

When the sunroof switch is in the Close state, the sunroof will begin moving in the closed direction.

#### **Sunroof Express Close**

When the sunroof control switch transitions to the Express Close state, 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.

### **Sunshade Operation**

#### **Sunshade Normal Open (Non-Express)**

When the sunshade switch is held in the Open position, the sunshade begins opening.

#### **Sunshade Express Open**

When the sunshade control switch transitions to the Express Open state, the sunshade will express open until the controller determines the sunshade has reached the fully open position, or the switch transitions to another state after first returning to the Off position.

### **Sunshade Normal Close (Non-Express)**

When the sunshade switch is in the Close state, the sunshade will begin moving in the closed direction until the switch returns to the Off position, or there is a sunroof coordination operation active and it reaches one of the positions described above, or the controller determines the sunshade has reached its fully closed position.

### **Sunshade Express Close**

When the sunshade control switch transitions to the Express Close state, the sunshade will express close until the controller determines the sunshade has reached the fully closed position, there is a sunroof coordination operation active and it reaches one of the positions described below, or the switch transitions to another state after first returning to the Off position. The sunshade motion will cease if the switch transitions back to the Close or Express Close state after returning to the Off position first.

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