2010 ACCESSORIES & BODY, CAB

Sunroof - Camaro

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Air Outlet Screw	2 N.m	89 lb in
Sunroof Air Deflector Screw	4 N.m	35 lb in
Sunroof Motor/Actuator Bolts	5 N.m	44 lb in
Sunroof Air Deflector Screw	4 N.m	35 lb in
Sunroof Frame to Roof Bolts	10 N.m	89 lb in
Sunroof Window Screws	8.5 N.m	75 lb in

SCHEMATIC AND ROUTING DIAGRAMS

SUNROOF SCHEMATICS

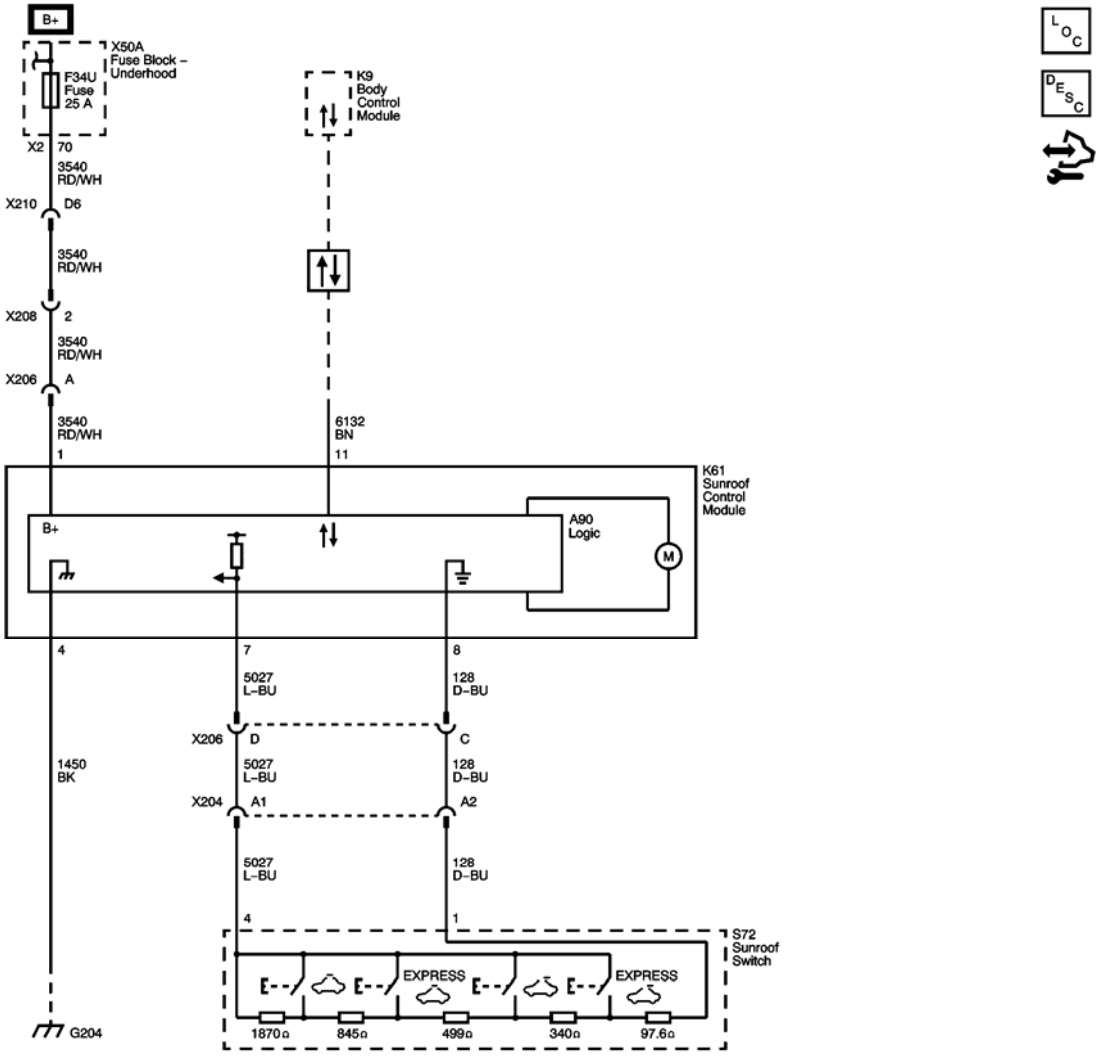

Fig. 1: Sunroof
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3664	B3664 02: Sunroof Position Select Switch High Signal Circuit Short to Ground B3664 05: Sunroof Position Select Switch High Signal Circuit High Voltage/Open B3664 59: Sunroof Position Select Switch High Signal Circuit Protection Time-Out

DTC B3697	B3697 00: Sunroof Actuator Malfunction B3697 39: Sunroof Actuator Internal Malfunction B3697 42: Sunroof Actuator Calibration Not Programmed B3697 4B: Sunroof Actuator Calibration Not Learned

DTC B3664

Diagnostic Instructions

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

DTC Descriptor

DTC 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 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, and 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 the LIN-Bus that the sunroof position select switch high signal circuit is shorted to ground.

B3664 05

The sunroof module has detected and reported via the LIN-Bus 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 LIN-Bus that the sunroof position select switch high signal 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 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

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: Because of the accessibility of the sunroof switch, perform the component testing before beginning the Circuit/System Testing.

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for less than 5 ohms between the low reference circuit terminal 1 and ground.
    - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool sunroof slide switch is short to battery.
    - If not the specified value, test the signal circuit terminal 4 for a short to ground. If the circuit tests normal, replace the K61 Sunroof Control Module.
4. Install a 5 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 1. Verify the scan tool sunroof slide switch is stuck.
    - If not the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the K61 Sunroof Control Module.
5. If all circuits test normal, 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 3.6-3.7 kohms between the switch terminals 1 and 4.
    - If not within the specified range, replace the S72 Sunroof Switch.
3. Test for 430-440 ohms between the signal terminal 1 and the low reference circuit terminal 4 while pressing the open switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
4. Test for 96-100 ohms between the signal terminal 1 and the low reference circuit terminal 4 while pressing the express open switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
5. Test for 1.7-1.8 kohms between the signal terminal 1 and the low reference circuit terminal 4 while pressing the close switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
6. Test for 930-940 ohms between the signal terminal 1 and the low reference circuit terminal 4 while pressing the express close switch.
    - If not within the specified range, replace the S72 Sunroof Switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Sunroof Opening Position Switch Replacement**
- **Sunroof Actuator Motor Replacement**
- **Control Module References** for sunroof motor/actuator replacement, setup, and programming.

DTC B3697

Diagnostic Instructions

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

DTC Descriptor

DTC 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 LIN-Bus 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 the LIN-Bus that the sunroof actuator has a malfunction.

B3697 39

The sunroof module has detected and reported via the LIN-Bus that the sunroof actuator has a internal malfunction.

B3697 42

The sunroof module has detected and reported via the LIN-Bus that the sunroof actuator is not programmed.

B3697 4B

The sunroof module has detected and reported via the LIN-Bus 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

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify that DTC B3697 42 or DTC B3697 4B is not set.
   - If the DTC is set, program or calibrate the K61 Sunroof Control Module. If the DTC resets, replace the K61 Sunroof Control Module.
2. Replace the K61 Sunroof Control Module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Sunroof Actuator Motor Replacement**
- **Control Module References** for sunroof motor/actuator replacement, setup, and programming.

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**.

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

Refer to **Power Sunroof Malfunction**.

POWER SUNROOF MALFUNCTION

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	1	1	-	-
Sunroof Switch Close Signal	1	1	1	-
Sunroof Switch Open Signal	1	1	1	-
Sunroof Module Ground	-	1	-	-
1. Power Sunroof Malfunction				

Circuit/System Description

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

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

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Sunroof Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

Ignition ON, press the sunroof switch to the open and close positions. The sunroof should open and close when changing between the commanded states.

Circuit/System Testing

NOTE: Because of the accessibility of the switches, perform the switch component testing before beginning the circuit/system testing.

1. Ignition OFF, disconnect the harness connector at the K61 Sunroof Control Module.
2. Test for less than 5 ohms between the ground circuit terminal 4 and ground.
    - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.
    - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the B+ circuit fuse is open, determine if the K61 Sunroof Control Module is causing the fuse to open. Replace the K61 Sunroof Control Module.
4. Ignition ON, verify that a test lamp does not illuminate between the circuit terminals listed below and ground:
    - Terminal 7
    - Terminal 8
    - If the test lamp does illuminate, test the appropriate circuit for a short to voltage.
5. Ignition OFF, verify that a test lamp does not illuminate between the circuit terminals listed below and B+:
    - Terminal 7
    - Terminal 8
    - If the test lamp does illuminate, test the appropriate circuit for a short to ground.
6. Disconnect the harness connector at the K9 Body Control Module.
7. Test for less than 5 ohms between the signal circuit terminal 11 at the K61 Sunroof Control Module and signal circuit terminal 16 X6 at the K9 Body Control Module.
    - If not the specified value, test the signal circuit for an open/high resistance, short to ground or a short to voltage.
8. Test for infinite resistance between signal circuit terminal 11 at the K61 Sunroof Control Module and

ground.
    - If not the specified value, test the signal circuit for a short to ground.
9. If all circuits test normal, test or replace the K9 Body Control Module.
10. Connect the harness connector at the K9 Body Control Module.
11. Disconnect the harness connector at the S72 Sunroof Switch.
12. Test for less than 5 ohms between the circuit terminals listed below:
    - S72 Sunroof Switch terminal 1 and K61 Sunroof Control Module terminal 8
    - S72 Sunroof Switch terminal 4 and K61 Sunroof Control Module terminal 7
    - If greater than the specified value, test the appropriate circuit for an open/high resistance.
13. If all circuits test normal, test or replace the K61 Sunroof Control Module.

Component Testing

Sunroof Switch

Static Test

1. Ignition OFF, disconnect the harness connector at the S72 Sunroof Switch.
2. Test for 3.5-3.7 kohms between the signal terminal 4 and the low reference circuit terminal 1.
    - If not within the specified range, replace the S72 Sunroof Switch.
3. Test for 430-440 ohms between the signal terminal 4 and the low reference circuit terminal 1 while pressing the open switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
4. Test for 96-100 ohms between the signal terminal 4 and the low reference circuit terminal 1 while pressing the express open switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
5. Test for 1.7-1.8 kohms between the signal terminal 4 and the low reference circuit terminal 1 while pressing the close switch.
    - If not within the specified range, replace the S72 Sunroof Switch.
6. Test for 930-940 ohms between the signal terminal 4 and the low reference circuit terminal 1 while pressing the express close switch.
    - If not within the specified range, replace the S72 Sunroof Switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Sunroof Opening Position Switch Replacement**
- **Sunroof Actuator Motor Replacement**
- **Control Module References** for sunroof motor/actuator replacement, setup, and programming

REPAIR INSTRUCTIONS

SUNROOF AIR DEFLECTOR REPLACEMENT

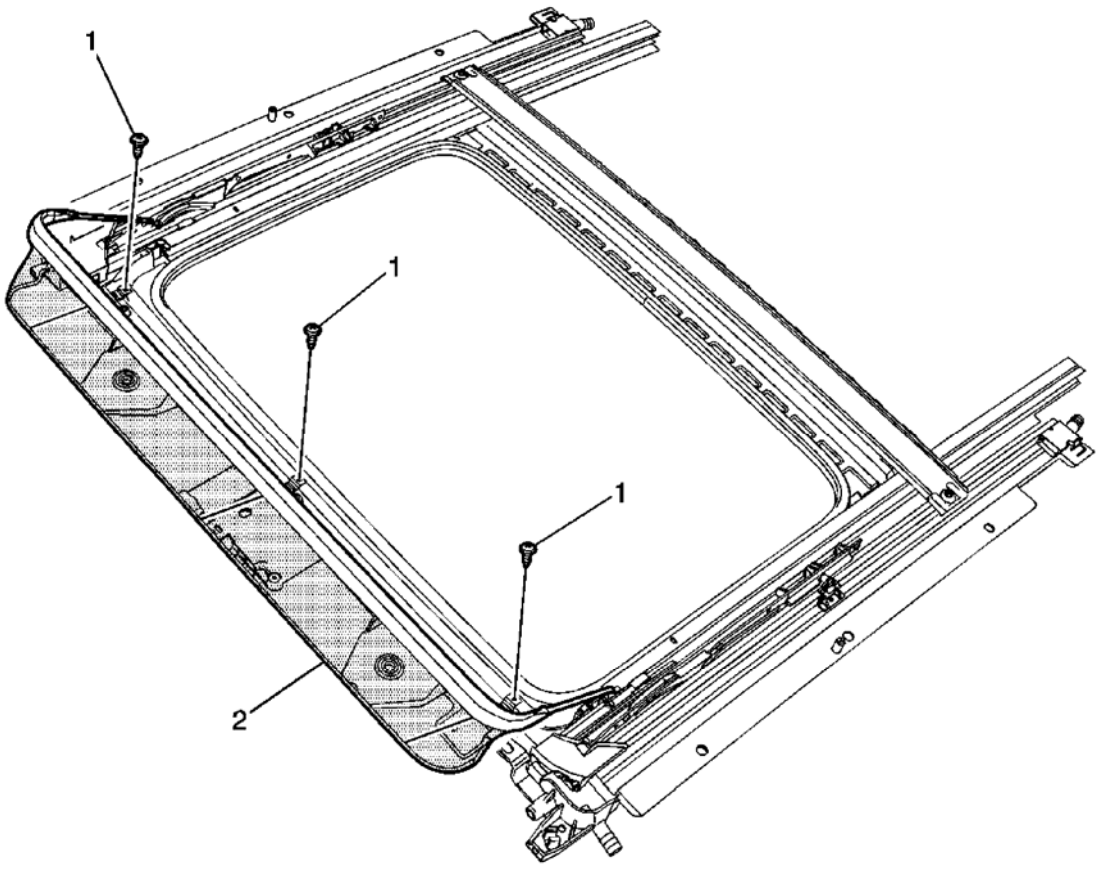

Fig. 2: Sunroof Air Deflector
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Sunroof Air Defector Retainers (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Procedures** 1. Open the sunroof window to the fully open position. 2. Release the left and right side of the sunroof air deflector side tension arms from the frame. 3. Use care not to damage the sunroof air deflector screen.

	Tighten: 4 N.m (35 lb in).
2	Sunroof Air Deflector

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 center of the pillar between the door hinges. The front hoses are installed in a rubber grommet and retained by clips.
2. The rear drain hoses are routed around the trunk opening just below the back glass. In some vehicle the drain hoses are routed out through the metal roof slots and routed to the lower wheelhouse to drain out of the vehicle. The rear hoses are installed in a rubber grommet and retained by clips.

Plugged Drain Hose

If a waterleak has occurred check for a plugged drain hose at each corner of drainage system.

1. Open the sunroof window front.
2. 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.

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

3. Use compressed air, 241 kPa (35 psi) or less to blow out any drain hose that is plugged.
4. Test the system again.
5. 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**.
6. 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.

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** .
3. Connect any disconnected hoses and replace the tie strap if necessary.
4. Ensure that the rear drain hoses are properly routed in the metal roof slot and taped in place.

SUNROOF FRAME REPLACEMENT

Removal Procedure

NOTE: A new sunroof frame does not include the sunroof window or the sunshade as components. You must install the old sunroof window and sunshade to the new sunroof frame.

1. Remove the sunshade panel. Refer to **Sunroof Sunshade Replacement**.
2. Remove the sunroof window. Refer to **Sunroof Window Replacement**.
3. It is only necessary to lower the headliner. Only do the steps in headliner replacement that will lower the headliner enough to gain access to the part. Refer to **Headlining Trim Panel Replacement** .
4. Disconnect the electrical connector to the sunroof actuator/motor.
5. Disconnect the electrical connector from the sunroof frame.

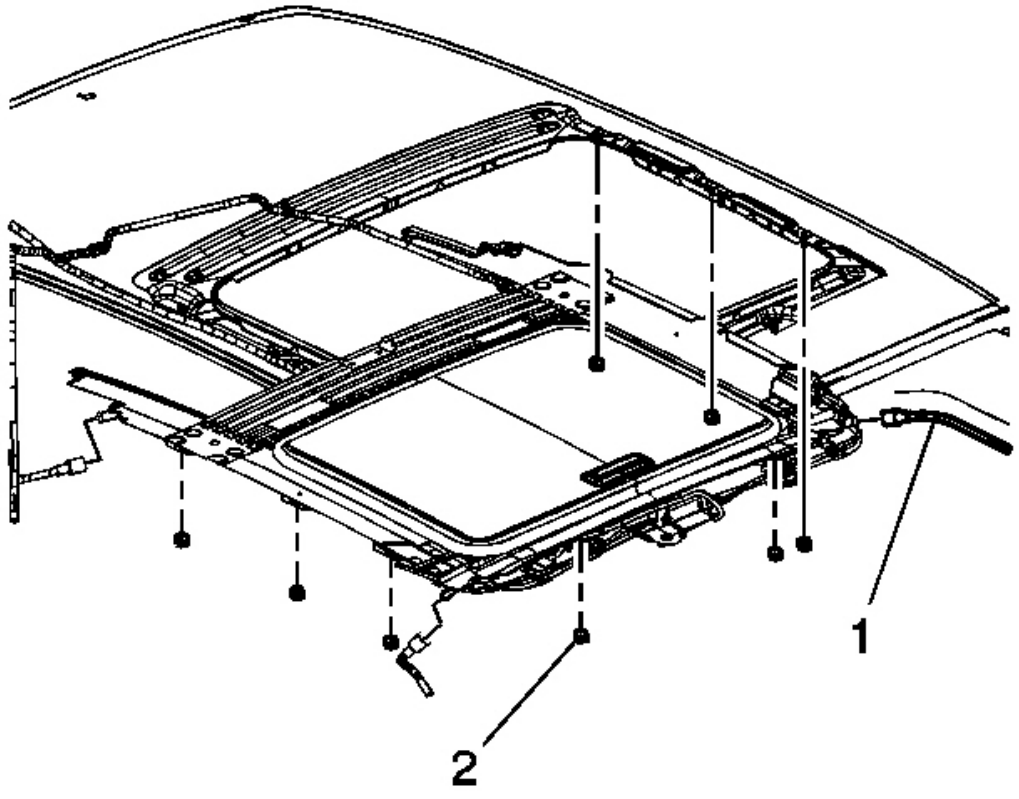

Fig. 3: Sunroof Module Assembly
Courtesy of GENERAL MOTORS CORP.

6. Disconnect the front and rear drain hoses (1) from the drain spouts on the sunroof frame. Refer to **Sunroof Housing Front Drain Hose Replacement** and **Sunroof Housing Rear Drain Hose Replacement**.

NOTE: Remove the 2 center bolts last in order to help support the sunroof frame to the roof ring.

7. Remove the sunroof frame bolts (2) from the roof.
8. Remove the center bolts from the sunroof frame.
9. With the aid of an assistant, lower and remove the sunroof frame out through the passenger side door.

Installation Procedure

1. Transfer all the necessary components to the new module.

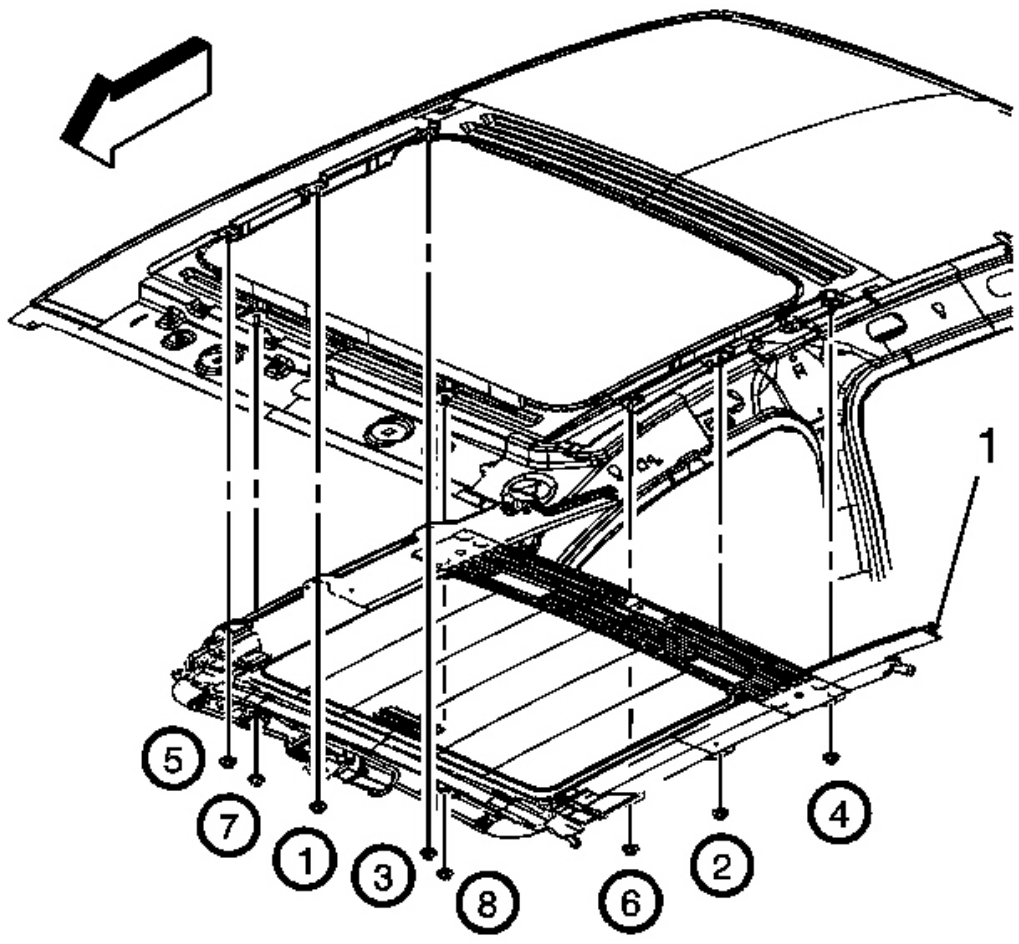

Fig. 4: Sunroof Module To Roof Nut Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

2. With the aid of an assistant, position the new sunroof frame to the studs located on the roof ring.
3. Install the center sunroof frame to roof bolts (1, 2) and tighten by hand.

CAUTION: Refer to Fastener Caution .

4. Install the remaining sunroof frame (1) bolts to the frame in sequence (3-8) and tighten to 10 N.m (89 lb in).

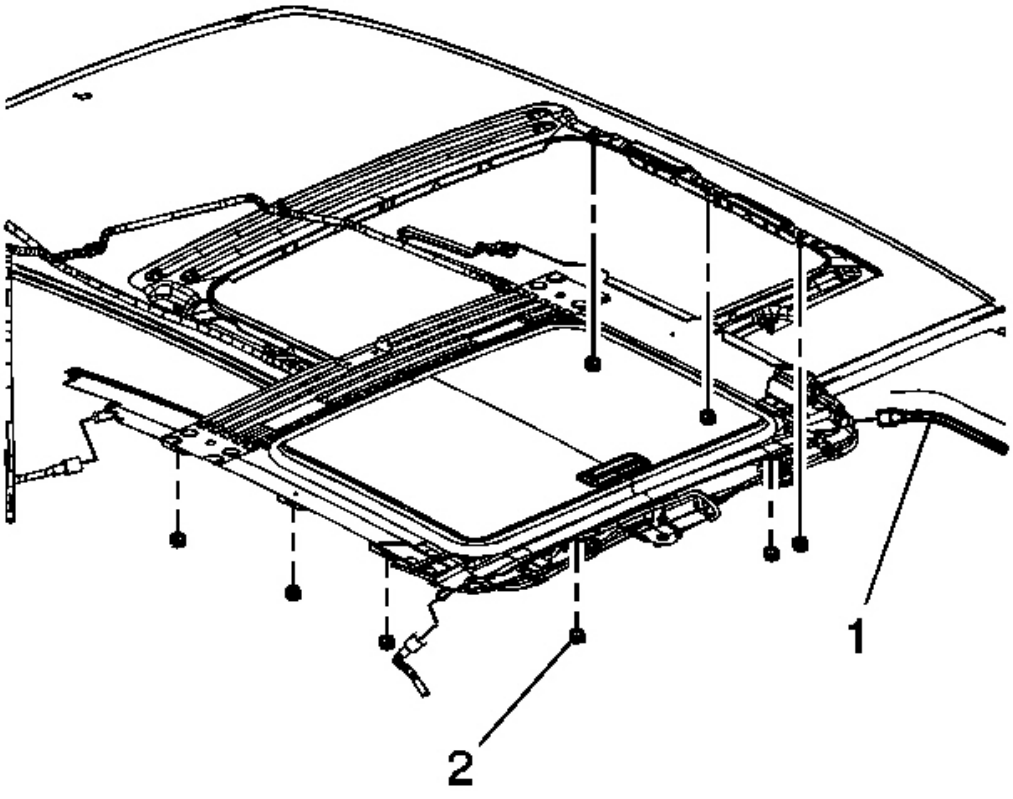

Fig. 5: Sunroof Module Assembly
Courtesy of GENERAL MOTORS CORP.

5. Connect the front and rear drain hoses (1) to the drain spouts on the sunroof frame. Refer to **Sunroof Housing Front Drain Hose Replacement** and **Sunroof Housing Rear Drain Hose Replacement**.
6. Install the sunroof window to the new sunroof frame. Refer to **Sunroof Window Replacement**.
7. Install the sunshade panel to the new sunroof frame. Refer to **Sunroof Sunshade Replacement**.
8. Connect the electrical connector to the sunroof actuator/motor.
9. Secure the harness to the sunroof frame.
10. Verify the proper operation of the sunroof before securing the headliner. Refer to **Sunroof Motor/Actuator Initialization/Teach Process (New Motor)** or **Sunroof Motor/Actuator Initialization/Teach Process (Existing Motor)**.
11. Install the headliner. Refer to **Headlining Trim Panel Replacement** .

SUNROOF HOUSING FRONT DRAIN HOSE REPLACEMENT

Removal Procedure

1. It is only necessary to lower the headliner. Only do those steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to **Headlining Trim Panel Replacement** .

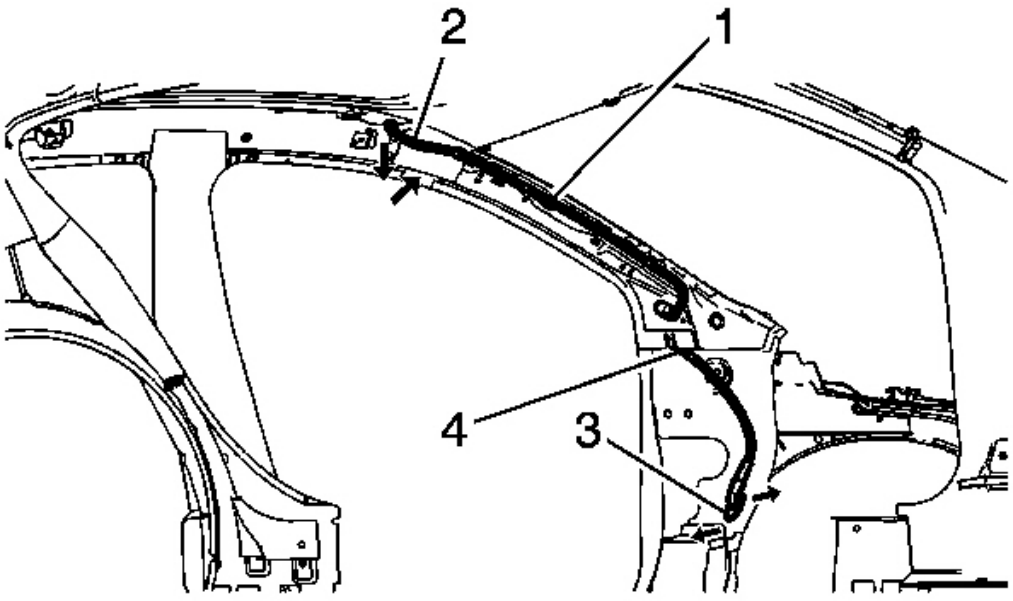

Fig. 6: Front Drain Hose Components
Courtesy of GENERAL MOTORS CORP.

2. Remove the front drain hose (1) from the sunroof frame.
3. Disengage the sunroof drain hose from the attachment points (2) on the windshield pillar.
4. Remove the body hinge pillar trim panel. Refer to **Body Hinge Pillar Trim Panel Replacement** .
5. Pull the front drain hose grommet (3) out of the front lower hinge pillar.
6. Tie a 3-foot length of string onto the lower end of the front drain hose.
7. Remove the hose through the top of the I/P. Do NOT pull the string all of the way out.
8. Remove the left and right air outlet duct and screw.
9. Disconnect the string from the hose.

Installation Procedure

1. Attach the string used in the removal procedure to the lower end of the drain hose.
2. Pulling the hose in place with the string, route the front drain hose down the windshield post and into the front lower hinge pillar.

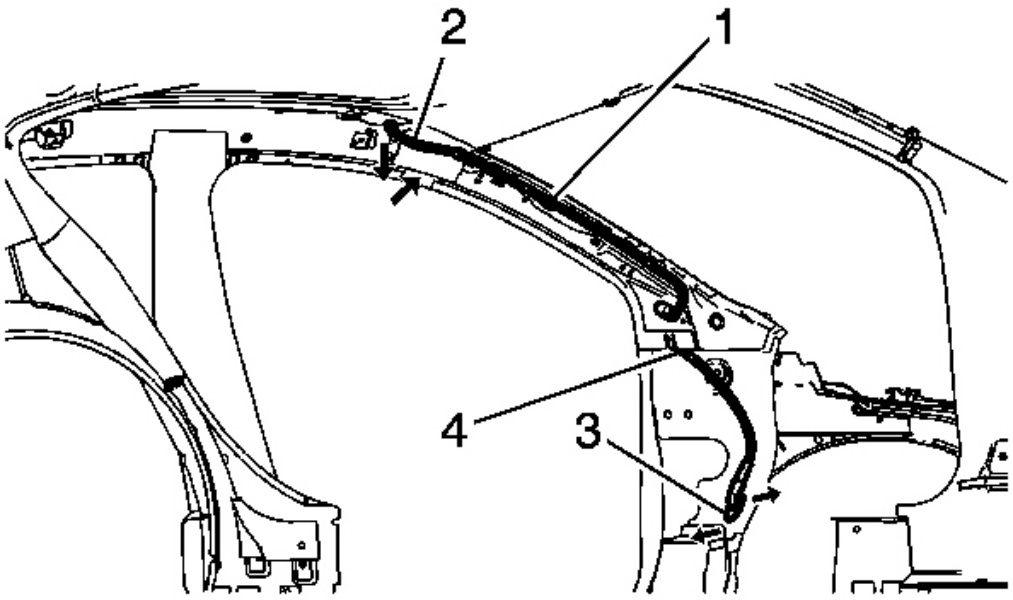

Fig. 7: Front Drain Hose Components
Courtesy of GENERAL MOTORS CORP.

3. Push the drain hose into the hole in the front lower hinge pillar. Insert approximately 25 mm (1 in) of drain hose into the hole.
4. Connect the drain hose (1) to the sunroof frame.
5. Connect the front drain hose to the attachments points (2) on the windshield pillar.
6. Install the front drain hose grommet (3) in the front lower hinge pillar.
7. Install the body hinge pillar trim panel. Refer to **Body Hinge Pillar Trim Panel Replacement** .
8. Install the left and right air outlet duct.

CAUTION: Refer to Fastener Caution .

9. Install the outlet screw. Tighten the door striker bolts to 2 N.m (89 lb in).
10. Install the carpet retainer.
11. Install the headliner. Refer to **Headlining Trim Panel Replacement** .

SUNROOF HOUSING REAR DRAIN HOSE REPLACEMENT

Removal Procedure

1. It is only necessary to lower the headliner. Only do those steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to **Headlining Trim Panel Replacement** .

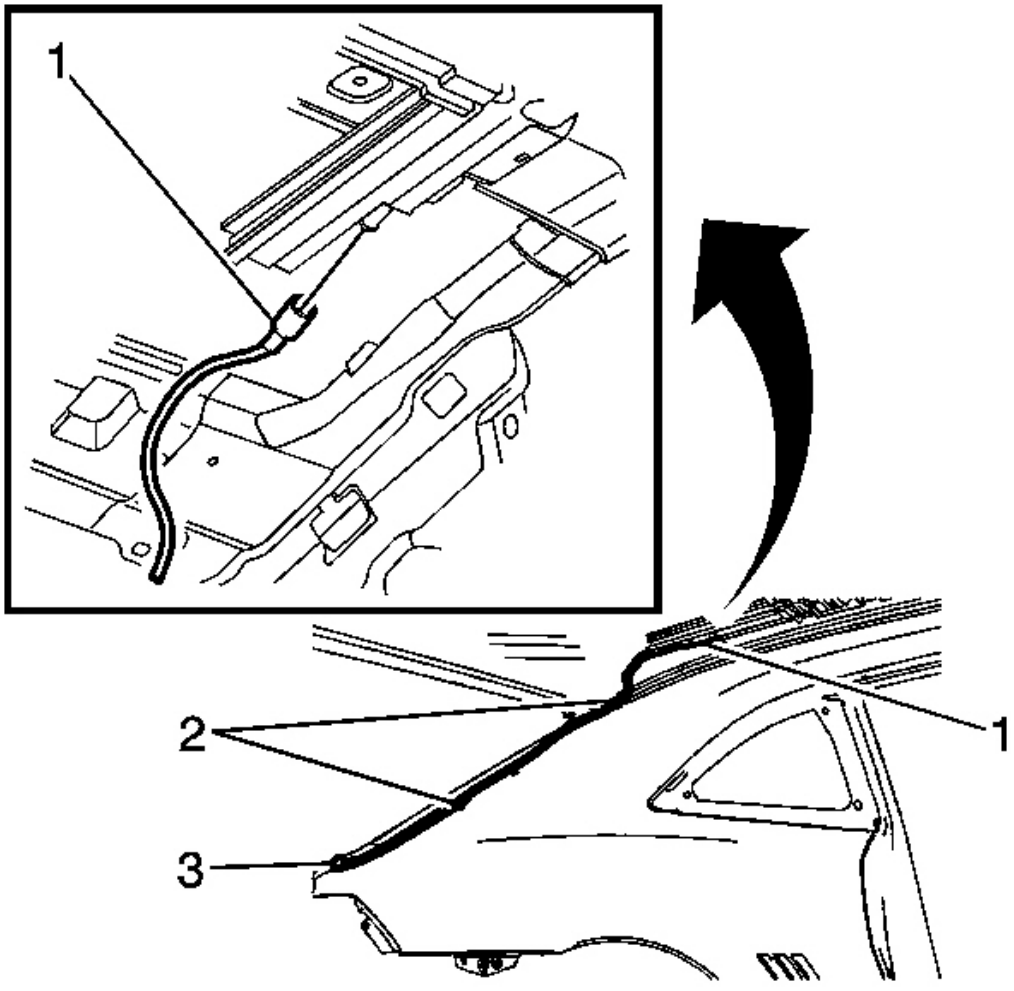

Fig. 8: Rear Drain Hose Components
Courtesy of GENERAL MOTORS CORP.

2. Remove the rear drain hose from the sunroof frame (1).
3. Disengage the sunroof drain hose from the attachment points (2) on the rear body side quarter panel.
4. Remove the rear window panel trim. Refer to **Rear Window Panel Trim Replacement** .
5. Pull the sunroof drain hose and grommet (3) out of the rear compartment panel.

6. Pull the rear drain hose out of the rear compartment. Remove the rear drain hose.

Installation Procedure

1. Route the rear drain hose down the rear body side quarter panel.

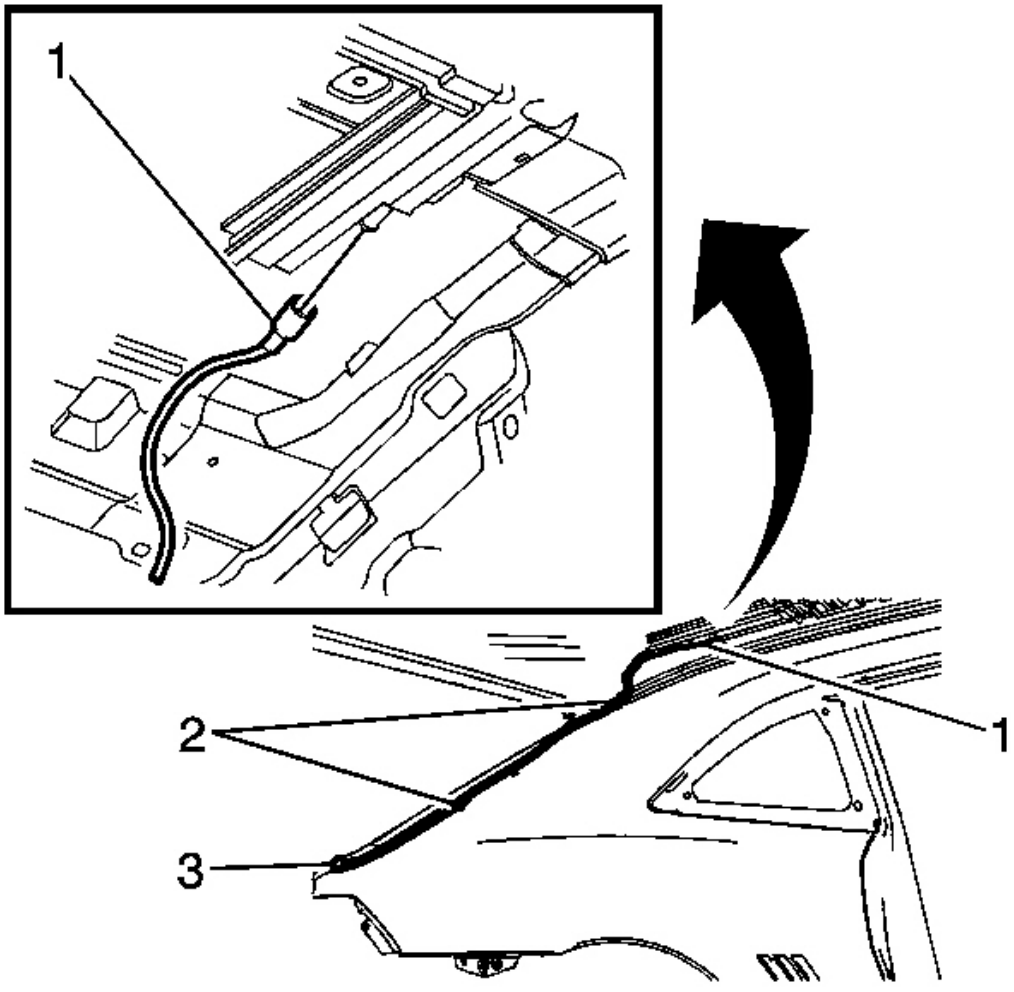

Fig. 9: Rear Drain Hose Components
Courtesy of GENERAL MOTORS CORP.

2. Connect the rear drain hose to the sunroof frame (1).
3. Connect the rear drain hose to the attachments points (2) on the rear body side quarter panel.
4. Install the rear window panel trim. Refer to **Rear Window Panel Trim Replacement** .

5. Push the rear drain hose and grommet (3) into the hole in the rear compartment panel until the grommet is fully engaged.
6. Install the rear window panel trim. Refer to **Rear Window Panel Trim Replacement** .
7. Install the rear compartment trim panel. Refer to **Rear Compartment Side Trim Panel Replacement** .
8. Install the headliner. Refer to **Headlining Trim Panel Replacement** .

SUNROOF OPENING TRIM FINISH LACE REPLACEMENT

Removal Procedure

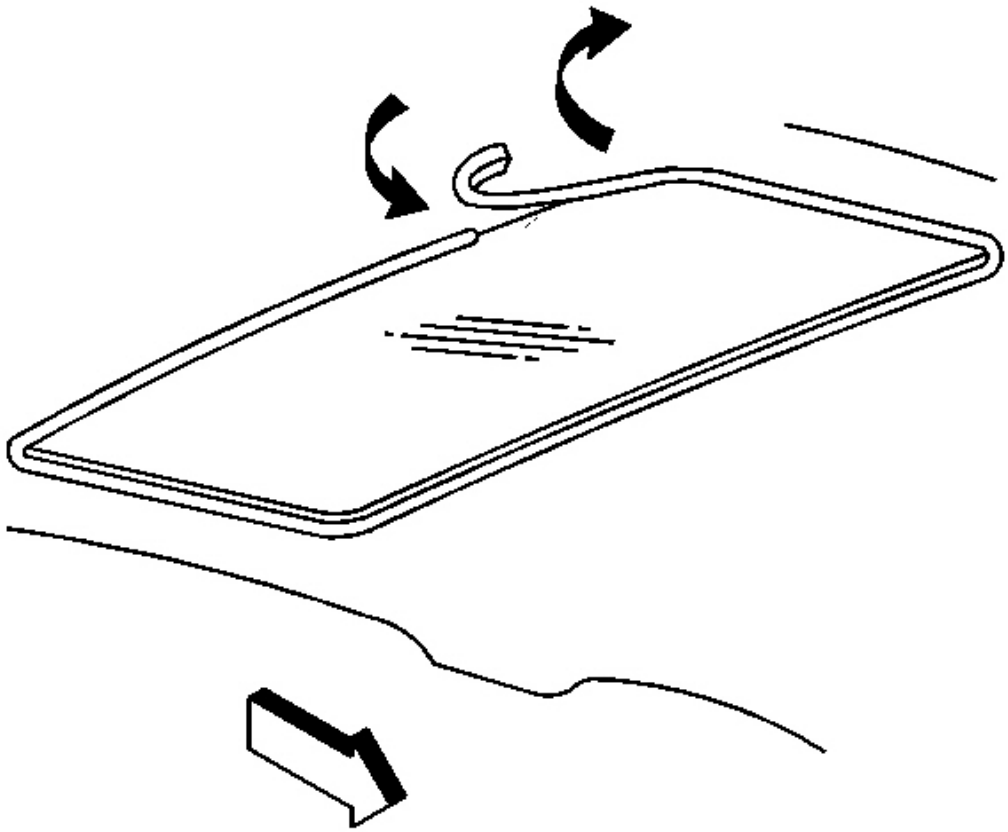

Fig. 10: View Of Sunroof Finishing Lace
Courtesy of GENERAL MOTORS CORP.

1. Beginning at the joint on the rear center of the sunroof opening, pull the sunroof finishing lace from the sunroof window track assembly.

2. Remove the sunroof finishing lace from the track assembly.

Installation Procedure

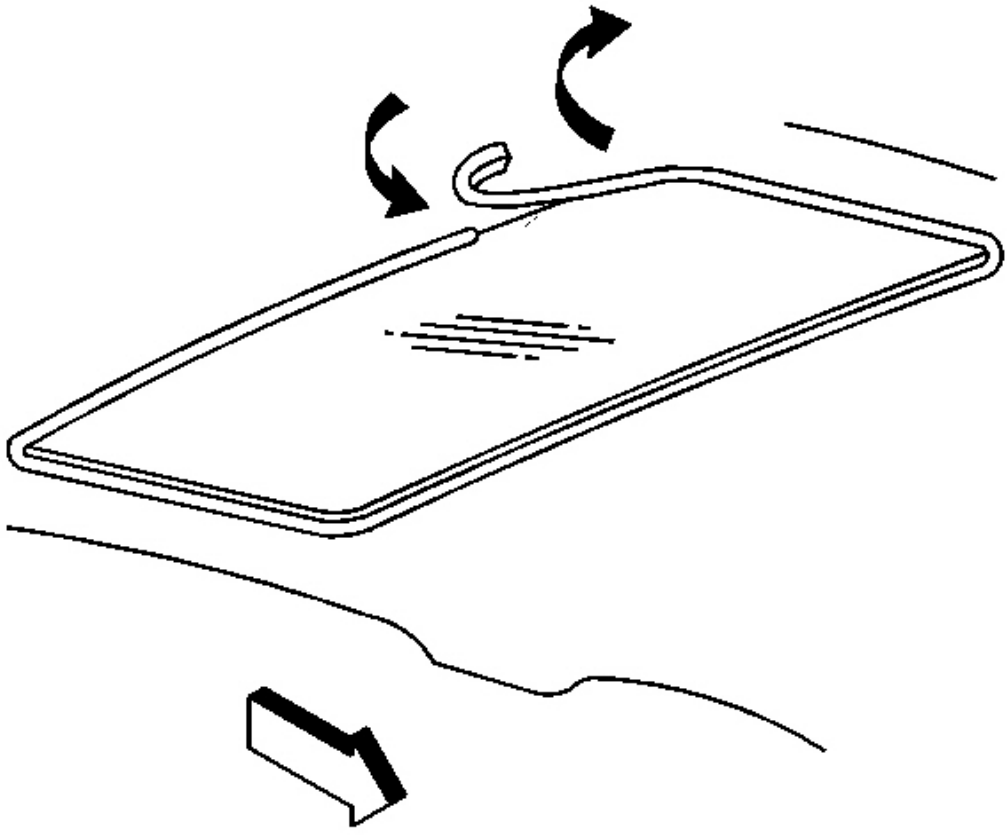

Fig. 11: View Of Sunroof Finishing Lace
Courtesy of GENERAL MOTORS CORP.

1. Position the end of the sunroof finishing lace at the center of the rear center of the sunroof opening.

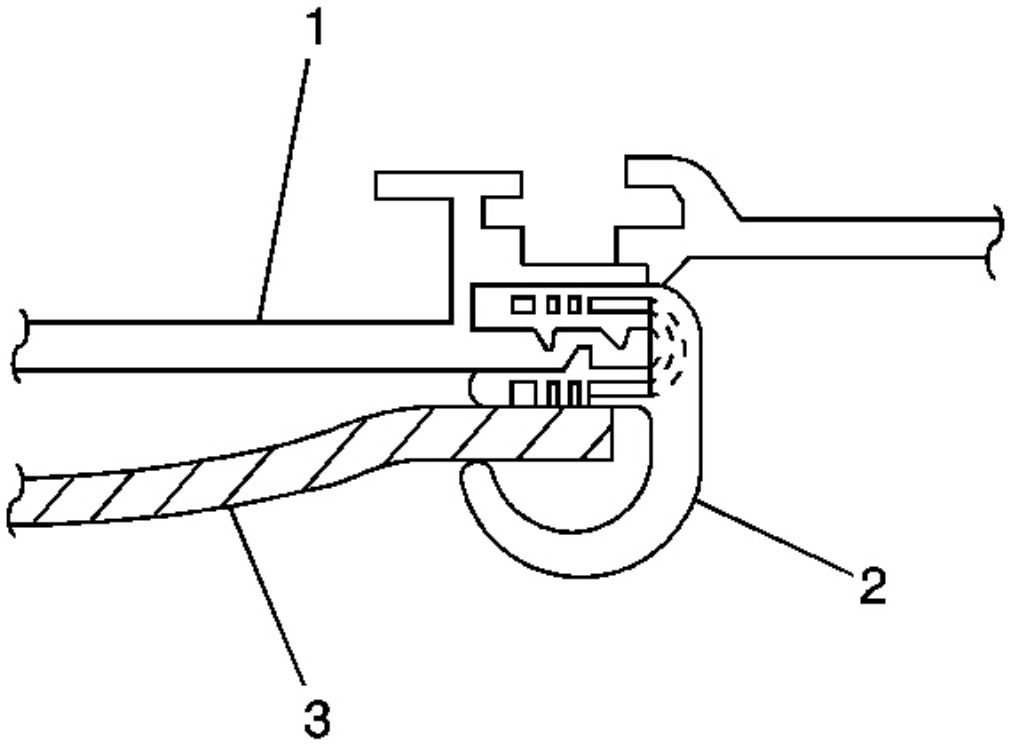

Fig. 12: Pushing Finishing Lace Onto Track Assembly Flange
Courtesy of GENERAL MOTORS CORP.

2. Push the finishing lace (2) onto the track assembly flange (1) until fully seated around the sunroof opening.
3. Pull the finishing lace draw cord toward the sunroof opening. Remove the cord from the periphery of the opening.
4. Ensure that the finishing lace (2) is properly seated over the outer surface of the headliner (3).

SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS (NEW MOTOR)

Perform the Initialization/Teach Process any time a new sunroof motor actuator is installed in the vehicle.

1. Ensure that the electrical harness on the headliner is connected to the sunroof motor.
2. Put the ignition in the RUN position.
3. Re-initialization (Normalization), press "Manual Close Switch" until the sunroof window reaches the Close Position or stops moving.
4. Release the switch.

5. Press "Manual Close Switch" for more than 10 seconds until the sunroof window starts and reaches the hard stop.
6. Verify the operation of the sunroof.

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

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

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

SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS (EXISTING MOTOR)

Perform the Initialization/Teach Process any time the sunroof motor/actuator is removed from the sunroof.

1. Ensure that the electrical harness on the headliner is connected to the sunroof motor.
2. Re-initialization (Normalization), press "Manual Close Switch" until the sunroof reaches the Close Position or stops moving.
3. Release the switch.
4. Press "Manual Close Switch" for more then 10 seconds or until the sunroof window starts and reaches the hard stop.
5. Verify the operation of the sunroof.

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

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

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

SUNROOF ACTUATOR MOTOR REPLACEMENT

Removal Procedure

1. It is only necessary to lower the headliner. Only do those steps in the headliner replacement procedure that will lower the headliner enough to gain access to the part. Refer to **Headlining Trim Panel**

Replacement .

NOTE: If the sunroof window is partially closed, remove the actuator/motor first before moving the sunroof window forward to the close position.

2. Disconnect the actuator/motor harness from the sunroof frame.
3. Disconnect the electrical connector from the sunroof actuator/motor.

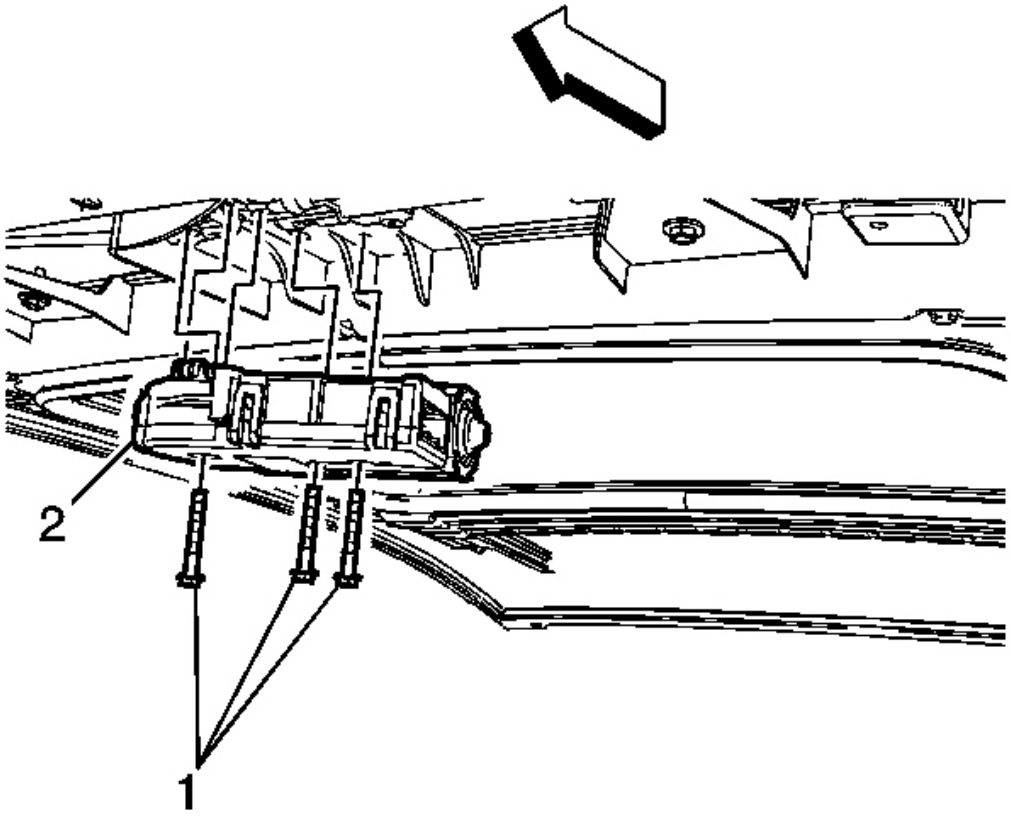

Fig. 13: Sunroof Actuator/Motor & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the sunroof actuator/motor bolts (1) from the sunroof frame.
5. Remove the sunroof actuator/motor (2) from the sunroof frame.

Installation Procedure

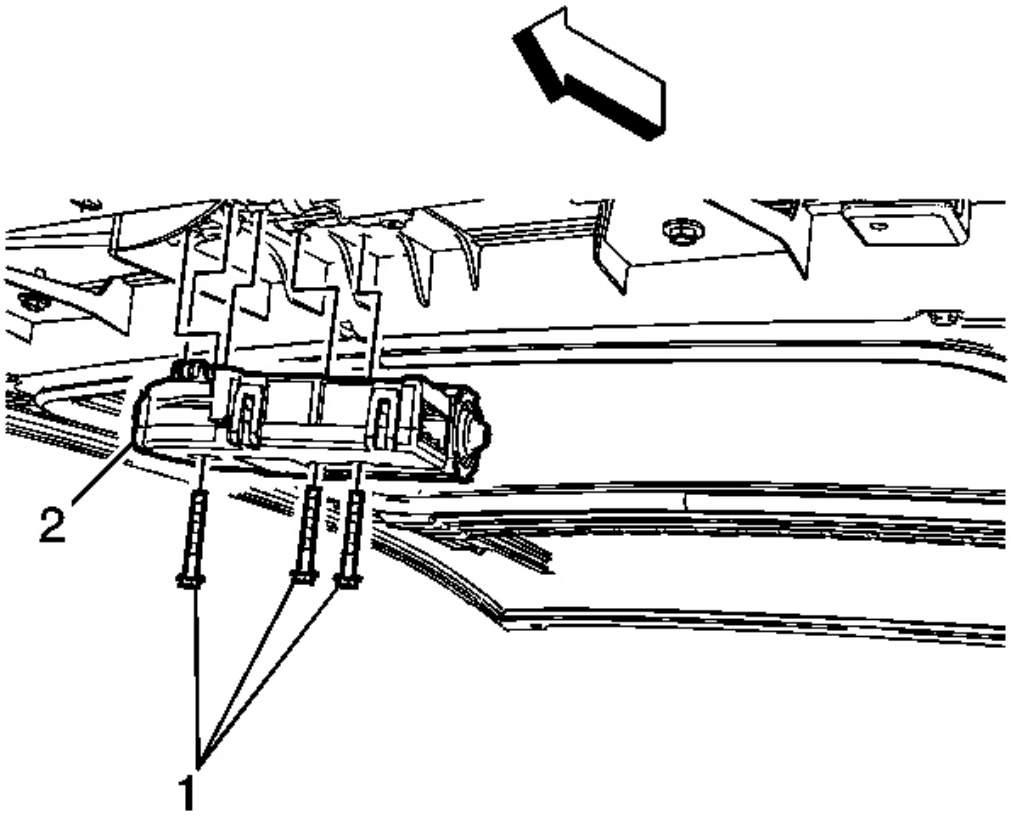

Fig. 14: Sunroof Actuator/Motor & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the sunroof actuator/motor (2) to the sunroof frame.

CAUTION: Refer to Fastener Caution .

2. Install the sunroof actuator/motor bolts (1) and tighten to 5 N.m (44 lb in).
3. Connect the electrical connector to the sunroof actuator/motor.
4. Secure the electrical harness to the sunroof frame.
5. Ensure the motor/actuator initialization teach process has been done. Refer to **Sunroof Motor/Actuator Initialization/Teach Process (New Motor)** or **Sunroof Motor/Actuator Initialization/Teach Process (Existing Motor)**.
6. Verify the proper operation of the sunroof before securing the headliner.

7. Install the headliner. Refer to **Headlining Trim Panel Replacement** .

SUNROOF SUNSHADE REPLACEMENT

Removal Procedure

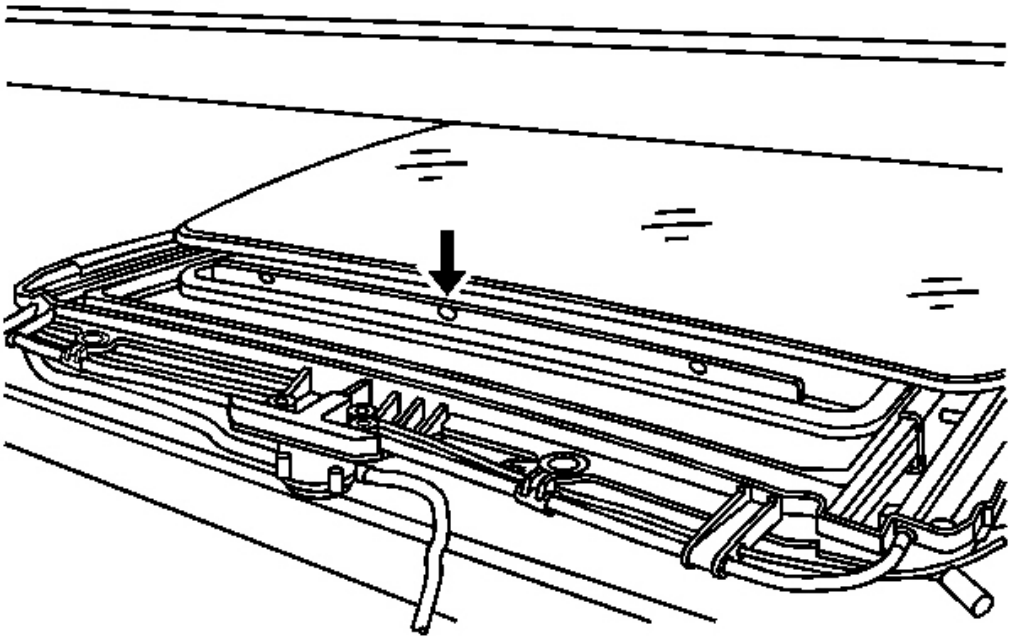

Fig. 15: Locating Sunshade
Courtesy of GENERAL MOTORS CORP.

1. Cycle the sunroof window to the partially open position.
2. Pull downward on the sunshade. Cycle the sunroof to full open position. Disengage the sunshade from the sunroof glass panel.

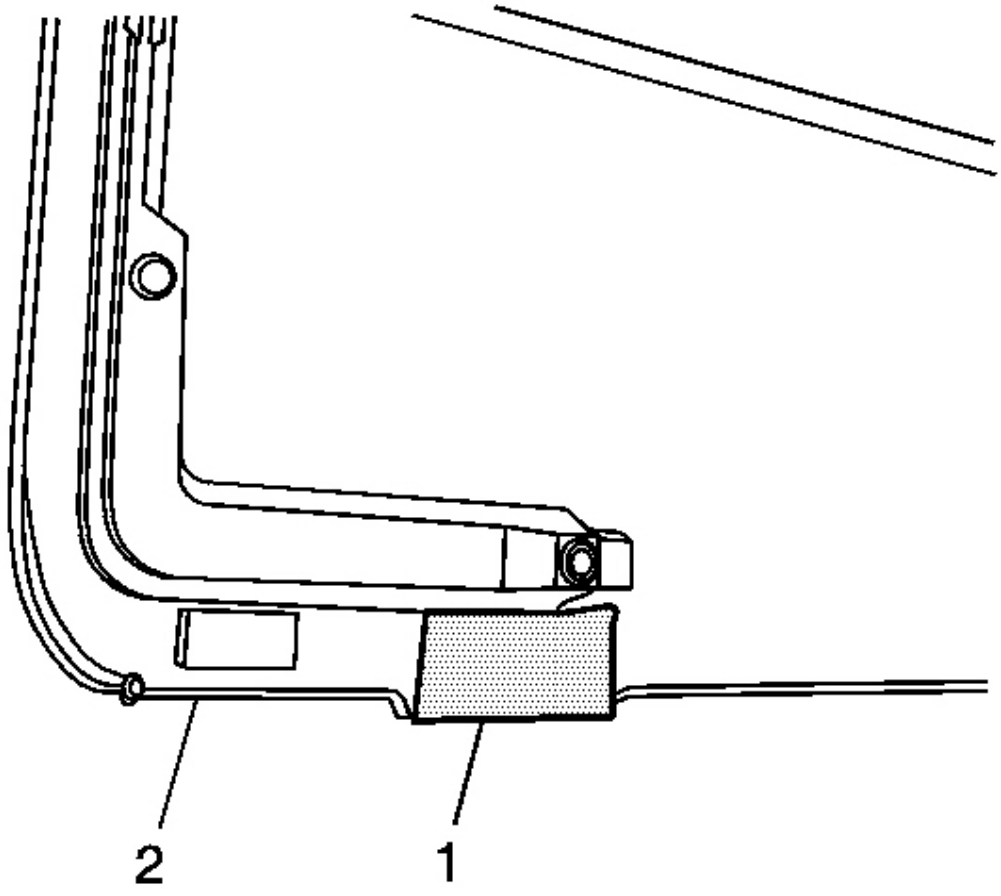

Fig. 16: Identifying Front Edge Of Sunshade Panel Slider Pad
Courtesy of GENERAL MOTORS CORP.

3. Depress the panel (2) to one side of the track.
4. Carefully arch the sunshade upward at the forward center edge.
5. Carefully lift the front edge (1) of the sunshade upward out of the track.

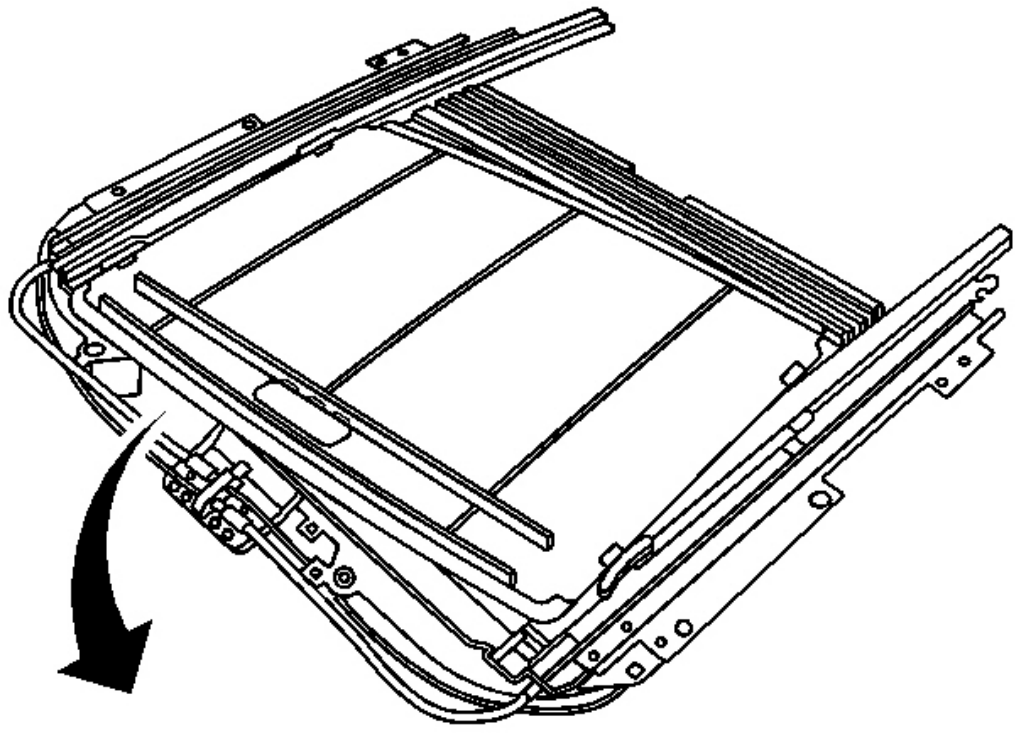

Fig. 17: View Of Sunshade & Track Assembly
Courtesy of GENERAL MOTORS CORP.

6. Slightly rotate the sunshade panel in order to remove the panel from the track.
7. Carefully remove the sunshade panel upward from the sunroof frame.

Installation Procedure

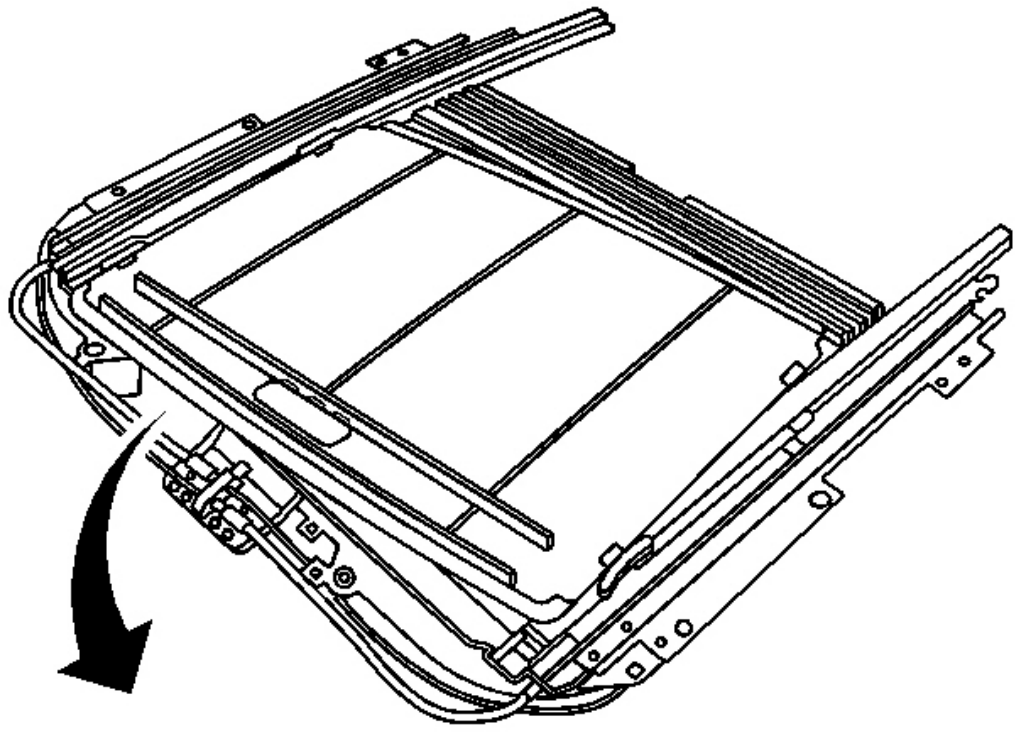

Fig. 18: View Of Sunshade & Track Assembly
Courtesy of GENERAL MOTORS CORP.

1. Position rear edge of the sunshade panel to the track.
2. Ensure that the slider pad at the rear is positioned into the track.
3. Depress the rear slider pad on the opposite side of the sunshade panel and release it into the track.

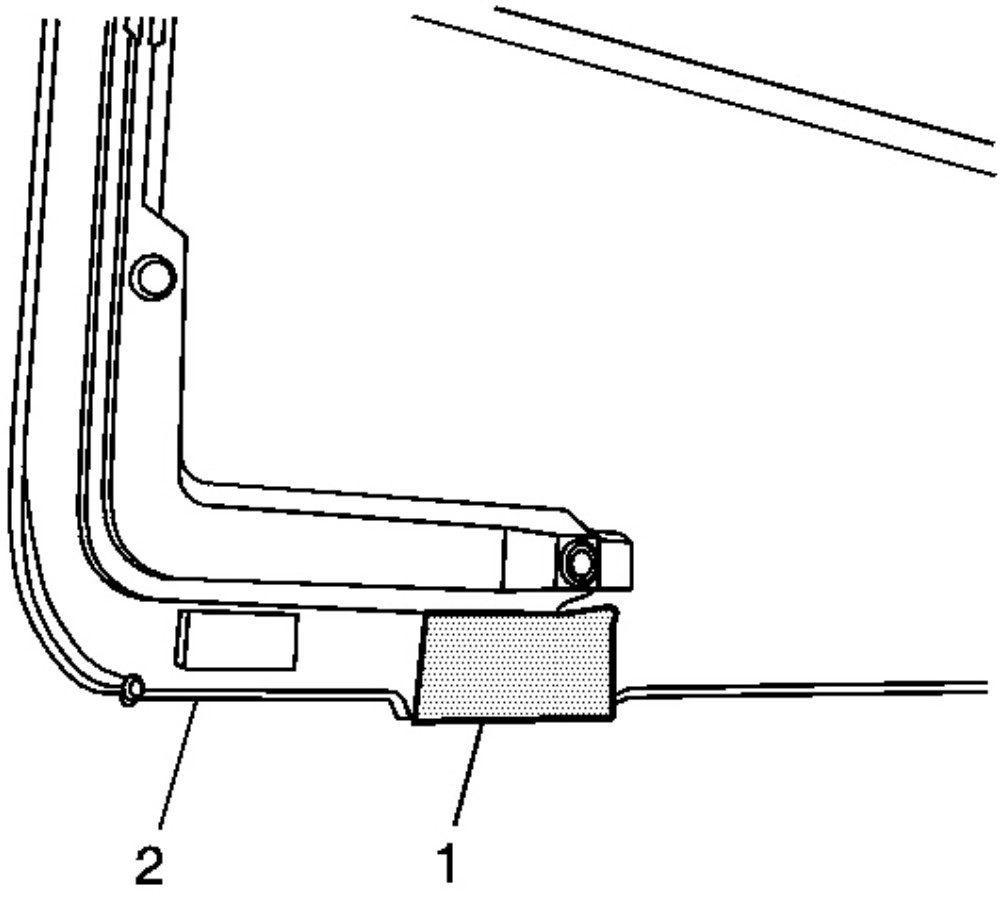

Fig. 19: Identifying Front Edge Of Sunshade Panel Slider Pad
Courtesy of GENERAL MOTORS CORP.

4. Install the front edge (1) of the sunshade panel slider pad into the track.
5. Arch the forward edge of the sunshade in order to insert it into sunshade track.
6. Install the slider pad into the track and release.
7. Slide the sunshade panel forward and rearward to ensure free operation is present.
8. With the sunshade partially open, pull downward on the sunshade. Cycle the sunroof to the vent position, allowing the glass panel to travel past the sunshade front edge.

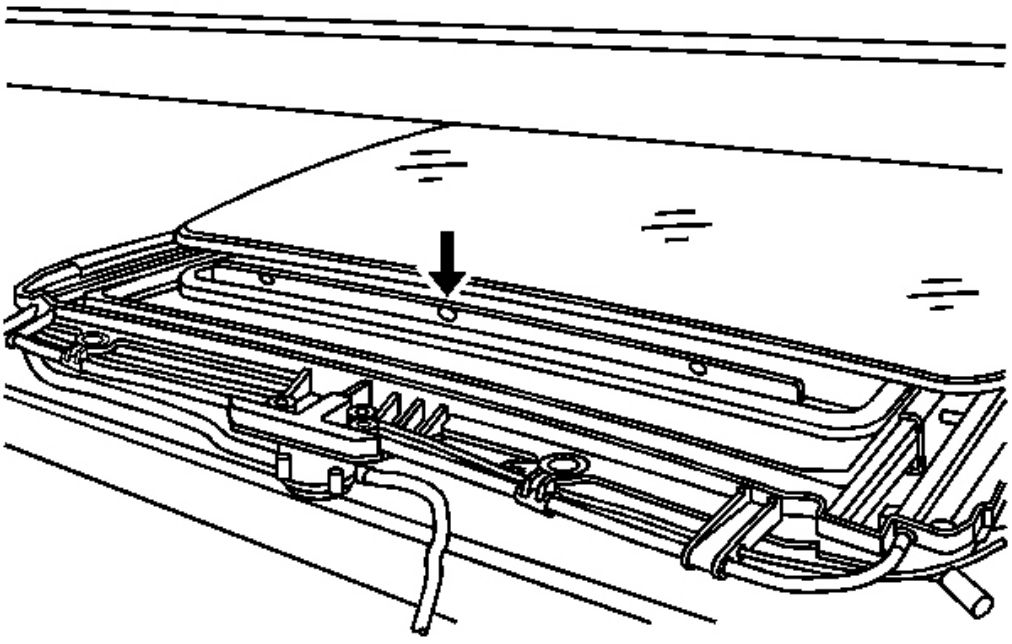

Fig. 20: Locating Sunshade
Courtesy of GENERAL MOTORS CORP.

9. Release the sunshade. Cycle the sunroof to the open position. Inspect for proper engagement of the sunroof glass panel and the sunshade panel.

SUNROOF OPENING POSITION SWITCH REPLACEMENT

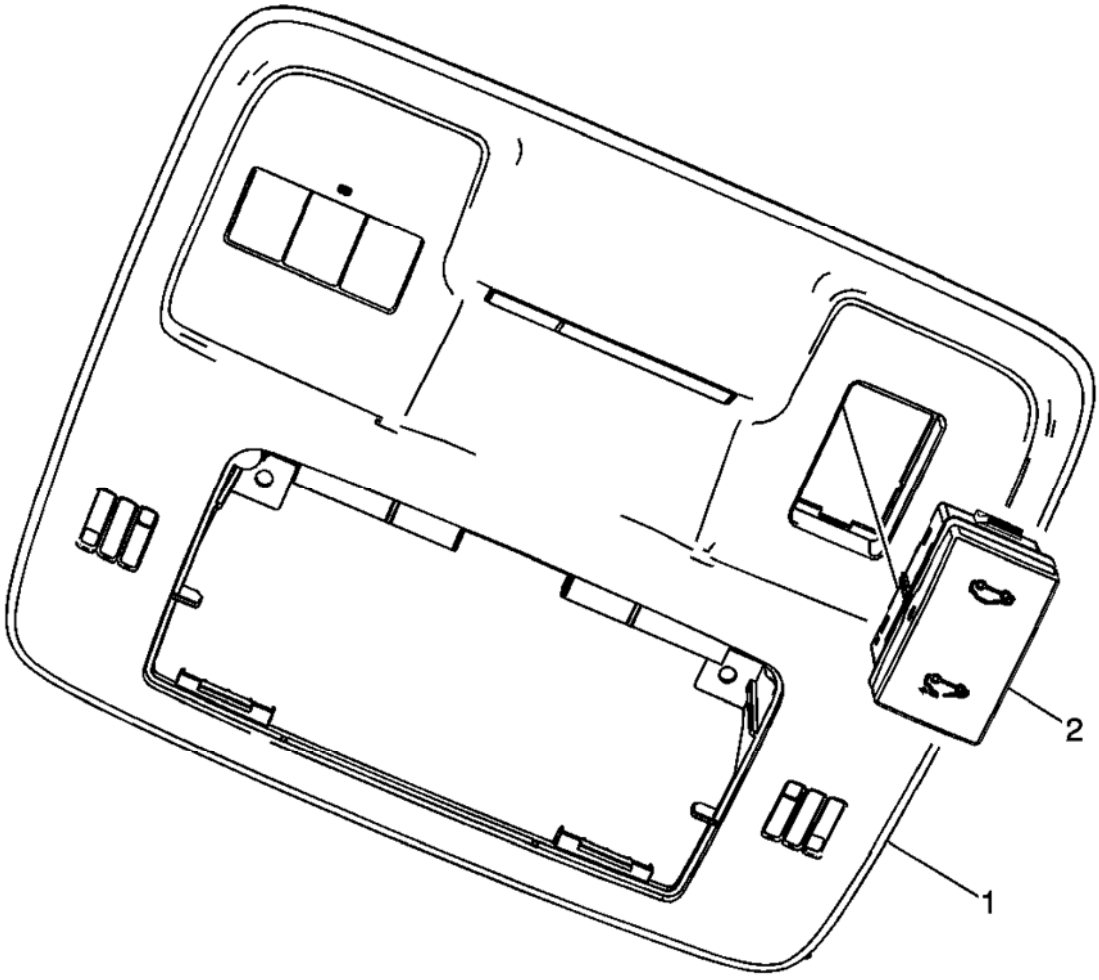

Fig. 21: Sunroof Opening Position Switch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Roof Console Refer to **Roof Console Replacement**
2	Sunroof Switch **Procedure:** Unsnap the switch from the roof console.

SUNROOF WINDOW HEIGHT AND OPENING FIT ADJUSTMENT

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

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

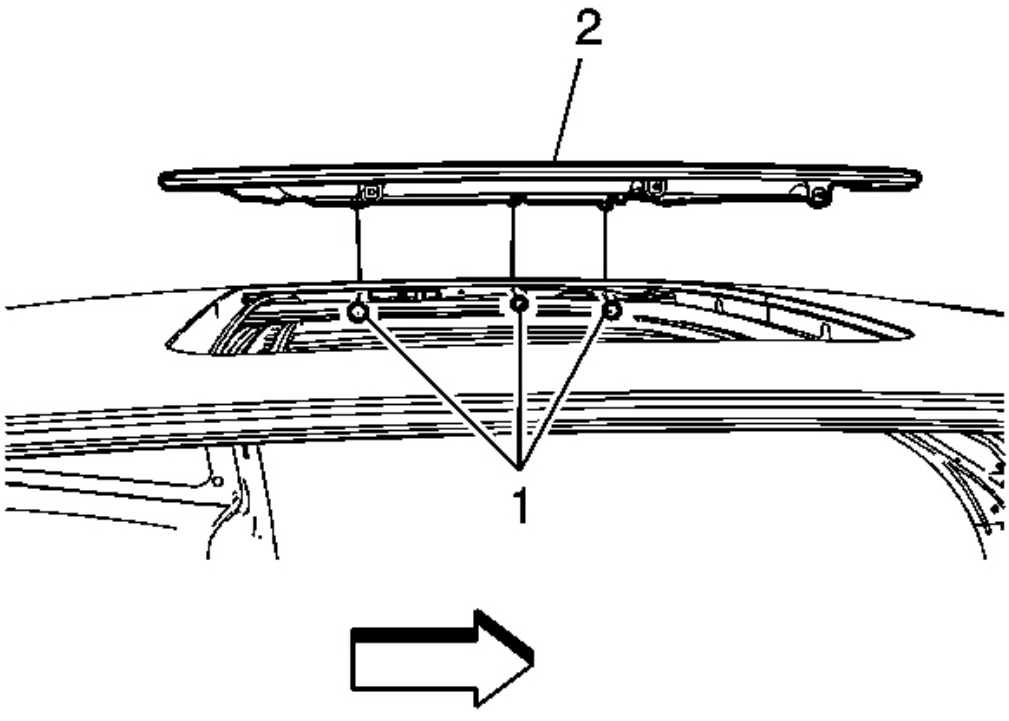

Fig. 22: Sunroof Window Screws
Courtesy of GENERAL MOTORS CORP.

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

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

CAUTION: Refer to Fastener Caution

4. Tighten the sunroof window adjustment screws to 8.5 N.m (75 lb in).
5. Cycle sunroof window through all positions.
6. Inspect the sunroof window adjustment. Adjust if necessary.

SUNROOF WINDOW REPLACEMENT

Removal Procedure

1. Slide the sunshade rearward.

CAUTION: In order to prevent damage to the paint, mask the roof panel in front of the sunroof opening using masking tape and paper.

2. Cycle the sunroof window to the vent position.

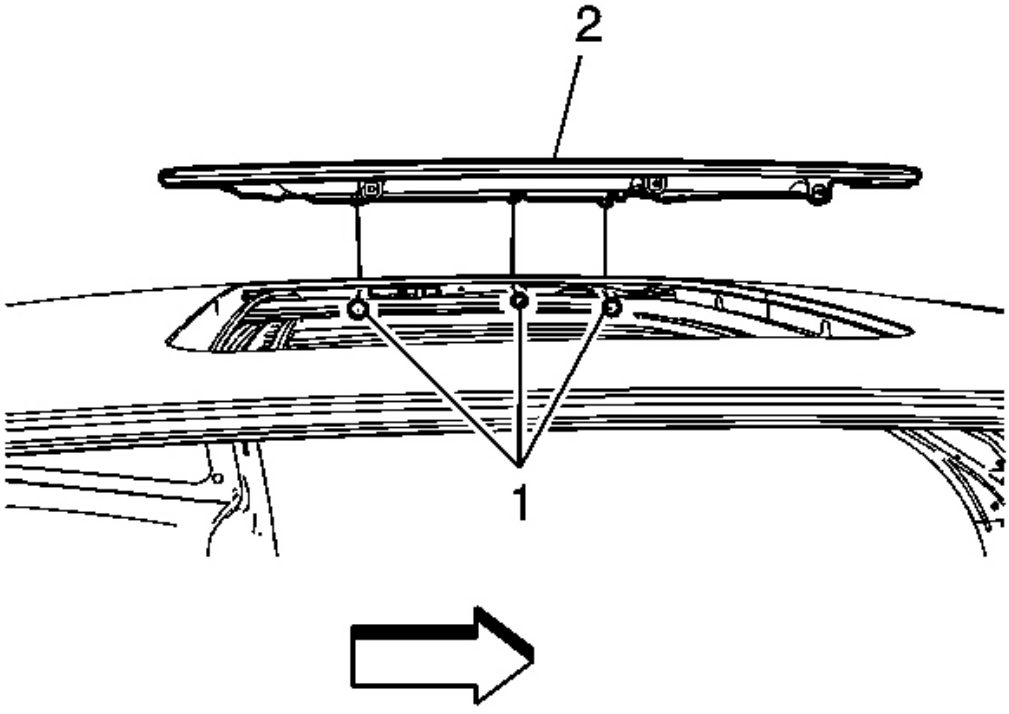

Fig. 23: Sunroof Window Screws
Courtesy of GENERAL MOTORS CORP.

3. Remove the sunroof window screws (1) from the window (2) on each side.

NOTE: Do NOT scratch the roof surface or the sunroof window.

4. Lift the sunroof window from the sunroof opening.

Installation Procedure

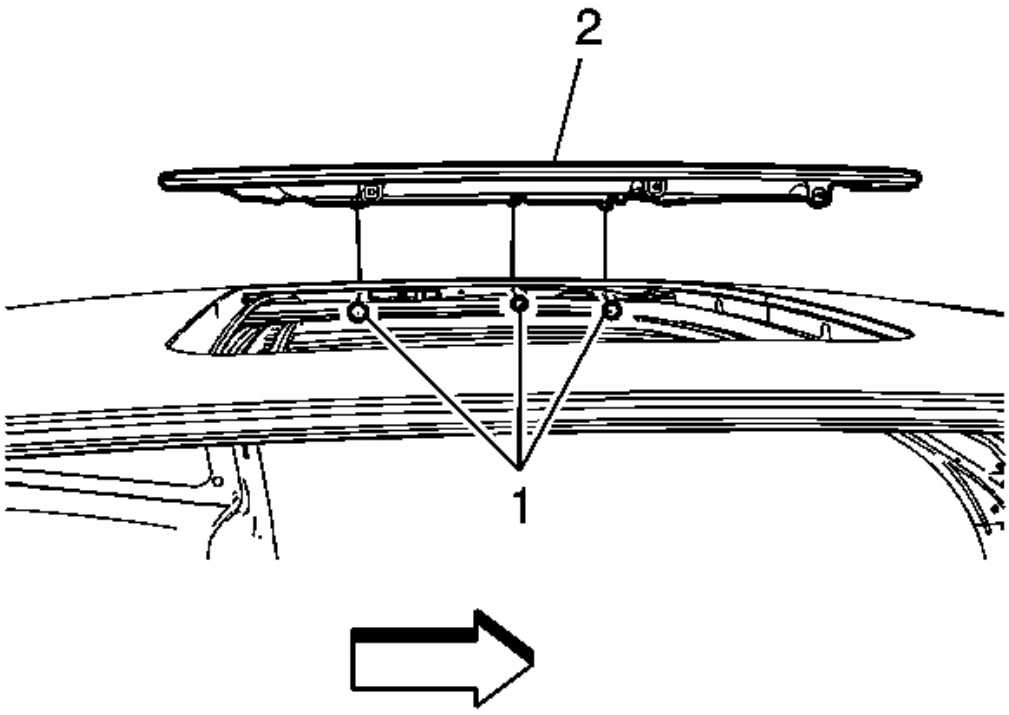

Fig. 24: Sunroof Window Screws
Courtesy of GENERAL MOTORS CORP.

1. Position the sunroof window into the opening.
2. Ensure that the window trade mark is to the rear of the opening and that sunroof window attachment tabs are to the inboard side of the mounting arms.

CAUTION: Refer to Fastener Caution .

3. Install the sunroof window screws (1) to each side of the window (2). Do not tighten the screws.

   Tighten the screws to 8.5 N.m (75 lb in).

4. Carefully close the sunroof window from the vent position to the full closed position.
5. Adjust the sunroof window. Refer to **Sunroof Window Height and Opening Fit Adjustment**.
6. Close the sunshade.

7. Cycle the sunroof window to ensure proper operation and fit.

DESCRIPTION AND OPERATION

SUNROOF DESCRIPTION AND OPERATION

The slide sunroof consists of a moving glass panel and a manual sunshade. With the spoiler sunroof system, the glass slides over the top of vehicle's roof. The glass is controlled by an integrated motor/controller. The sunshade has a mechanical connection to the glass causing it to open with the glass and keeping it from closing more than the glass.

The electrical portion of the slide sunroof system consists of:

- Body control module (BCM)
- Sunroof glass control module
- Sunroof 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 control module is configured as the slave.

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

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

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

Sunroof Glass Control Switch

The sunroof control switch is connected directly to the controller. The sliding glass switch provide detent positions for open, express open, off, and close. The control switch completes the circuit between two signals provided by the control module, a reference ground input and a pull-up voltage provided by an analog to digital switch input. The control switch place 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 appropriate function.

System Protection Functions

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

Motor stall

If the sunroof is moving in the open or close direction and stops moving for 350 ms while the switch or LIN-Bus command is active, the motor shall be turned off to prevent overheating.

Sunroof System Thermal Protection

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

Sunroof Operation

Sliding Class

Normal Open

When the sunroof sliding glass switch is held in the OPEN position, the sunroof will begin opening. Motion will continue until the switch returns to the OFF state.

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, the switch transitions to another state after first returning to the OFF position.

Normal Close

When the sunroof switch is in the CLOSE state, the controller will begin moving the sunroof in the close direction. The EXPRESS CLOSE operation is not available.