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Description & Operation

DESCRIPTION AND OPERATION

DESCRIPTION

The dual pane sunroof consists of a front sliding glass panel and rear stationary glass panel which allows additional sun light and/or ventilation into the interior of the vehicle. The system also includes a power sunshade which can be closed when additional sun light is not desired.

The dual pane sunroof system allows the sunroof front glass to be opened, closed or placed in the vent position electrically by actuating switches in the overhead console. The sunroof system receives battery feed through a fuse in the Power Distribution Center (PDC) and an ignition wire to determine vehicle ignition state. The sunroof will only operate when the ignition is set to ON/Run, Accessory or while the Accessory Delay system is active. The power sliding sunroof system does not communicate through Controller Area Network (CAN) Bus Circuit. Therefore, the power sunroof system cannot generate Diagnostic Trouble Codes (DTC's).

The dual pane sunroof system features an express operation (press & release switch) convenience feature that will automatically open or close the sunroof or sunshade. In addition the power sunroof system also features an obstacle detection feature which automatically reverses the sunroof or sunshade when it encounters an obstacle within the roof opening during express close operation.

The dual pane sunroof features a mesh fabric wind deflector which deploys when the glass is in a slide open position to minimize wind noise in the interior.

The electric motors operate the sliding glass panel or the sunshade through the use of mechanical drive cables, mechanical linkages and guides. For further mechanical information, refer to the Body section of this service information for additional information on these components.

The sunroof glass can be cycled to the following positions:

- **Vent Position** - The sliding sunroof glass panel tilts upward at the rear for the Vent position.
- **Open Position** - The sliding sunroof glass tilts downward and slides rearward beneath the fixed glass panel.
- **Closed Position** - The sliding glass panel seals flush with the roof in the closed position to eliminate wind noise.

The major components of the dual pane power sunroof system include:

- **Sliding Glass Panel** - (Refer to 23 - Body/Sunroof - Description).
- **Frame and Mechanism** - (Refer to 23 - Body/Sunroof - Description).
- **Motor Assemblies** - The dual pane sunroof and power sunshade motor assys are secured to each side of center on the front frame member of the sunroof, between the outer roof panel and the headliner.
- **Power Sunshade** - (Refer to 23 - Body/Sunroof - Description).
- **Switches** - The dual pane power sunroof and power sunshade switches are integral to the overhead console centered in the headliner between the windshield upper header and the front of the sunroof opening.
- **Wind Deflector** - (Refer to 23 - Body/Sunroof - Description)

The sunroof circuit is protected by a 25 amp cartridge fuse located in the Power Distribution Center (PDC).

OPERATION

The dual pane power sunroof sliding glass panel and power sunshade motors both receive battery feed through a fused B(+) circuit from the Power Distribution Center (PDC). However, the on-board electronic module of each sunroof or sunshade motor monitors an input on a fused ignition (run - accessory) circuit and is configured to allow the power sunroof and the power sunshade to be operated only when the ignition is set to the ON/Run or ACCESSORY state or when the Accessory Delay System is active. The Accessory Delay System enables accessory operation with the ignition off only if neither front door has been opened.

The sunroof receives the following hard-wired commands from the overhead console switches:

- Sunroof Open
- Sunroof Close
- Sunroof Vent
- Sunroof Switch Return
- Sunshade Open
- Sunshade Close

The electronic overhead console communicates on the LIN Bus. The sunroof unit itself is not part of any communications network.

The sunroof has two modes of operation; manual and express. Manual mode is active when the sunroof switch is pressed and held for a time >0.8 seconds. When in manual mode the sunroof or sunshade operation will stop whenever the switch released. Express mode operation is a convenience feature that will automatically open or close the sunroof when the switch is pressed & released in a time <0.8 seconds. Pressing any of the sunroof switches while express mode is active will immediately stop sunroof operation. The sunroof also provides an obstacle detection feature which automatically reverses the sunroof when it encounters an obstacle within the roof opening during express close operation.

Switches mounted in the overhead console controls sunroof operation. The sunroof switch is a rocker design with a push button in the center of the two halves of the rocker. Pressing the rocker towards the front of the car commands the sunroof closed. Pressing the rocker towards the rear of the car commands the sunroof

open. Pressing the center push button commands the front sunroof glass panel up into the vent position. If sunroof glass and sunshade are closed and one of the sunroof open/vent push buttons are pressed, the system will automatically retract the sunshade to behind the front glass opening (mid-point) before opening or venting the sunroof glass pane. Therefore, the sunshade can never cover the movable glass pane opening unless the pane is in the fully closed position.

The chart describes the normal sunroof response to glass control switch inputs (for both Express and Manual operation) when the glass is in various positions.

	Initial Glass Position →	Glass Closed	Glass Slide Open	Glass Vent	
Glass Switch Actuation	**OPEN**	Sunshade opens to mid position (if closed) then glass slides open to comfort stop position	No movement	Glass first cycles closed and continues to slide open position	**Sunroof Response**
	VENT	Sunshade opens to mid position (if closed) then glass cycles to vent position	Glass first slides closed and continues to vent position	No movement	
	CLOSE	No movement	Glass slides to closed position	Glass cycles to the closed position	

A rocker switch module mounted in the overhead console controls the power sunshade operation. Pressing the rocker towards the front of the car commands the sunshade closed. Pressing the rocker towards the rear of the car commands the sunshade open. When opening the sunshade it will automatically stop at mid-position, the sunshade open switch must be pressed again to continue to full open position. When attempting to close the sunshade and the glass is in the vented or open position the sunshade will stop at the mid-position. Pressing the sunshade close switch again will automatically close the glass; once the glass has fully closed the sunshade will automatically cycle to the closed position.

	Initial Shade Position →	Shade Closed	Shade Half Open	Shade Full Open	
Shade Switch	**OPEN**	Sunshade cycles to half	Sunshade cycles to full open position	No movement	**Sunroof Response**

Actuation		open position			
	CLOSE	No movement	Glass first cycles to closed position (if glass open or vented) then sunshade cycles to closed position	- Sunshade cycles to half open position (if glass open or vented)- Sunshade cycles to full closed position (if glass closed)	

The integrated sunroof motor electronics are programmed to operate only one motor at a time (sunshade and glass cannot simultaneously operate). The two motors communicate switch input information as well as sunroof and sunshade position information with each other through a serial bus circuit, but do not communicate with any other electronic modules in the vehicle. The integrated motor electronics are programmed to automatically move the sunshade from the closed to mid-open before allowing the sliding glass panel to open or vent. Likewise, if the sunshade switch is pressed to close the sunshade while the sliding glass panel is in an open position, the integrated motor electronics are programmed to automatically close the glass panel before closing the sunshade.

The integrated sunroof motor electronics provide an obstacle detection feature for both the sliding glass panel and the sunshade that is active during express close operation. The motor electronics monitor motor closing load through motor speed. When an obstacle is detected due to a significant decrease in motor speed, the electronics will stop the motor closing motion and automatically reverse the motor direction to allow the obstacle to be removed. Refer to (Refer to Electrical/Power Top/MOTOR, Sunroof/Standard Procedure) for options to override the obstacle detection system.

The integrated sunroof motor electronics provide a thermal protection feature to protect the motors from overheating. If the sunroof is cycled repeatedly open/close enough to cause motor overheating the software will allow one final closing cycle before it stops responding to further switch inputs. Once a motor has cooled sufficiently, normal operation will be automatically restored. However, the ignition switch must remain in the ON or ACCESSORY positions so that the module remains awake long enough to monitor the cool down of the motor.

The integrated sunroof motor electronics monitors glass panel and power sunshade positions by counting motor rotations through integrated hall effect sensor output. If a motor is removed and re-installed or a new service motor is installed the Initialization procedures (Refer to Electrical/Power Top/MOTOR, Sunroof/Standard Procedure) must be followed to reset and calibrate the electronics with the sunroof glass and sunshade positions.