Memory Seat Operation

The driver seat control switch provides a voltage signal to the DSM only when activated. This voltage signal causes the DSM to power the appropriate motor until the input is removed. The motor circuits are normally grounded through the DSM. The DSM internally switches the appropriate circuit from ground to voltage to operate the motors.

As the seat is adjusted, the DSM monitors the motor position sensors to record the current seat position. The DSM removes voltage from the motor upon termination of the seat control switch input or if the DSM does not detect movement from the motor while monitoring the position sensor during a memory recall operation.

If the DSM loses the signal from any of motor position sensors, the affected seat motor operates in jog mode. Jog mode allows limited operation of the affected seat motor using only the seat control switch. When the seat control switch is operated in jog mode, the seat moves in the desired direction for one second, then stops. The seat control switch must be released, then pressed again in order to move the seat for an additional second. Jog mode is an indication that there is a seat motor sensor fault. If the memory seat is operating in jog mode, a DTC sets in the DSM.

DSM Hard Stop/Soft Stop

The DSM has the ability for soft stops both at the upper and lower limits on all axes of the driver seat. When an axis reaches the hard stop and the switch is held for approximately one second, it then reverses direction 180 ms and establishes the soft stop for that axis in that direction. The DSM uses this back up strategy to check sensor integrity any time movement has stopped prematurely due to a sensor failure or obstruction.

A hard stop occurs when one of the memory seat track axes or backrest recline physically reach the end of travel and can go no further. A soft stop occurs when the seat stops before physically reaching the end of travel. The hard stop is set by seat design and cannot be changed or adjusted. The soft stop is set by the DSM. To prevent unnecessary stress on the seat and motors, the DSM sets soft stop positions, 2 for each moving axis. The DSM uses a preset distance from the hard stop to determine where the soft stop occurs. When an axis reaches the hard stop and the switch is held for approximately one second, the DSM establishes the soft stop for that axis in that direction.

Easy Entry/Exit

The easy entry/exit feature is a function of the DSM that moves the driver seat back approximately 50.8 mm (2 in) (unless seat is already positioned at or near the end of travel) when the ignition is turned off. The DSM receives ignition status over the MS-CAN and operates the driver seat rearward. The DSM cancels this operation if a valid input command is received from the driver seat control switch, memory set switch, exterior mirror control switch or if the function has been disabled.

The DSM records the current seat positions before operating the seat for an easy exit operation. During easy entry operation (when the ignition is turned on), the seat is returned to the recorded seat position previous to the easy exit operation. Easy entry operation is cancelled if a valid input command is received by the DSM. A memory position recall using the memory set switch also overrides the easy exit operation.

The easy entry/exit feature can be enabled/disabled on the message center. For information on programming vehicle settings in the message center, refer to the Owner's Literature.

Climate Controlled Seat Operation

The driver and passenger climate controlled seat buttons are selected from the FCIM or FDIM (touchscreen). The FDIM is mounted directly to the APIM. The climate controlled seat system functions independently of the vehicle's climate control system. When the climate controlled seat buttons are pressed on the touchscreen, the APIM sends the request to the GWM using the HS-CAN3. The GWM sends the message to the SCME over the MS-CAN.

When the climate controlled seat buttons are pressed on FCIM, the FCIM sends the request to the SCME using the MS-CAN.

The seat cushion and backrest are each equipped with a blower motor assembly. As cabin air is drawn through each blower motor, the blower motors heat or cool the air, which is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

The SCME monitors seat cushion temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through the foam pad.

Climate Controlled Seat Heating Characteristics

- In heat mode, the blower motor can add up to 40–60° C (72–108° F) to the ambient inlet air temperature.
- The system control settings are indicated next to each climate controlled seat heat button on the touchscreen. The first setting is HIGH (3 indicators), the second setting is MED (2 indicators) and the third is LOW (1 indicator), then OFF (no indicators).
- When heating, the SCME varies the speed of the blower motors and the duty cycle of the integral Thermo-Electric Device (TED) in order to reach and maintain the desired temperature determined by the system control settings.

Climate Controlled Seat Cooling Characteristics

- In cool mode, the blower motors can remove up to 8° C (14° F) from the ambient air temperature entering the system.
- The system control settings are based on the 3 indicators next to each climate controlled seat cool button on the touchscreen. The first setting is HIGH (3 indicators), the second setting is MED (2 indicators) and the third is LOW (1 indicator), then OFF (no indicators).
- The SCME maintains a constant blower motor speed and a constant Thermo-Electric Device (TED) supply voltage (duty cycle is determined by the switch setting) in COOL mode.

Climate Controlled Seat Recovery Mode

NOTE: *The presence of overtemperature faults (Diagnostic Trouble Codes (DTCs) B2729, B2730, B272A and B272B) can be induced by incorrectly operating the climate controlled seat system after an initial heat setting has been attained. If a heat setting is repeatedly turned off and on in an attempt to increase the seat temperature or repeatedly toggled between heat and cool modes, an overtemperature condition can result and the Diagnostic Trouble Codes (DTCs) may be set.*

If the temperature of one of the blower motors rises above 110° C (229.8° F) in the heat mode or 65° C (148.9° F) in the cool mode for more than 4 seconds, the SCME records an overtemperature DTC, removes voltage from the Thermo-Electric Devices (TEDs) (part of the blower motor assembly) and goes into recovery mode (blower only) for 30 seconds to cool down the blower motor. The same occurs if a temperature difference of 60° C (108° F) or greater is detected between the backrest and cushion blower motors on either front seat. The SCME continues to monitor the blower motors while in recovery mode. If the temperature of the Thermo-Electric Devices (TEDs) do not drop to 105° C (220.8° F) in the heat mode or 60° C (139.9° F) in the cool mode after 30 seconds, the system continues to cool the blower motors in recovery mode for up to 5 minutes. If the Thermo-Electric Devices (TEDs) cool down after 30 seconds, but before 5 minutes (checked at 4 second intervals), the system is operating normally. An overtemperature DTC is still recorded even if the system recovers and is operating normally. This is more likely to occur during extreme cabin temperatures with significant seat back sun load. If the system does not recover within 30 seconds in heat mode or within 5 minutes in cool mode, the SCME disables that seat (fault mode) and remains off until the ignition is cycled. Also, if the SCME detects a temperature differential fault twice during the same ignition cycle, the SCME disables the seat. When a fault causes a shutdown, the climate controlled seat indicators turn off and that seat is not operational until the next ignition cycle.

Component Description

Driver Seat Control Switch - With Memory

The seat control switch is hard-wired to the DSM, which controls seat operation. When a specific seat adjustment position is selected, an individual circuit is switched to voltage.

Seat Control Switch - Without Memory

The seat control switch contains normally closed contacts (which are grounded). When a specific adjustment position is selected, an individual circuit is switched to voltage.

DSM

The driver seat control switch and power memory seat motors are hard-wired to the DSM. The DSM controls the operation of the power memory seat. The DSM communicates on the Medium Speed Controller Area Network (MS-CAN). PMI is required when a new DSM is installed. The DSM hard stop/soft stops must be set/reset any time a new DSM, driver seat track or horizontal motor is installed.

Memory Set Switch

The memory set switch contains 3 momentary contact switches. It is hard-wired to the DDM and is used to recall each memory position stored in the DSM.

Driver Seat Track - With Memory

There are 3 front seat track bi-directional motors present on power seat tracks. The horizontal (fore/aft) front seat track motor is the only seat track motor which can be serviced separately from the seat track assembly. All other seat track motors (front height, rear height) are serviced as part of the seat track assembly. Each seat track motor contains a Hall-effect sensor which provides seat track position information to the DSM for setting/obtaining desired preset seat memory positions. The seat track motors move the power seat forward/backward and up/down depending on the polarity of voltage supplied from the DSM.

Seat Track - Without Memory

There are 3 front seat track bi-directional motors present on power seat tracks. The horizontal (fore/aft) front seat track motor is the only seat track motor which can be serviced separately from the seat track assembly. All other seat track motors (front height, rear height) are serviced as part of the seat track assembly. The seat track motors move the power seat forward/backward and up/down depending on the polarity of voltage supplied from the seat control switch.

FDIM

If equipped with climate controlled seats, the FDIM (touchscreen) contains climate controlled seat control buttons.

FCIM

If equipped with climate controlled seats, the FCIM contains climate controlled seat buttons. PMI is required when a new FCIM is installed.

SCME

If equipped with climate controlled seats, The SCME controls the operation of the climate controlled seat system. PMI is required when a new SCME is installed.

Blower Motor

If equipped with climate controlled seats, the seat cushion and backrest are each equipped with a blower motor assembly that includes a seat blower (Thermo-Electric Device (TED) and fan motor, serviced as an assembly). There is also a temperature sensor (thermistor) in each blower motor which provides feedback to the SCME. The blower motor assembly is controlled by the SCME.

Front Seat Power Lumbar Assembly

The front seat power lumbar assembly is mounted to the backrest (serviced as an assembly).