SEATS

The X250 offers a number of front seating options. All variants start with a 10-way electrically adjustable driver seat, which is complemented by an 8-way electrically adjustable front passenger seat. The SV8 offers a 16-way electrically adjustable driver seat, which is complemented by a 12-way electrically adjustable front passenger seat. The controls for adjustment are on the seats, with the memory buttons in the door.

The following tables highlight the features available for each seating option:

Driver Seat

Seat Type	Non-Heated	Heated	Heated and Cooled	Lumbar Support	Memory
10-way	Yes	Optional	Optional	2-way	Yes
16-way	No	No	Yes	4-way	Yes

Passenger Seat

Seat Type	Non-Heated	Heated	Heated and Cooled	Lumbar Support	Memory
10-way	Yes	Optional	Optional	2-way	No
12-way	No	No	Yes	4-way	No

NOTE: Climate Controlled Seats™ (CCS) provide both heating and cooling and are equipped with perforated leather to allow conditioned air to circulate. To maintain consistent interior styling, rear seats will also include perforated leather in vehicles with the CCS option, but cooled seating will only be available for the front seats.

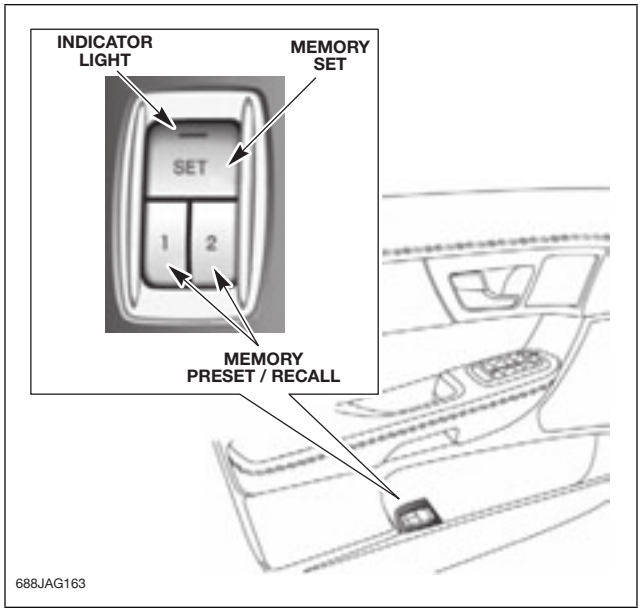
NOTE: The driver and passenger front seats, although almost identical, have some unique components. The front driver seat has a seat position sensor and the front passenger seat has an Occupancy Classification System (OCS). In both instances the components form an integral part of the airbag Supplemental Restraint System (SRS).

WARNING:

⚠ Prior to removal of the front seats and before disconnecting the front seat wiring harness electrical connectors (which includes the side airbag module electrical connectors), the battery ground cable should be disconnected and a period of at least 1 minute allowed to elapse. The same amount of care should be taken when handling and storing the front seats as would be taken when handling and storing airbag modules.

Seat Movement / Memory

The driver's seat switch pack is connected to the driver's seat module by a LIN bus. Any seat movement selection generates a message which is passed via the LIN to the driver's seat module. The seat module processes the request and operates the applicable seat function.



Each seat motor contains a hall position sensor. The sensor sends a feedback signal to the driver's seat module. The signal is used for memory store and recall functions.

Memory Operation

The memory switch communicates with the driver's seat module via the LIN bus in the driver's seat switch pack. The memory store switch has two buttons: 1 and 2 to allow two separate memory positions to be stored and 'set' button with integral LED. The seat, door mirror and steering column motors have position sensors which provide feedback to driver's seat module.

Once the driver's seat, steering column and exterior mirrors have been adjusted, the vehicle is able to memorize these settings for future use by using the following procedure with the ignition on:

Push the memory 'SET' button, the LED in the switch will illuminate

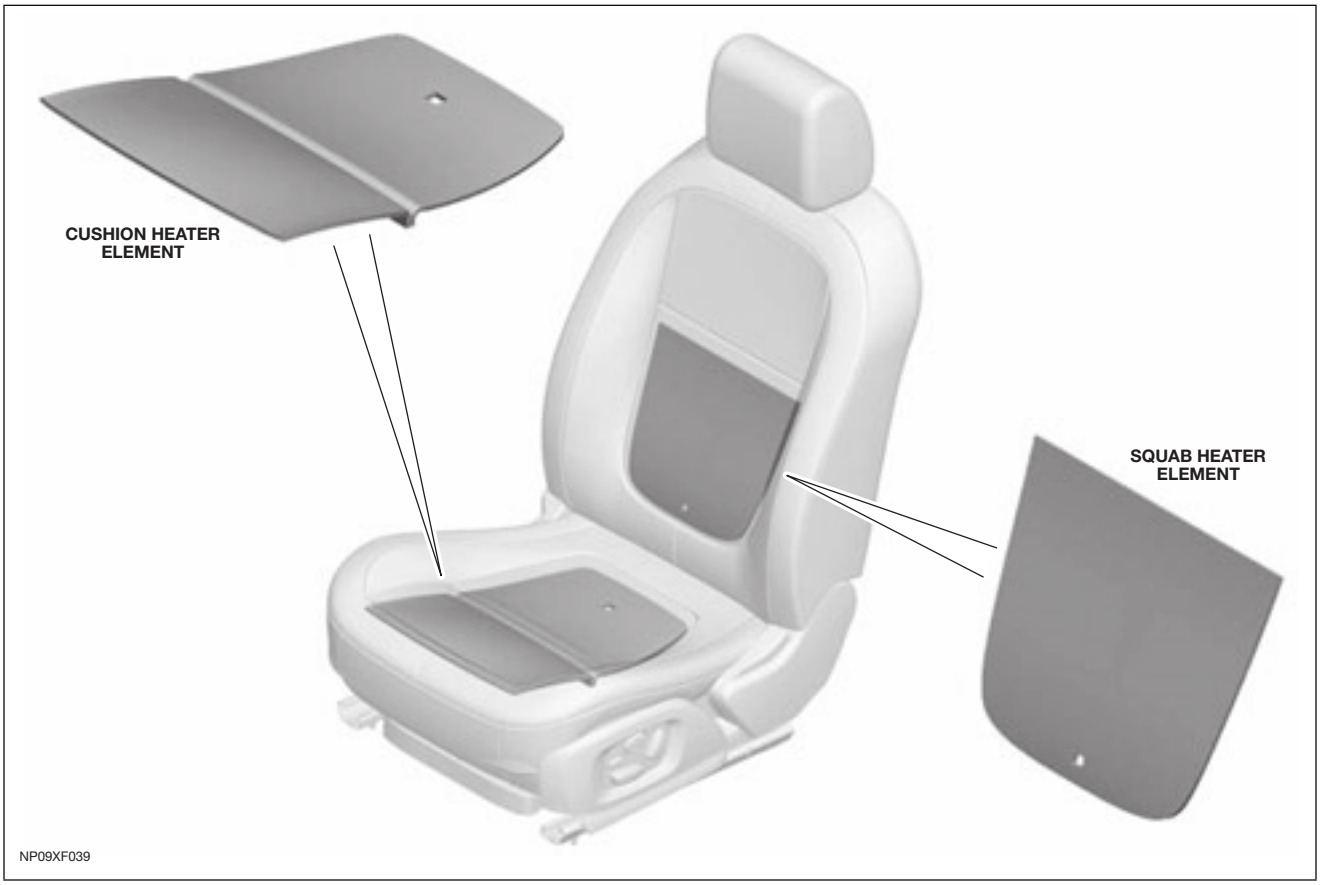
Press the memory button 1 or 2 to memorize the current settings. The LED will extinguish, a chime will sound to confirm that the settings have been memorized and the message center will display a confirmation message.

The positions can be recalled by pressing the applicable button 1 or 2.

Heated Seats

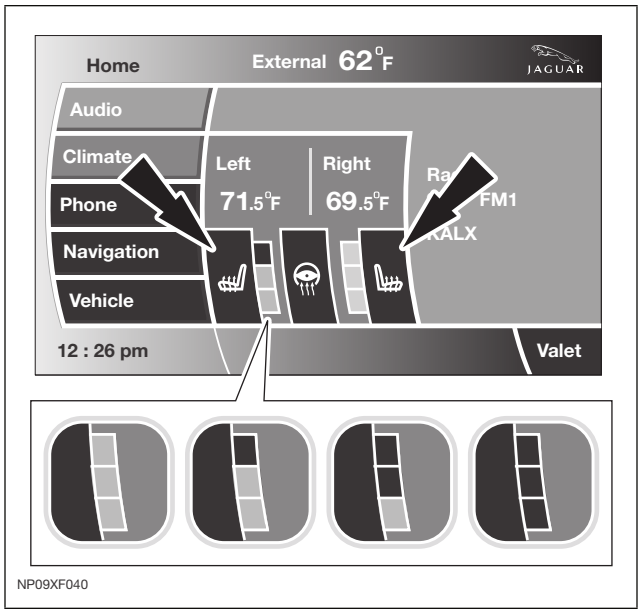
Mat-type heated front seats are optional on Luxury models and standard on Premium Luxury models. Vehicles fitted with the 3-stage heated front seat option also feature a heated steering wheel.

The 3-stage heated front seats feature 2 heater elements, one located in the seat back and one located in the seat cushion.



Heating requests are generated using the soft buttons on the TSD. These requests are transmitted to the information control module (ICM) over the MOST® ring. The ICM forwards these requests to the automatic temperature control (ATC) module via the MS CAN bus; seat heating is controlled by the ATC module via the CJB.

The CJB provides a power supply to the heating elements and also monitors the temperature of the front seats using a negative temperature coefficient (NTC) sensor located in each seat cushion. The CJB transmits the temperature readings back to the ATC module to provide closed loop control.



Steering Wheel Heater

The steering wheel heater has 1 heat setting and can be turned on and off by pressing the soft button located on the TSD screen. When the ignition is switched off, the heater will reset to off.

Power for the heater element is supplied by the on receipt of a request from the module over the medium speed CAN bus. Temperature control for the heater element is provided by the steering wheel heater control module which receives a temperature feedback signal from a thermistor located within the steering wheel.

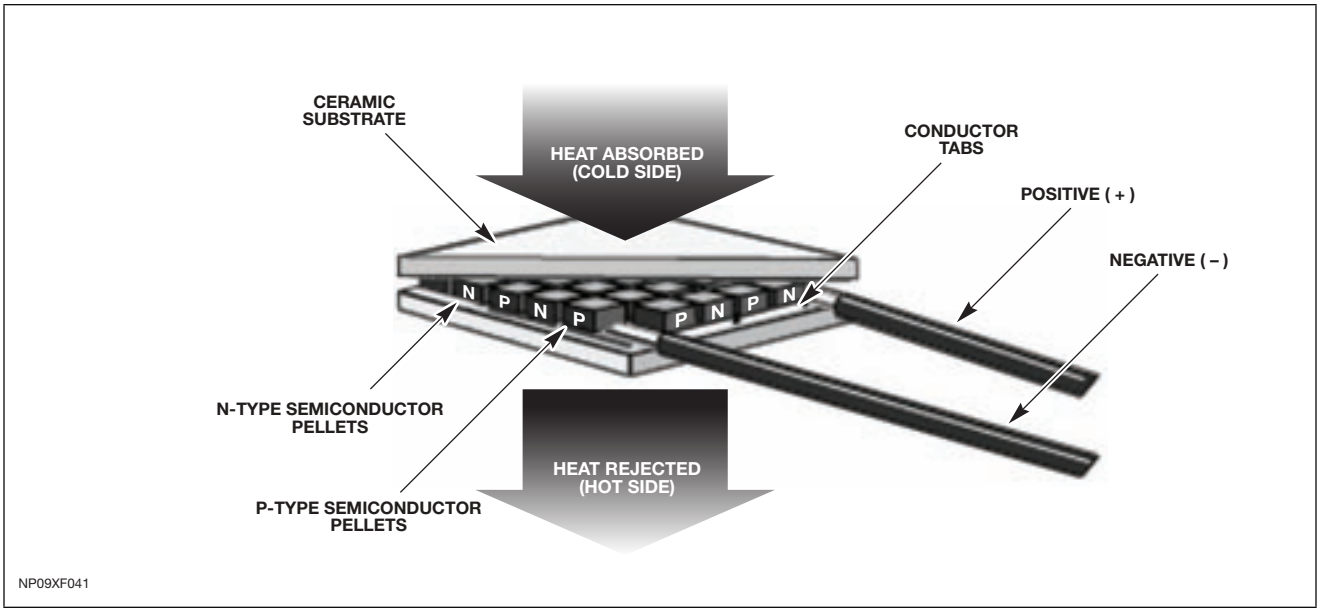
Climate Controlled Seat™ System

Vehicles fitted with the optional Climate Controlled Seat™ system (CCS) significantly improve the comfort level of the occupants by focusing the cooling directly on the passenger through the seat. The CCS system uses a Peltier cell, also known as a proprietary thermoelectric device (TED), to provide individual heating and cooling to the front seat assemblies. Named for Jean Peltier, who discovered the thermoelectric cooling effect in 1834, the Peltier effect occurs when an electrical current is passed through a junction formed by two dissimilar conductors, creating a heat pump. A heat pump absorbs heat from one side of the system, causing it to cool, and then transfers the heat to the other side, causing it to warm.

The 2008 MY XJ and 2009 MY XF use a solid-state Peltier cell that consists of a number of semiconductor elements, sandwiched between two substrates and connected in series and parallel. When voltage is applied in one direction, one side absorbs heat (creating a cooling effect) while the other the cell rejects heat. Switching polarity between the circuits creates the same effect but in the opposite direction.

The operation is similar to a conventional air conditioning system; one cell acts as the evaporator and absorbs heat while the other cell is the condenser which rejects the heat. The pump is replaced by an electrical charge and the heat energy is transported by the cell's metal construction rather than by a refrigerant.

Peltier Cell Operation



It is important to understand the operation and limitations of the Peltier cell. A Peltier cell has an efficiency of only 5-10%, compared to a conventional air conditioning system with an efficiency of 40%. The cell is capable of cooling the incoming air by approximately 8°C (12.4°F), which means that temperature output will depend on the ambient temperature inside the vehicle.

Example: If the temperature in the vehicle is the same as or exceeds the heat rejection side of the cell, poor cooling will be the result. If the temperature is colder than the heat absorption rate, the cell may start to ice up.

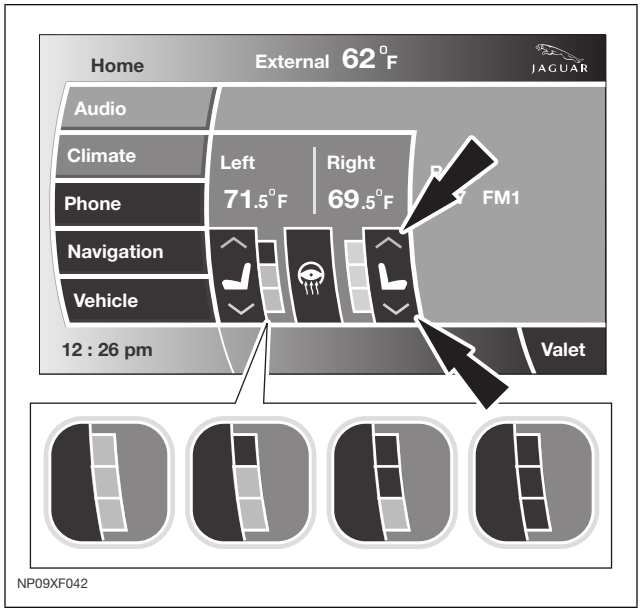
Benefits of using Peltier cells:

- Ability to cool or heat by simply reversing current flow
- Solid-state device, no moving parts
- Rugged, highly reliable
- Quiet, small & lightweight
- Pulse width modulated with feedback for accuracy
- Environmentally safe

Component Description

Touch Screen Display

CCS adds additional temperature control selections to the TSD from either the Climate menu or Home menu.



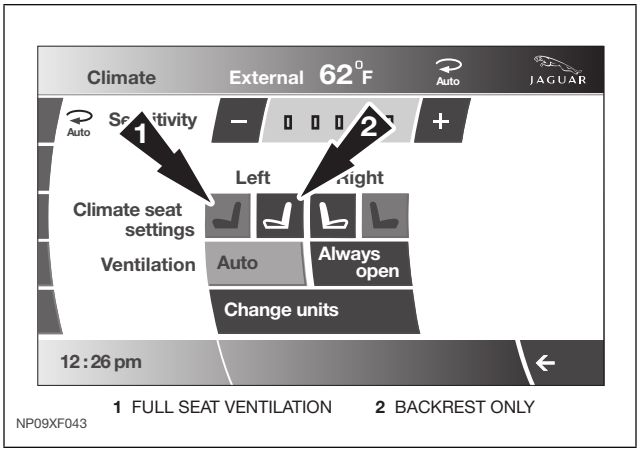
NP09XF042

Heating and cooling requests are generated using the soft buttons on the TSD. The TSD captures switch presses and steps through the three levels of heating or cooling. The temperature level indicators light up either red or blue to show the selected level of heating or cooling.

Backrest Only Ventilation

'Backrest only ventilation' allows the user to set the seat ventilation so that only the seat backrest is ventilated. Backrest only ventilation is selected using the touch-screen from the Climate control settings menu.

For the left or right front seat select the appropriate icon:



1 FULL SEAT VENTILATION **2** BACKREST ONLY

NP09XF043

When one of the heating or cooling settings is selected, filtered ambient air is circulated by a fan, forcing the air through a Peltier cell, where it is thermally conditioned.

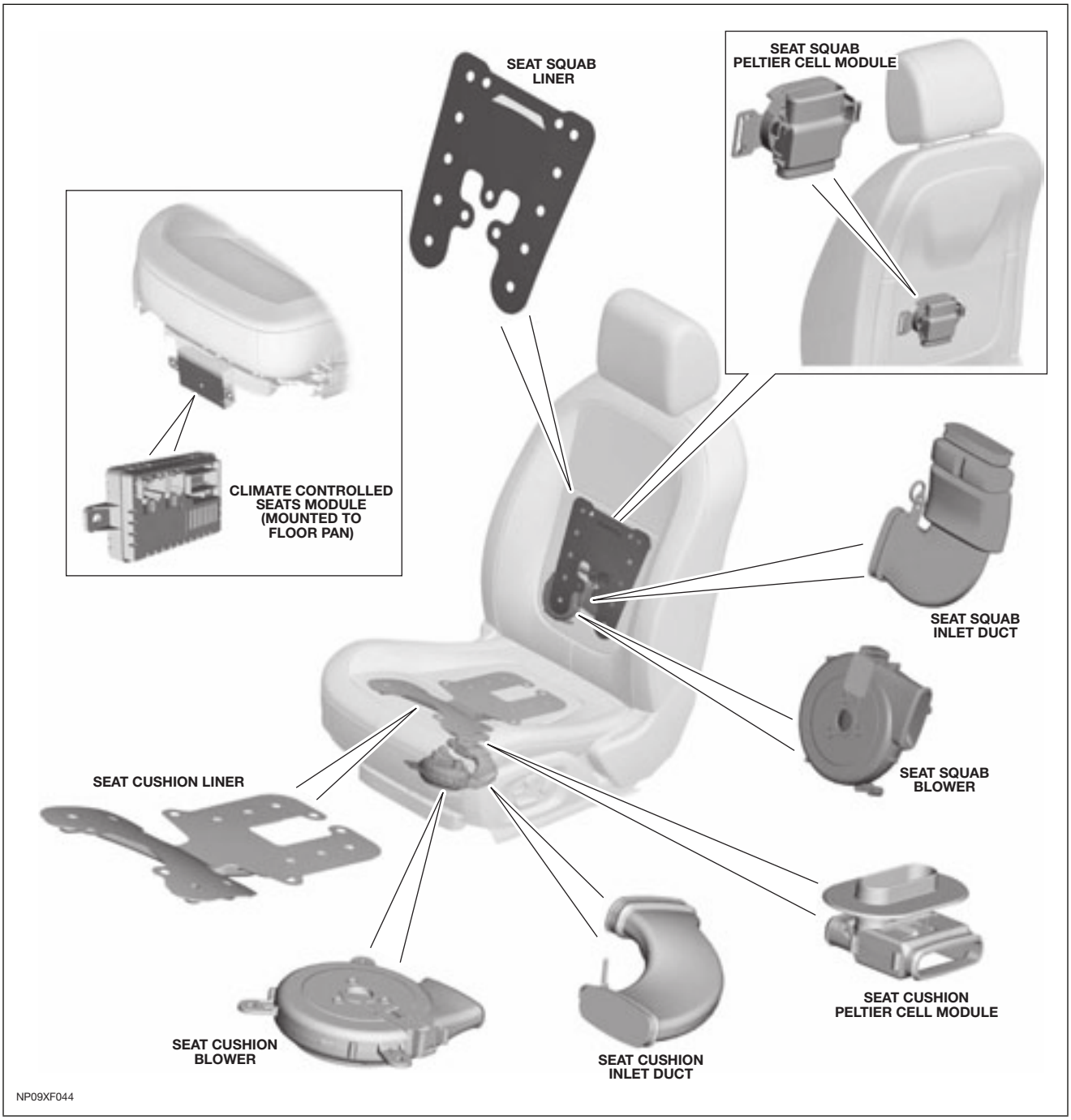
NOTE: Due to electrical loads, if the CCS system is activated with the key on / engine off, the system will not operate.

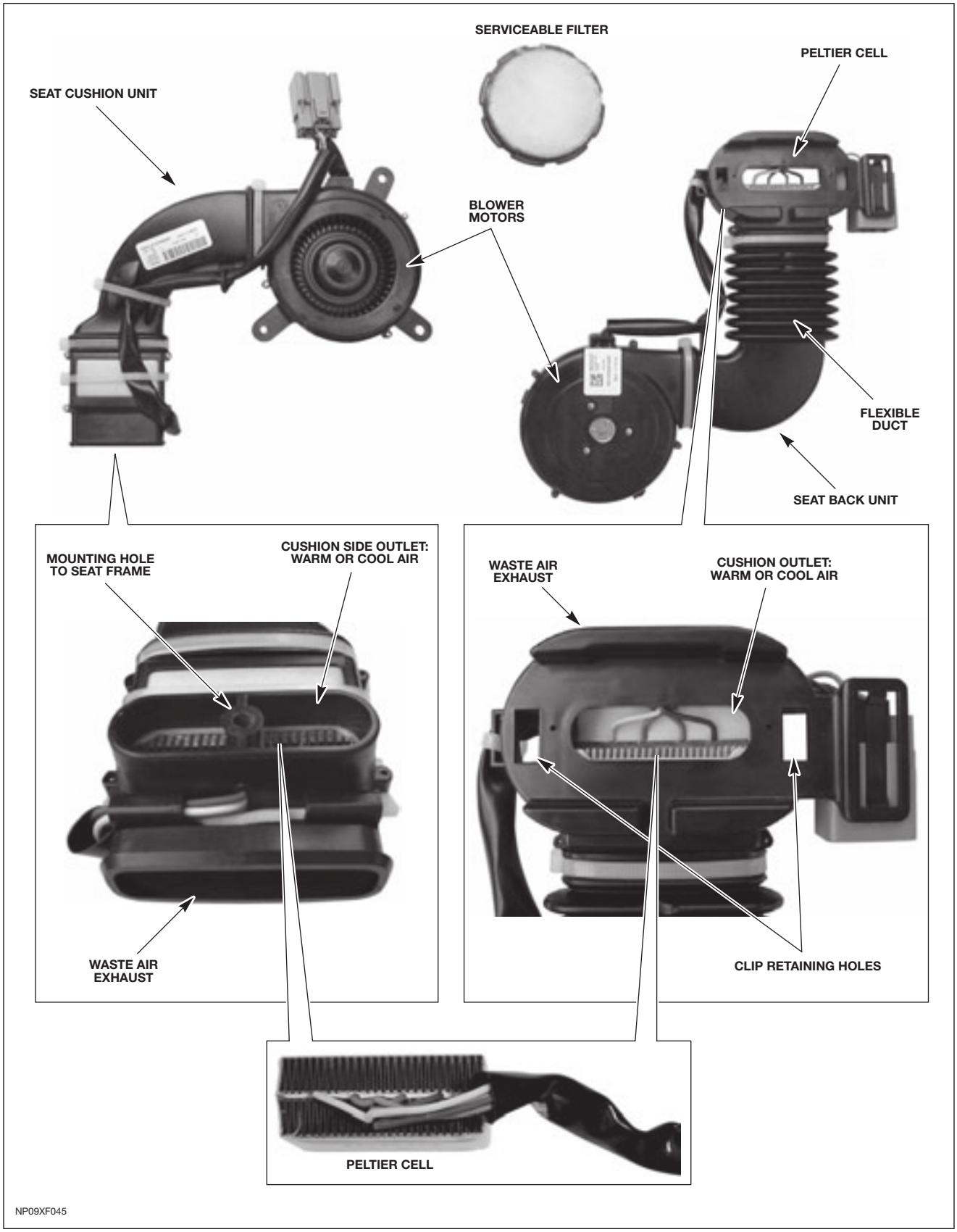
Climate Units

Each seat contains two climate units, one located in the seat back and the other in the seat cushion. Each contains a filter, blower fan, Peltier cell and an air duct. They are serviced as a complete unit with the exception of the separately serviceable filter. Ported channels in the foam cushions evenly direct the flow of conditioned air through breathable perforated leather seat covers to the occupant.

NOTE: Climate modules are serviced as complete units.

Component Location: Climate Controlled Seats™




SERVICEABLE FILTER
PELTIER CELL
SEAT CUSHION UNIT
BLOWER MOTORS
FLEXIBLE DUCT
SEAT BACK UNIT
MOUNTING HOLE TO SEAT FRAME
CUSHION SIDE OUTLET: WARM OR COOL AIR
WASTE AIR EXHAUST
WASTE AIR EXHAUST
CUSHION OUTLET: WARM OR COOL AIR
CLIP RETAINING HOLES
PELTIER CELL
NP09XF045

Principles of Operation

The CCS system is completely independent of the heating and air conditioning system. The existing automatic temperature control module does not control any aspect of CCS operation; the controlling software is contained within the Climate Controlled Seat Module (CCSM) located under the right front seat when fitted.

The CCSM is on the MS CAN network, as it requires information from other modules for operation (such as engine rpm). The CCSM requires an 'Engine Running' message to allow system operation as well as an 'enable' message from the Engine Control Module (ECM).

Temperature requests are transmitted to the information control module (ICM) over the MOST ring. The ICM forwards these requests to the CCSM (located under the passenger front seat) over the MS CAN bus.

In order to preserve battery and electrical system functionality, the Battery Monitor System (BMS) communicates with the ECM to reduce or even disable system operation based on total vehicle electrical loads. For example, when a request is made for cooling or heating, the ECM uses an electrical load management strategy to determine the available current and regulates power to the cells as it becomes available. During a high demand or electrical load (rear defroster, A/C, wipers, etc.) the ECM will regulate the power to the Peltier cells to prevent potential overloading of the electrical system.

The CCSM uses a PWM signal to regulate the temperature of the Peltier cells and a variable-voltage for the speed of the blower fans in order to maintain the selected temperature. Fan speed may increase or decrease slightly while on a specific setting as the controller regulates system output temperature.

The CCSM logic applies a series of steps when the system receives a command. The steps vary depending on the mode selected and whether the cells are hot or cold.

The CCSM powers up the cells with minimum air flow to set the cell temperature, and then the module steps up the blower speed to ensure the correct temperature is achieved quickly.

Heat Mode Operation

The CCSM operates in a closed loop control mode, using the feedback from the system thermistor. In heat mode, the Peltier cells are wired in parallel with nearly full battery voltage across each cell when first turned on. The CCSM monitors the NTC fin temperature sensors and adjusts the PWM duty cycle to the Peltier cells while also varying voltage to the blowers to achieve and maintain the temperature set point. The air flow from the blower is split over both sides of the cell, half going into the seat cushions and the other half released as waste. If either blower fails or the cells start to overheat, the CCSM will shut down both assemblies in that individual seat for protection.

Cool Mode Operation

The CCSM operates in an open loop mode. In cool mode, the Peltier cells are wired in series, with each cell supplied with half the battery voltage during initial startup. If the seat is switched from cushion and seat back to just seat back, the seat back now receives full voltage.

The difference between heat and cool modes is in the way the system is controlled. The CCSM monitors the fin temperature to ensure that the system is working properly with no PWM adjustments to the Peltier cells. For example, if the CCSM sees the fin temperature on the cells getting very cold to a potential ice up condition, it will turn off the cells for approximately 4 seconds, until the temperature stabilizes, then restart. During this process the blower speed will cycle from low to high, which may be noticeable to the user. This is considered normal operation if there are no codes stored in the CCSM.

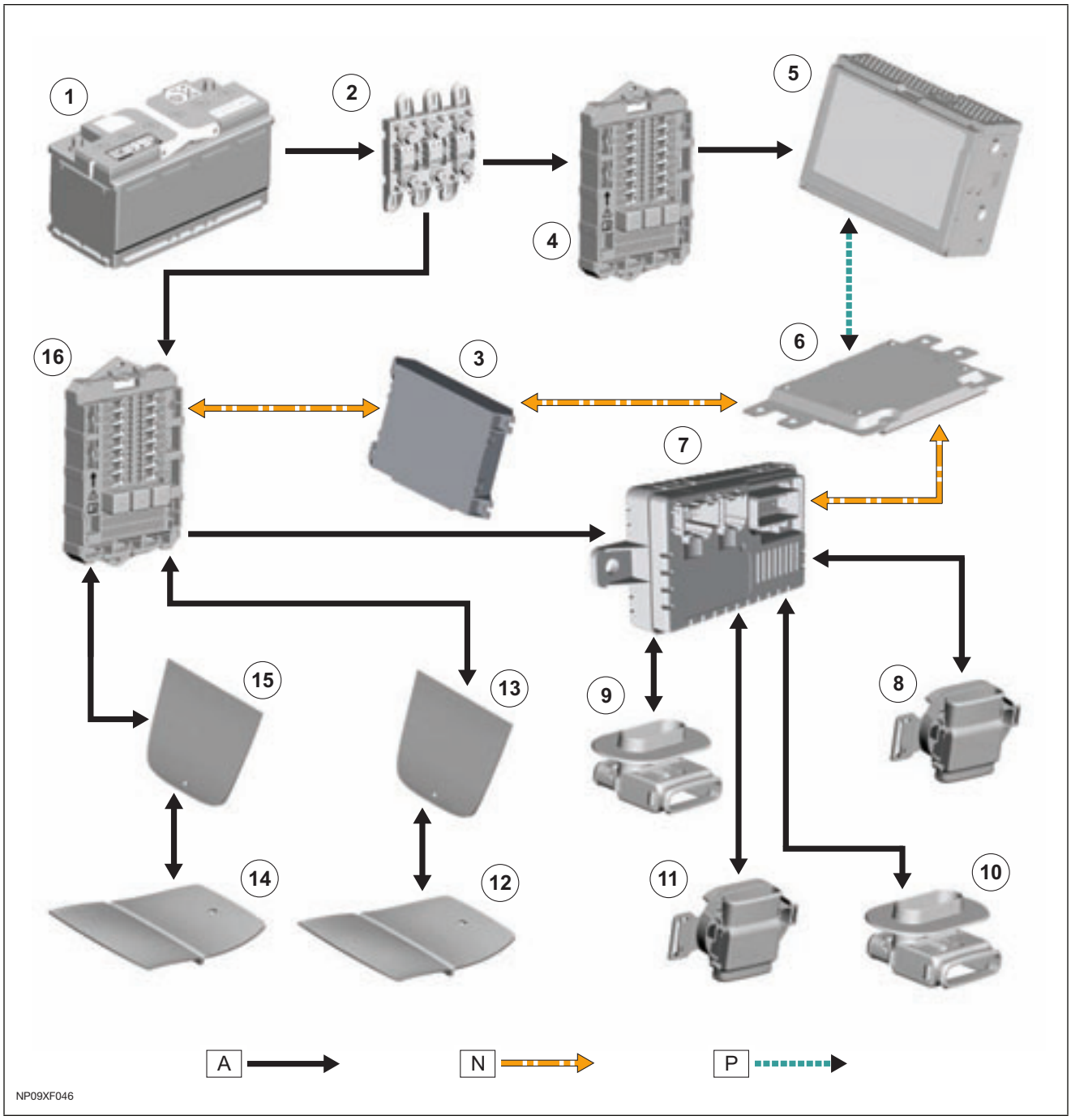
NOTES: The Peltier cells will not operate unless the engine is running.

After the ignition is switched off, the CCSM will retain the current temperature settings for approximately 15 minutes. After this period, the seats will be set to 'off' when the ignition is switched back on.

CCSM Fuses

The CCSM is powered by two 20amp fuses located in the CJB. These are separate circuits, but once inside the CCSM they are joined together. Due to current load, if one fuse blows, the other may also.

Seat Heating / Cooling Control Diagram



A Hardwired
N Medium speed CAN bus
P MOST ring
1 Battery
2 BJB
3 ATC module
4 RJB (rear junction box)
5 TSD
6 Information control module
7 Climate controlled seat module
8 Passenger seat squab climate module
9 Driver seat cushion climate module
10 Passenger seat cushion climate module
11 Driver seat squab climate module
12 Passenger seat cushion heater element
13 Passenger seat squab heater element
14 Driver seat cushion heater element
15 Driver seat squab heater element
16 CJB