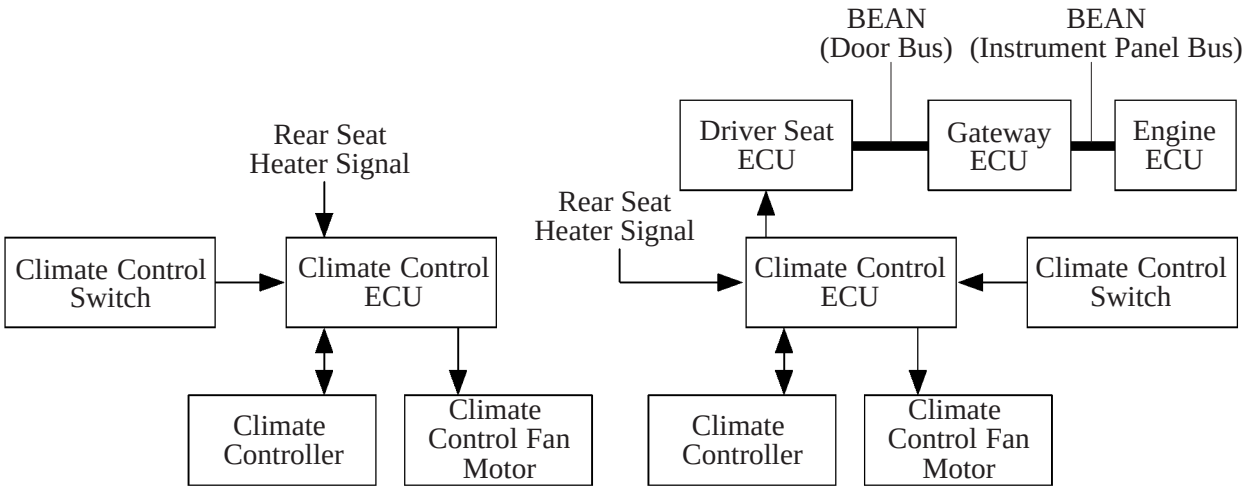
■CLIMATE CONTROL SEAT SYSTEM

1. General

- The climate control seat system is optional equipment on the front seat.
- The climate control seat system provides warm air, cool air, or airflow to the seat surface to minimize the discomfort that the occupant feels from the seat surface. Thus, the level of comfort has been improved.
- The climate control seat system is provided independently for the driver and the front passenger and is controlled by the respective climate control ECUs.
- A Peltier element* is used in the controller for this system.

* Peltier element: Consisting of two different types of metals, the area in which the metals are joined generates or absorbs heat when an electric current is applied to the element at a prescribed temperature.

▶ System Diagram ◀



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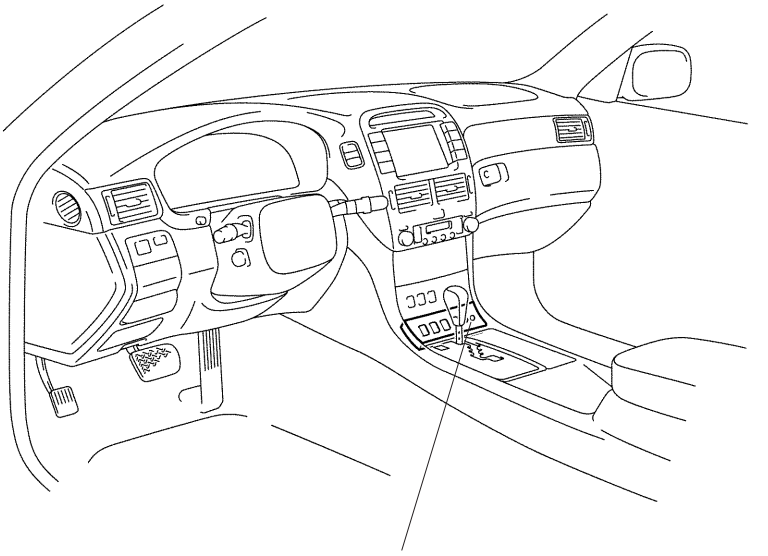
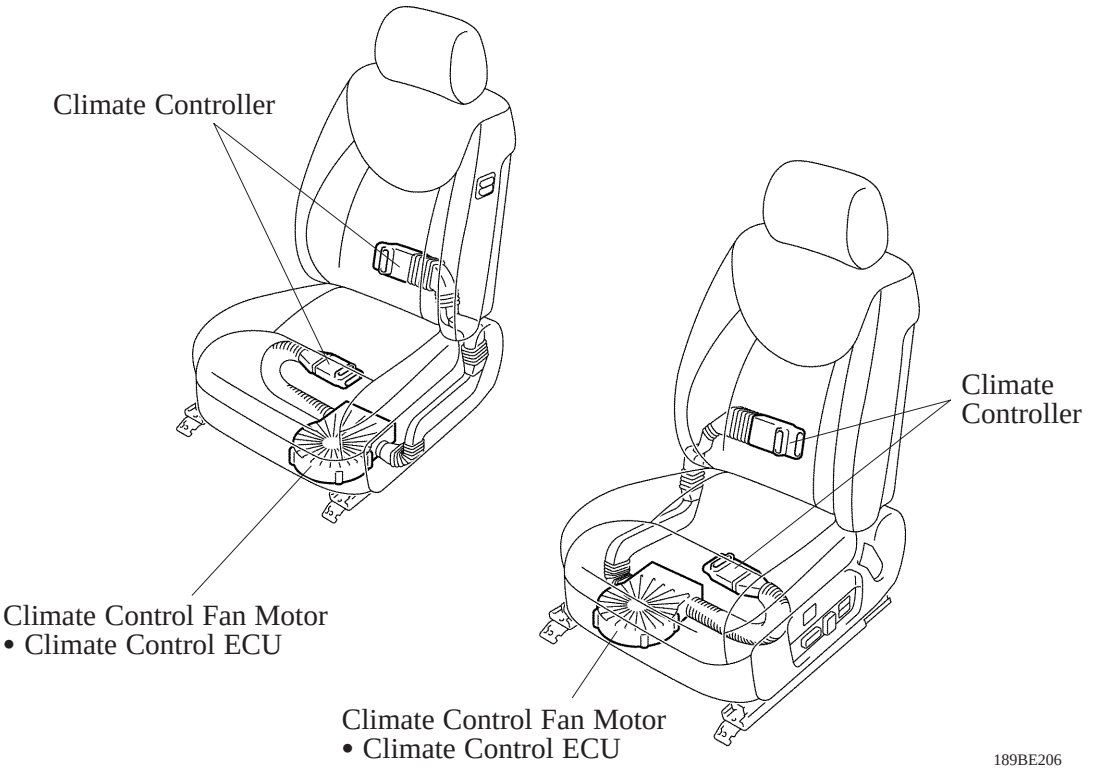
2. Layout of Component





3. Function of Component

Component	Outline
Climate Control Switch	• Switches the modes as follows: cool air in 3 stages, airflow, and warm air in 3 stages. • During failure control, the indicator light in the climate control switch flashes to inform the occupants of the malfunction in the system.
Seat Climate Controller	Cools or warms the airflow from the climate control fan motor upon receiving instructions from the ECU in accordance with the volume setting of the climate control switch.
Temperature Sensor	Detects the surface temperature of the seat back and seat cushion.
Climate Control Fan Motor	Provides airflow to the seat back and seat cushion upon receiving instructions from the ECU in accordance with the volume setting of the climate control switch.
Climate Control ECU	• Controls the system based on the signals from the temperature sensor and the climate control switch. • While the system is activated, only the driver side climate control ECU outputs an idle-up signal.

4. System Operation

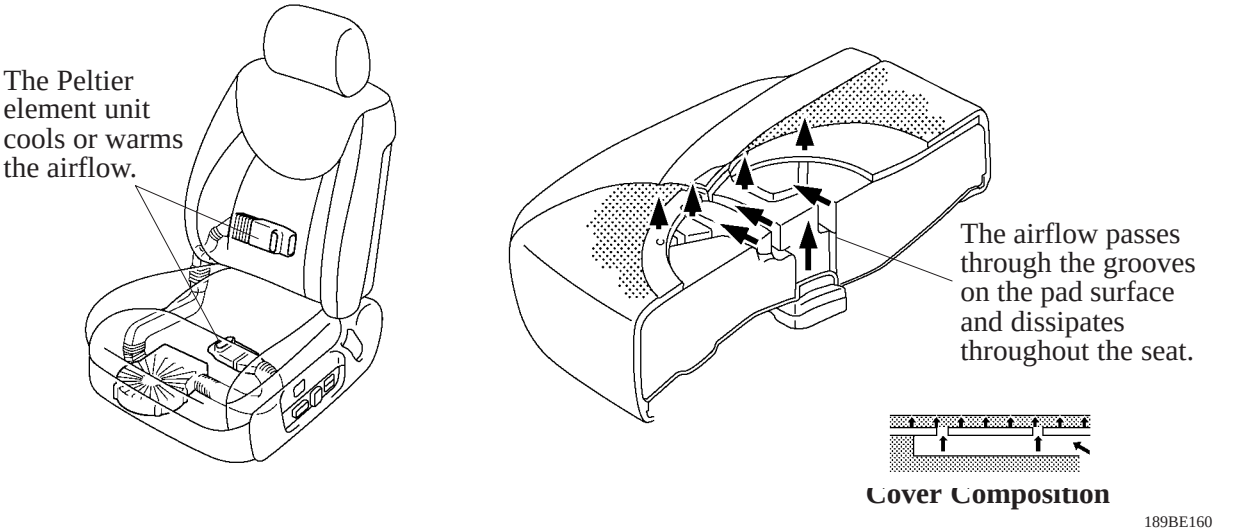
General

This system effects the controls listed below.

Control	Driver	Front Passenger
Normal Control	○	○
Power ON Full-Power Control	○	○
Engine Idle-Up Output Control	○	—
Rear Seat Heater Operation Power-Down Control	○	○
Fail Control	○	○

Normal Control

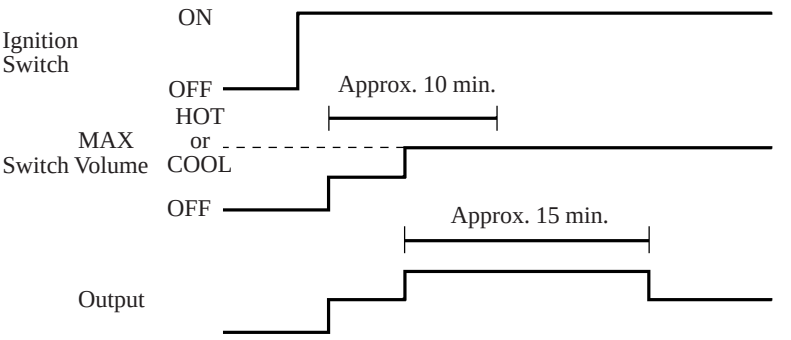
This system operates the climate control fan motor located underneath the seat to provide airflow to the seat cushion and seatback. The airflow is heated or cooled by the Peltier element in the climate controller. The air that flows to the pad surface is distributed by passing through the grooves that are provided on the pad surface. This air is then dissipated throughout the seat through the non-woven cloth layer and is discharged through the seat cover.



Power ON Full-Power Control

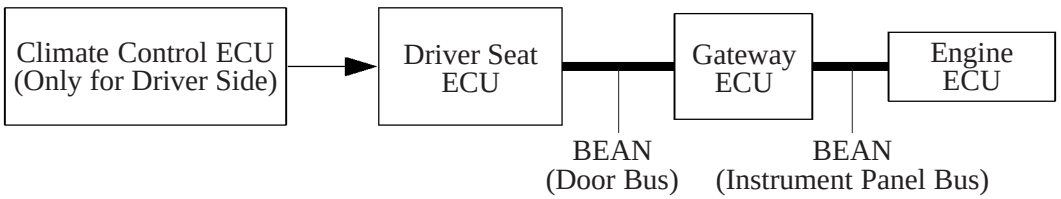
This control outputs maximum voltage to the climate controller and the climate control fan motor for approximately 15 minutes only when the conditions listed below have been met.

- Ignition position ON
- After the climate control switch has been turned ON, the switch volume has subsequently been turned to MAX HOT or COOL within approximately 10 minutes.
- The rear seat heater is not activated.



Engine Idle-Up Output Control

Provided only to the driver side, this control enables the climate control ECU to output an idle-up signal to the driver seat ECU while the system is activated. The driver seat ECU then uses the BEAN to send the idle-up signal to the Engine ECU via the Gateway ECU.



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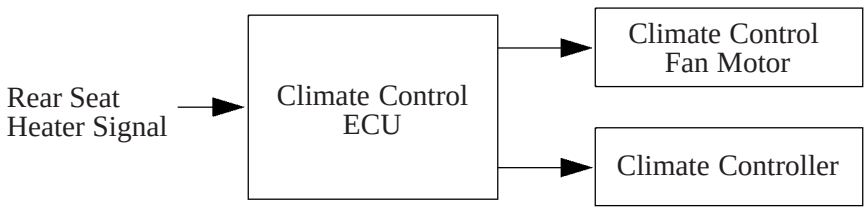
Rear Seat Heater Operation Power-Down Control

This control prohibits full power control while the rear seat heater is being activated.



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Fail Control

a) General

This control effects the following three controls: overcurrent protection control, overheating protection control, and transient voltage drop control.

b) Overcurrent Protection Control

Areas for detecting overcurrent are provided in the climate controller and the climate control fan motor. The indicator light in the climate control switch flashes to inform the occupants of the overcurrent if the conditions listed below have been met. When the climate control switch is turned OFF the indicator light turns OFF, and when the switch is operated, the indicator light operates in accordance with the volume.

Detection Area	Detection Condition
Climate Controller	• The climate control switch is OFF or is not in the airflow mode. • The output waveforms of the climate control fan motor do not match the waveforms of the motor monitor.
Climate Control Fan Motor	• The climate control switch is not turned OFF. • The actuation current of the climate control fan motor has exceeded the specified value continuously for approximately 2 seconds.

c) Overheating Protection Control

Two methods for detecting an overheating condition have been adopted: one that monitors the temperature conditions and the other that monitors the temperature rise.
This control stops or reinstates the output to the climate controller when the conditions listed below have been met.

Detection Area	Detection or Reinstatement Condition
Temperature Conditions	• The climate control switch is OFF or is not in the airflow mode. • The signals input by the temperature sensor exceed the temperatures given below for approximately 1 second or longer: During cooling: 12°C or less During heating: 85°C or more • The reinstatement conditions consist of the signals input by the temperature sensor that continuously exceed the temperatures given below for approximately 1 second: During cooling: 14°C or more During heating: 83°C or less
Temperature Rise	• The climate control switch is set to the cooling mode and the signals input by the temperature sensor exceed 60°C. • The signals input by the temperature sensor have continuously exhibited a temperature rise at 5-second intervals for 2 or more times. • Approximately 15 minutes or longer have elapsed after the climate control switch has been turned ON. • The reinstatement conditions consist of the resumption of system control in accordance with the volume setting of the climate control switch when the signals input by the temperature sensor drop below 40°C.

d) Transient Voltage Drop Control

This control stops the current when the power voltage of the climate control ECU continuously drops below approximately 8V for approximately 10 ms.
The reinstatement conditions consist of the resumption of system control in accordance with the volume setting of the climate control switch when the power voltage of the ECU reaches above approximately 12 V continuously for approximately 10 ms.