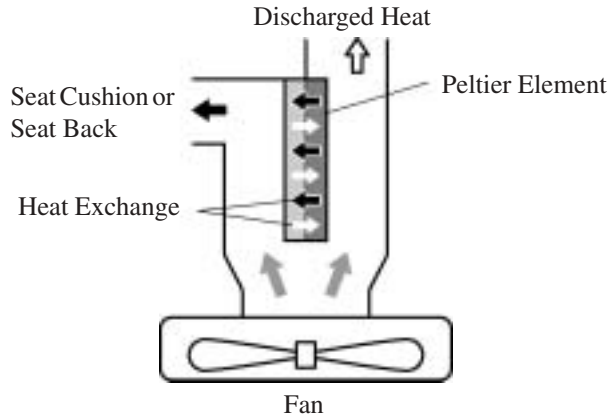


— REFERENCE —

*: *Peltier Element:*

The Peltier element is a semi-conductor element that transfers heat from one side to the other when direct current is applied to it. This feature is utilized to cool one side of the Peltier element and heat the other side. When the current is reversed, the direction of the heat transfer is also reversed. Thus, the heating and cooling effects can be reversed. Also, the amount of heat exchange can be adjusted by varying the voltage.

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4. System Operation

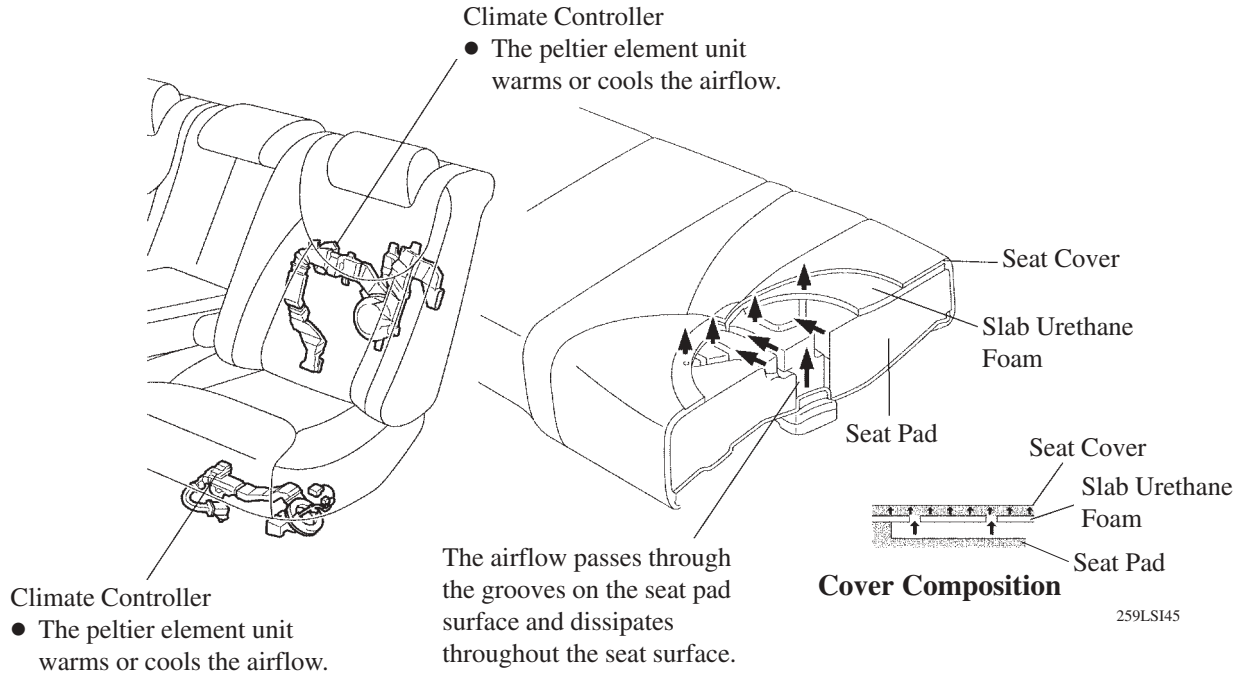
General

This system effects the controls listed below.

Control	Front		Rear
	Driver	Front Passenger	Outer Side
Normal Control	○	○	○
Power ON Full-Power Control	○	○	○
Engine Idle-up Output Control	○	—	○
Fail-safe Control	○	○	○

Normal Control

This system operates the climate control fan motor located underneath the seat to provide airflow to the seat cushion and seat back. The airflow is warmed or cooled by the peltier element in the climate controller. The air that flows to the seat surface is distributed by passing through the grooves that are provided on the seat pad surface. This air is then dissipated throughout the seat surface through the slab urethane foam and is discharged through the seat cover.



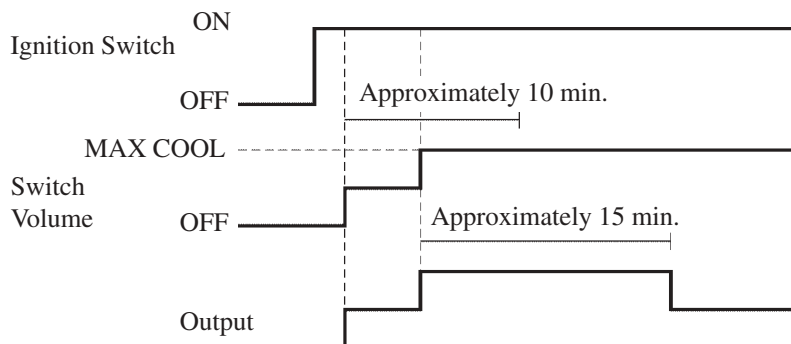
Power ON Full-Power Control

This control outputs maximum voltage to the climate controller and the climate control fan motor when power on.

- While cooling, only a full-power control is performed if the ignition switch in the ON position.
- While heating, a full-power control of the seat heater and TED is performed simultaneously every time the heat switch is turned on.

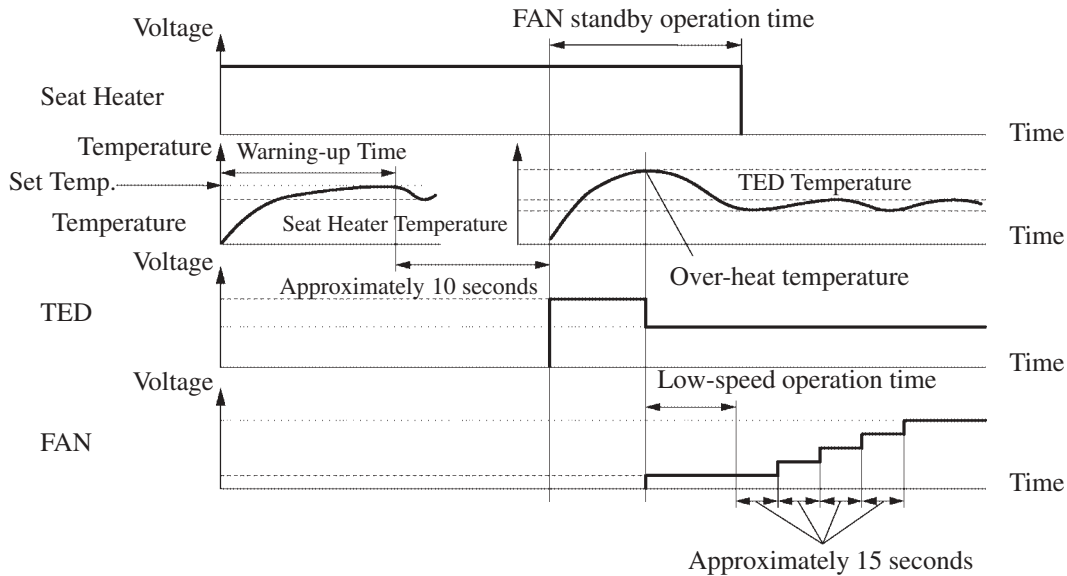
1) MAX COOL Control

- Ignition switch is turned ON position.
- After the climate control switch has been turned ON, the switch volume has subsequently been turned to MAX COOL within approximately 10 minutes.
- Full-power control is performed for approximately 15 minutes.



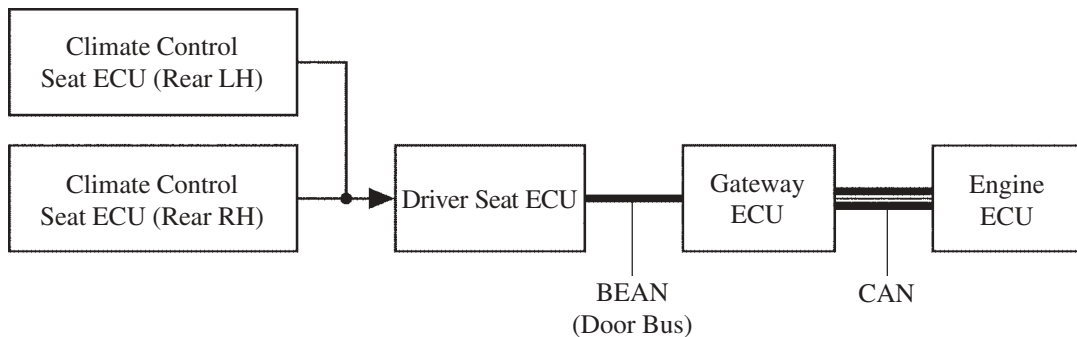
2) MAX HOT Control

- Ignition switch is turned ON position. After the climate control switch has been turned ON, the switch volume has subsequently been turned to MAX HOT.
- When the seat reaches the set temperature, switching the heater on/off keeps the seat temperature.
- TED operates after approximately 10 seconds.
- When the TED over-heat temperature is detected, the output voltage is decreased and the FAN begins to operate. Then, switching the TED on/off keeps the set temperature.
- After a certain time passes, the output voltage to the FAN is increased gradually every 15 seconds.



Engine Idle-Up Output Control

The climate control seat ECU outputs the idle-up signal to the driver seat ECU while it controls the climate control seat system. The driver seat ECU sends the idle-up control demand signal to the engine ECU.



Fail-Safe Control

1) General

Fail-safe control effects the following six controls.

- Overcurrent protection control
- Overheating protection control
- Transient voltage drop control
- Switch input voltage detection control
- Power source short detection control
- Temperature sensor open/short detection control

2) Overcurrent Protection Control

Areas for detecting overcurrent are provided in the climate controller and the climate control fan motor. The climate control stops or reinstates when the conditions listed below have been met.

At this time, the indicator light in the climate control switch blinks to inform the occupants of the overcurrent.

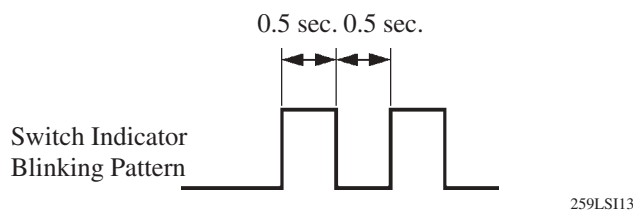
a. Climate Controller

Detection Condition	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control switch is ON. (without airflow mode) • The climate control ECU constantly monitors the input current into the TED and seat heater. When this input current waveform from the TED and seat heater does not conform with the waveform to the TED and seat heater 10 times or more.
Reinstatement Condition	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.

b. Climate Control Fan Motor

Detection Condition	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control switch is ON. (without airflow mode) • The actuation current (approximately 6 A) of the climate control fan motor has exceeded the specified value continuously for approximately 2 seconds.
Reinstatement Condition	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.

► Blinking Pattern ◀



3) Overheating Protection Control

Two methods for detecting an overheating condition are used: one that monitors the temperature condition 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.

a. Temperature Condition

Detection Condition	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control switch is ON. (without airflow mode) • The signals input by the temperature sensor built in the climate controller exceeds the temperatures given below for approximately 1 second or longer: <ul style="list-style-type: none"> During Cooling: 12°C (54°F) or less During Heating: 74°C (165°F) or more
Reinstatement Condition	The restatement conditions consist of the signals input by the temperature sensor that continuously exceed the temperature given below for approximately 1 second: <ul style="list-style-type: none"> During Cooling: 14°C (57°F) or less During Heating: 72°C (162°F) or more

b. Temperature Rise

Detection Condition	When both conditions listed below have been met:
	<ul style="list-style-type: none"> • The climate control switch is set to the cooling mode and the signals input by the temperature sensor exceed 60°C (140°F). • The signals input by the temperature sensor have continuously exhibited a temperature rise at 5 seconds intervals for 2 or more times.
Reinstatement Condition	When both conditions listed below have been met:
	<ul style="list-style-type: none"> • The climate control switch is set to the cooling mode and the signals input by the temperature sensor exceed 60°C (140°F). • Approximately 15 minutes or longer have elapsed after the climate control switch has been turned ON.
Reinstatement Condition	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 (104°F).

4) Transient Voltage Drop Control

When the power source voltage of the climate control ECU has met the conditions listed below, this control stops or is reinstated.

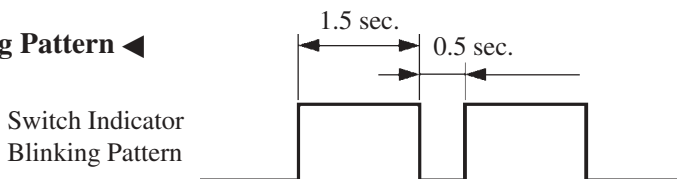
Detection Condition	When both conditions listed below have been met:
	<ul style="list-style-type: none"> • The climate control switch is ON. • Continuously drops below approximately 8 V for approximately 10 msec.
Reinstatement Condition	The reinstatement conditions consist of the resumption of system 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 msec.

5) Switch Input Voltage Detection Control

When the input voltage of the climate control switch has met the conditions listed below, this control stops or is reinstated. At this time, the indicator light in the climate control switch blinks to inform the occupant.

Detection Condition	When both conditions listed below have been met:
	<ul style="list-style-type: none"> • The climate control switch is ON. • The input voltage is outside of the normal range (approximately 0.43 V or below, or 4.24 V or above) for approximately 1 second or more.
Reinstatement Condition	The reinstatement condition consists of the climate control switch being turned OFF.

► Blinking Pattern ◀

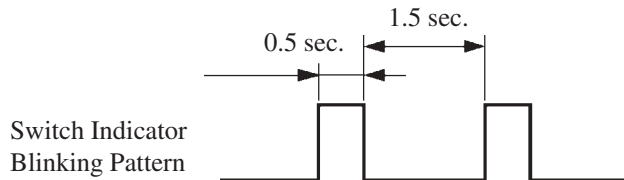


6) Power Source Short Detection Control

When the voltage of the climate control switch that supplies current to the power source terminals (V5, TB5, TC5, and H5) and the temperature sensor have met the conditions listed below, this control stops or is reinstated. At this time, the indicator light in the climate control switch blinks to inform the occupant.

Detection Condition	When the climate control switch for the power source terminals (V5, TB5, TC5, and H5) and the temperature sensor are approximately 1V or less for approximately 20 msec or more.
Reinstatement Condition	The reinstatement condition consists of the climate control switch being turned from ON to OFF.

► **Blinking Pattern** ◀



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7) Temperature Sensor Open/Short Detection Control

The voltage of the temperature sensors that is supplied to the input signal terminals (TBS, TCS, and HS) has met the conditions listed below, this control stops or is reinstated. At this time, the indicator light in the climate control switch blinks to inform the occupant.

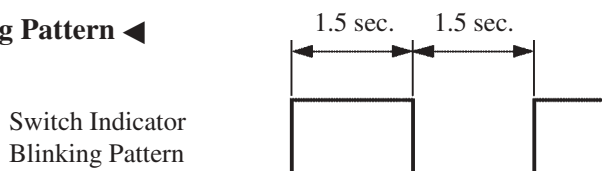
a. Temperature Sensor (for Climate Control)

Detection Condition	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control is in the warm mode and the temperature sensor's detection value is 130°C (266°F) or more or -20°C (68°F) or less. • There are no changes in the temperature sensor temperature for two consecutive times at 5-second intervals.
	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control is in the cool mode and the temperature sensor's detection value is 130°C (266°F) or more. • There are no changes in the temperature sensor temperature for two consecutive times at 5-second intervals.
Reinstatement Condition	The reinstatement condition consists of the climate control switch being turned OFF.

b. Temperature Sensor (for Seat Heater)

Detection Condition	When both conditions listed below have been met: <ul style="list-style-type: none"> • The climate control is in the warm mode and the temperature sensor's detection value is 130°C (266°F) or more or -30°C (86°F) or less. • There are no changes in the temperature sensor temperature for two consecutive times at 10-second intervals.
Reinstatement Condition	The reinstatement condition consists of the climate control switch being turned OFF.

► **Blinking Pattern** ◀



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