

PTC HEATER

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Purpose

- The PTC heater is a supplementary heater which uses electricity as the heat source to improve the heating performance of the A/C unit temporarily when the diesel engine is cold.

Function

- The PTC heater performs operation necessity determination of the climate control unit, and the front body control module (FBCM) performs operation permission determination and controls the PTC heater.
- The PTC heater warms the air passing through the A/C unit by generating heat.

PTC heater operation necessity determination

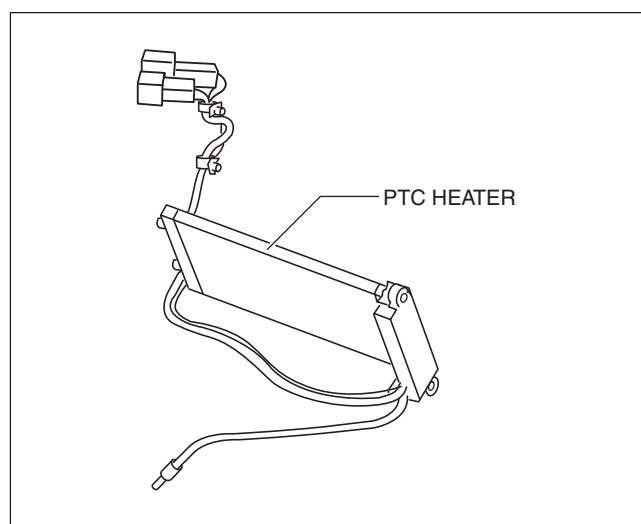
- When the airflow volume setting is 1 or higher, the climate control unit determines the necessity of operating the PTC heater based on the ambient temperature, airflow temperature setting, cabin temperature, and the engine coolant temperature.

PTC heater operation permission determination

- The front body control module (FBCM) determines the necessity of operating the PTC heater according to the vehicle conditions when the PTC heater operation request signal is received from the climate control unit, and it calculates the output value based on the ambient temperature and engine coolant temperature to operate the PTC heater.

Construction

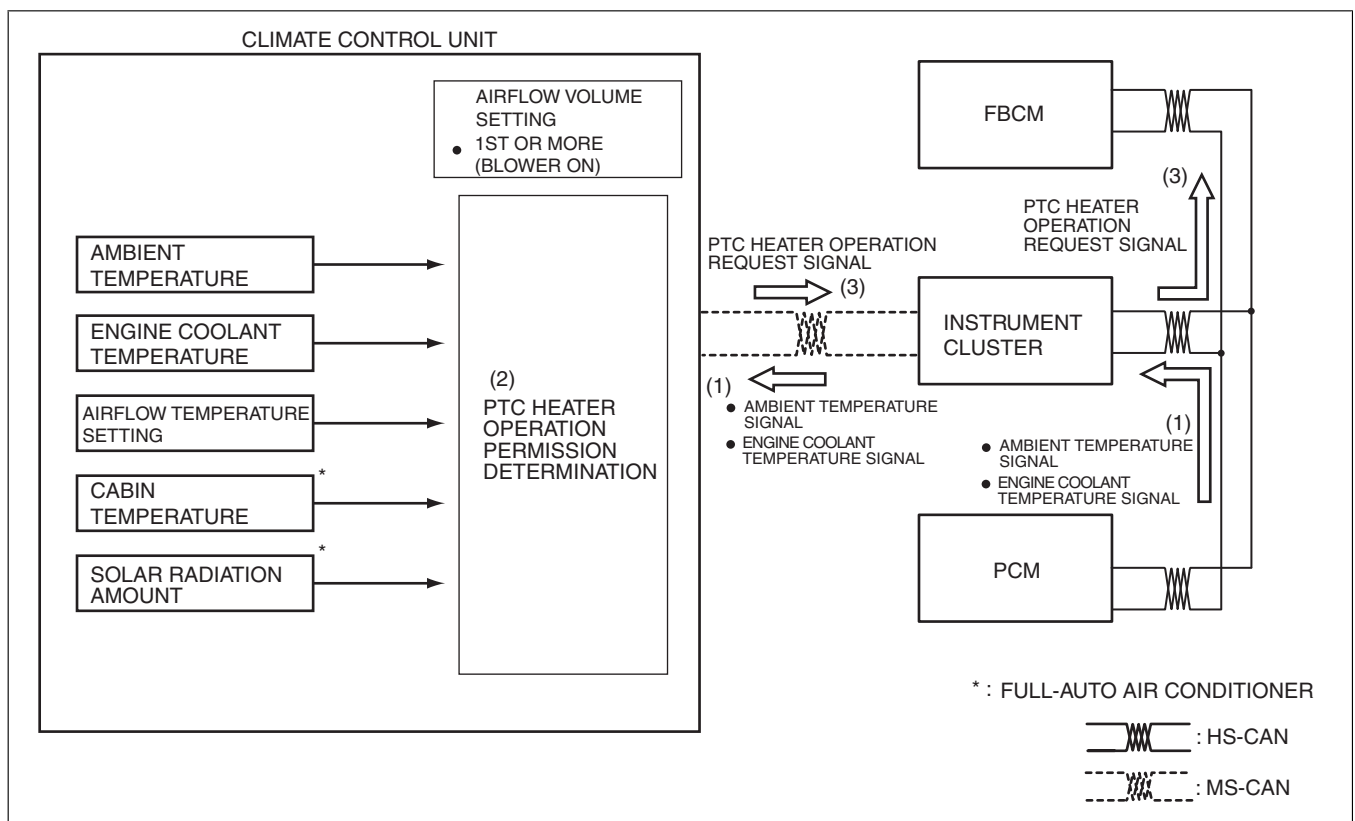
- The PTC heater consists of the heater element (PTC element), fins, and the case, and it generates heat by passing electric current to the heater element.
- The electrical resistance of the PTC heater has a tendency to increase in proportion to the heat generation of the heater element (PTC element).



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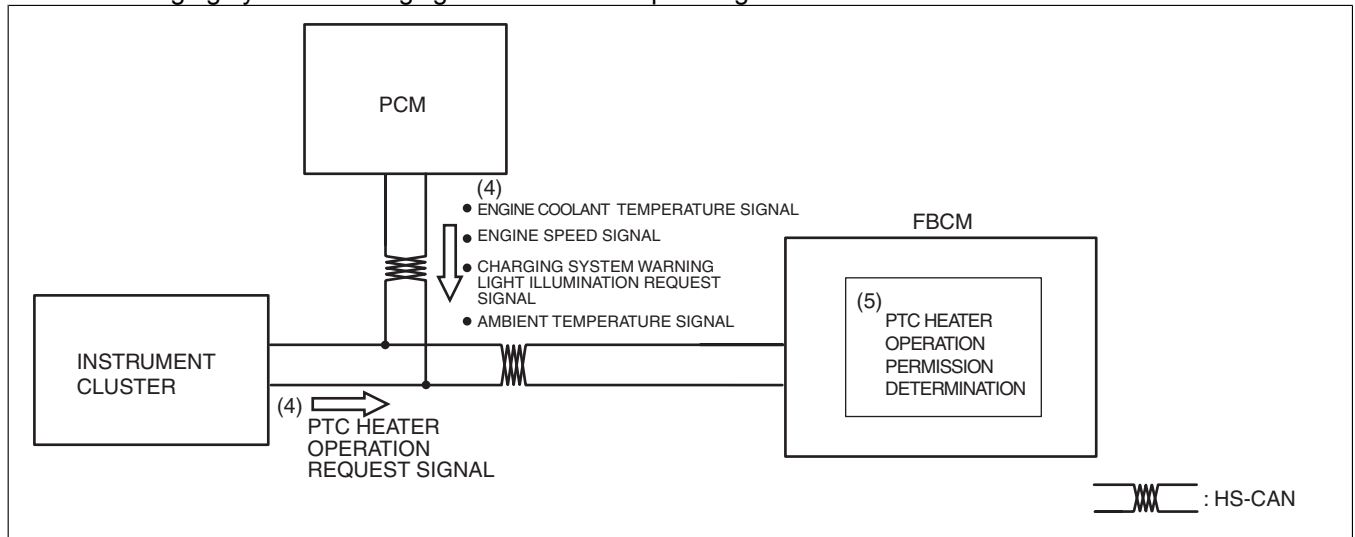
Operation

1. When the ignition is switched ON (engine on), the climate control unit receives (1) the ambient temperature signal and the engine coolant temperature signal from the PCM.
2. When the airflow volume setting is 1 or higher, the climate control unit determines (2) the necessity of operating the PTC heater based on the ambient temperature and the engine coolant temperature.
3. When the climate control unit determines the necessity of operating the PTC heater, it sends (3) the PTC heater operation request signal to the front body control module (FBCM).



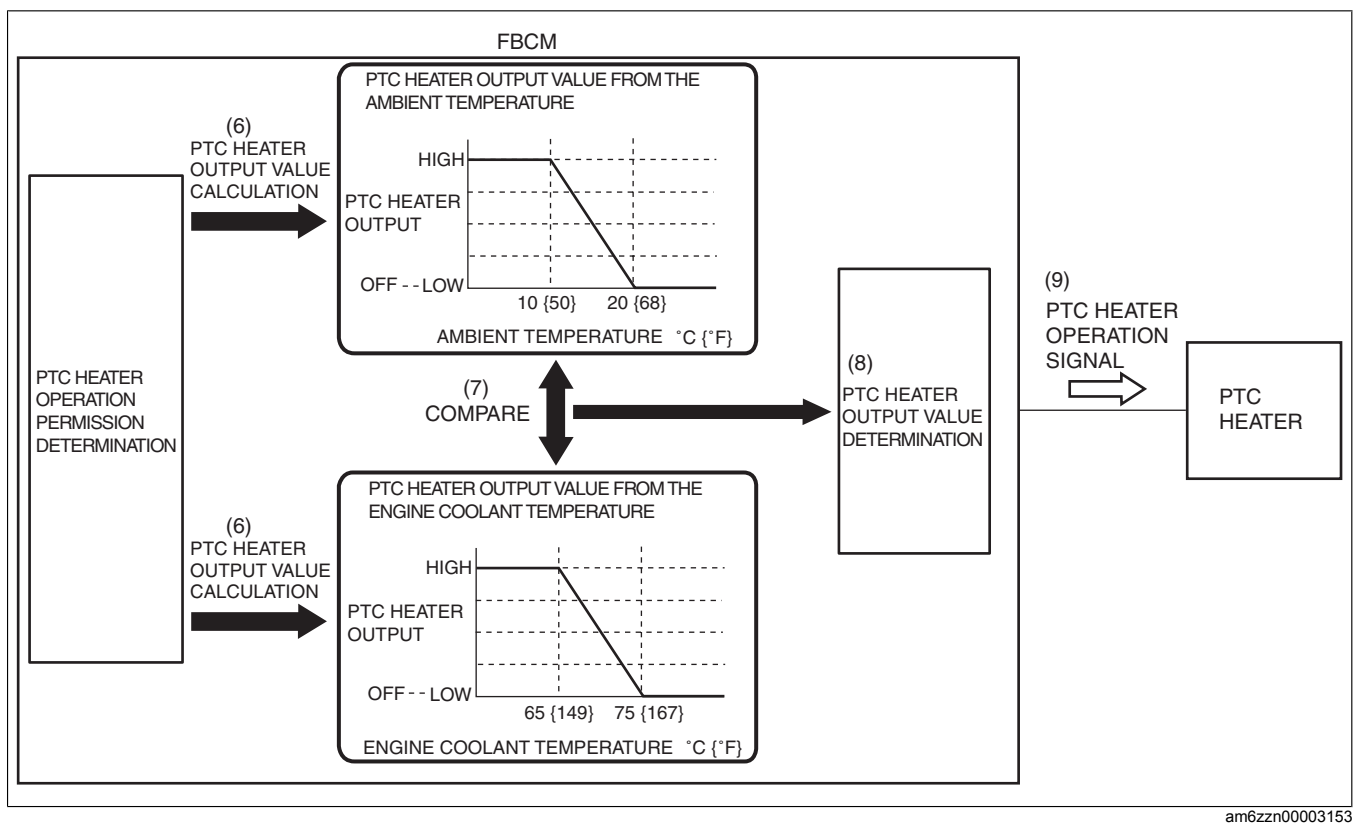
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4. When the PTC operation request signal from the climate control unit is received and all of the following conditions (4) are met, the front body control module (FBCM) permits (5) the operation of the PTC heater.
- Receives engine speed of **400 rpm** or more signal
 - Receives ambient temperature signal of less than **20 °C {68 °F}**
 - Receives engine coolant temperature signal of less than **75 °C {167 °F}**
 - PTC heater operation request signal is received
 - Charging system warning light illumination request signal is not received



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5. When the PTC heater operation permission is determined, the front body control module (FBCM) calculates (6) the PTC heater output based on the ambient temperature and engine coolant temperature.
6. The front body control module (FBCM) compares (7) each calculated PTC heater output from the ambient temperature and engine coolant temperature, and determines (8) the lower PTC heater output value as the PTC heater output value.
7. The front body control module (FBCM) outputs (9) a PTC heater operation signal based on the determined PTC heater output value.



Fail-safe

- The front body control module (FBCM) inhibits the PTC heater operation if each of the signals cannot be received.