■AIR CONDITIONER CONTROL

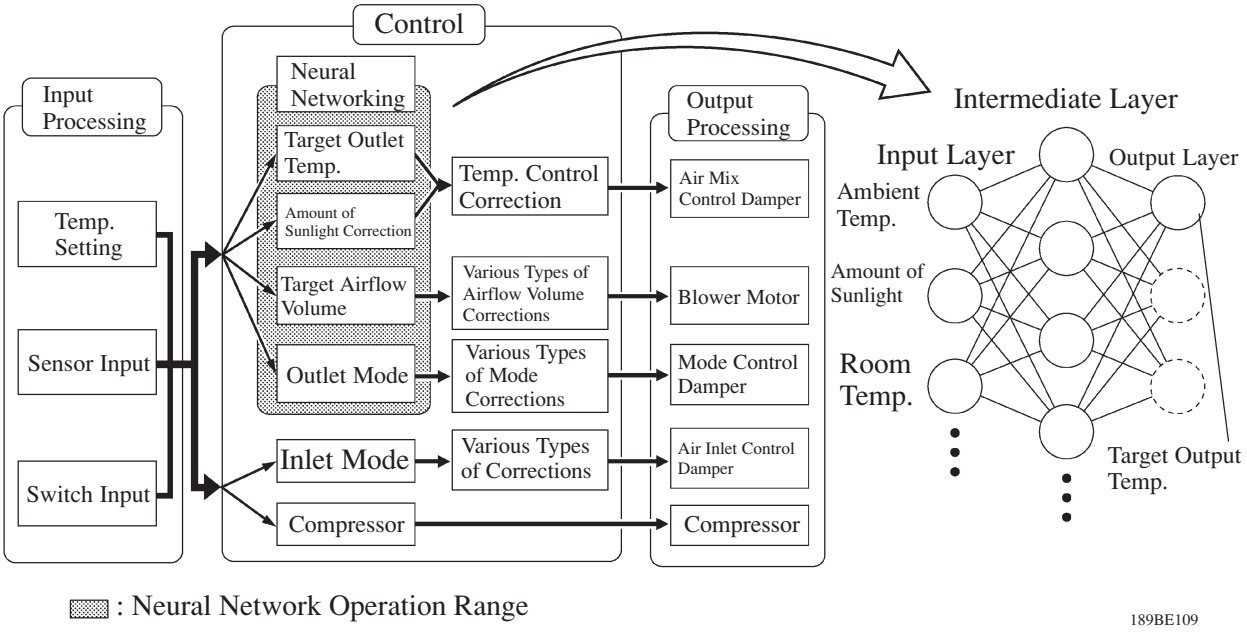
1. Air Conditioner ECU

The air conditioner ECU has following controls.

Control	Outline	Automatic	Manual
Neural Network Control [See next page]	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input/output relationship that is similar to a human brain.	○	—
Outlet Air Temperature Control	In compliance with the temperature setting at the temperature control switch, the neural network control calculates the outlet temperature based on the input signals from various sensors. In addition, corrections in accordance with the signals from the evaporative temperature sensor and the water temperature sensor are added to control the outlet air temperature.	○	—
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Outlet Control	Automatically switches the outlets in accordance with the outlet mode ratio that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Inlet Control	Automatically controls the air inlet control damper in accordance with the airflow volume that has been calculated by the neural network control.	○	—
Variable Capacity Compressor Control	Controls the compressor to turn ON/OFF and the discharge capacity based on the signals from various sensors.	○	○
Outer Temperature Indication Control	Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioner ECU, and shown in the multi-information display in the combination meter and air conditioner panel.	○	—
Rear Window Defogger Control	Switches the rear defogger on for 15 minutes when the rear defogger switch is switched on. Switches it off if the switch is pressed while it is operating.	○	—
Pollen Removal Mode Control [See page BE-53]	Quickly removes pollen from the face areas of the driver and front passenger when the pollen removal mode switch is pressed.	○	—
Self-diagnosis	Checks the sensors in accordance with operation of air conditioner switches, then clock displays a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).	○	○
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioner switches (actuator check function).	○	—

2. Neural Network Control

- In the previous automatic air conditioner system, the ECU determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors.
  However, because the sensors of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, but extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network is used in the automatic air conditioner system. With this technique, the data that has been collected under varying environmental conditions is stored in the ECU, which effects control to provide enhanced air conditioner comfort.
- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, air conditioner ECU controls the servomotors and blower motor in accordance with the control volumes that have been calculated by the neural network control.

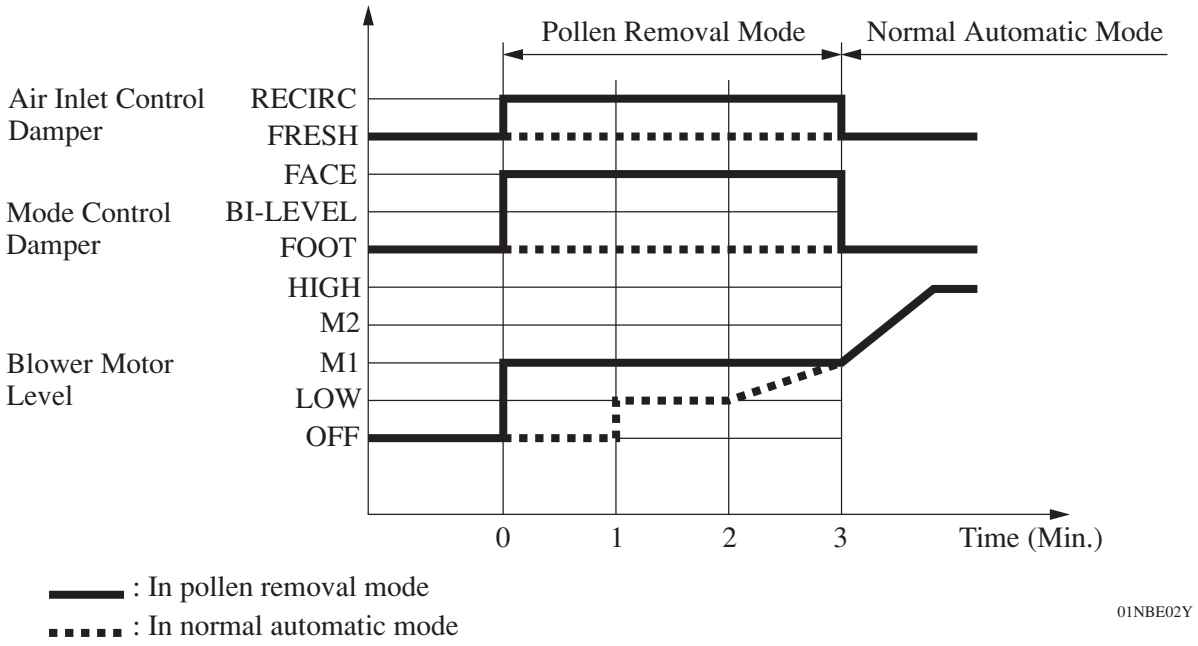


3. Pollen Removal Mode Control

Operation

- When the pollen removal mode switch is pressed, the air conditioner ECU changes to the recirculation mode and face mode. This allows the air conditioner to direct clean air, which has passed through the clean air filter, to the face areas. Thus, the air conditioner removes pollen and captures it in the clean air filter.
- From the pollen removal mode control, the air conditioner automatically resumes normal automatic mode control after 3 minutes at normal temperatures, or after 1 minute when the outside temperature is low (5°C maximum).

▶ Example of Operation in Warm-up ◀



4. Self-diagnosis

The air conditioner ECU has a self-diagnosis function. It stores any operation failures in the air conditioner system memory in the form of DTC (Diagnostic Trouble Code).
For details, see the RAV4 Repair Manual (Pub. No. RM01N0E).