■SYSTEM CONTROL

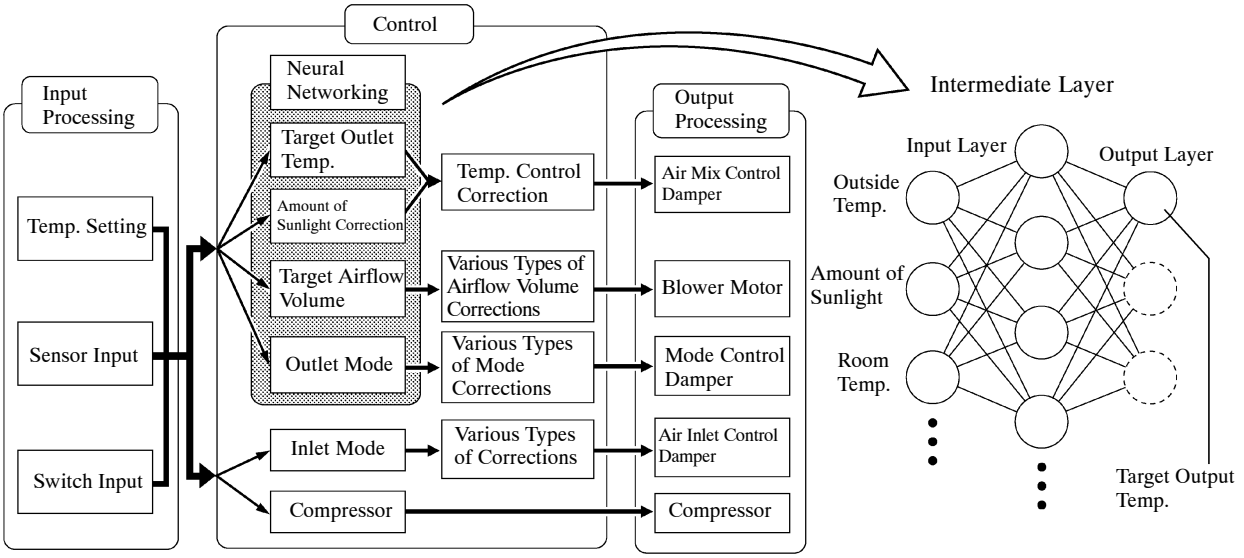
1. General

The air conditioning system has the following controls.

Control	Outline	Automatic A/C	Manual A/C
Neural Network Control [See page BE-60]	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.	○	—
Manual Control	The A/C ECU controls the damper positions (air inlet control damper, air mix control damper and mode control damper) and blower speed in accordance with the positions of the switches (temperature control switch, blower switch, mode select switch and air inlet control switch).	—	○
Outlet Air Temp. Control	Based on the temperature set at the temperature control switch, the neural network control calculates the outlet air temperature based on the input signals from various sensors.	○	—
	The temperature settings for the driver and front passenger are controlled independently in order to provide separate vehicle interior temperatures for the right and left sides of the cabin. Thus, air conditioning that accommodates the occupants' preferences has been realized.	○	—
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 air outlets in accordance with the outlet mode that has been calculated by the neural network control based on the input signals from various sensors.	○	—
	In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower, outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to FOOT/DEF mode to prevent the windows from becoming fogged when the outside air temperature is low.	○	—
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated required outlet air temperature.	○	—
Compressor Control	Through the calculation of the target evaporator temperature based on various sensor signals, the A/C ECU optimally controls the discharge capacity by regulating the opening extent of the A/C compressor solenoid valve.	○	○
	The A/C ECU compares the A/C pulley speed signals, which are transmitted by the lock sensor located on the A/C compressor, with the engine speed signals, which are transmitted by the ECM (crankshaft position sensor). When the A/C ECU determines that the A/C pulley is locked, it turns off the magnetic clutch. (Only for models with 2GR-FE engine)	○	○
MAX A/C Control	When the temperature control switch is in the MAX A/C position, the A/C ECU turns the compressor on and activates the servomotor (air inlet) to set the air inlet control damper to the RECIRC position, improving the cooling efficiency.	—	○
Rear Window Defogger Control [See page BE-172]	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger button is pressed. Switches them off if the button is pressed again while they are operating.	○	○
Outside Temperature Indication Control	Calculates the outside temperature using signals transmitted by the outside temperature sensor. Calculated values are corrected by the A/C ECU and then indicated on the multi-information display.	○	○
Self-Diagnosis [See page BE-61]	A DTC (Diagnostic Trouble Code) is stored in the memory when the A/C ECU detects a problem with the air conditioning system.	○	○

2. Neural Network Control

- In previous automatic air conditioning systems, the A/C 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 senses 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, or 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 conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the A/C ECU. The A/C ECU can then effect control to provide enhanced air conditioning 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, the A/C ECU controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.



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3. Self-Diagnosis

- The A/C ECU has a self-diagnosis function. It stores any operation failures in the air conditioning system memory in the form of DTC (Diagnostic Trouble Code).
- There are two methods for reading DTC. One is to use a hand-held tester, and the other is to read DTC indicated on the heater control panel display (Only for models with automatic air conditioning).
- For details, see the 2007 Camry Repair Manual (Pub. No. RM0250U).

Service Tip

The A/C ECU uses the CAN protocol for diagnostic communication. Therefore, a hand-held tester and a dedicated adapter [CAN VIM (Vehicle Interface Module)] are required for accessing diagnostic data. For details, see the 2007 Camry Repair Manual (Pub. No. RM0250U).