

■ SYSTEM CONTROL

1. General

The air conditioner system has following control.

Control	Outline
Neural Network Control [See page BE-93]	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.
Automatic Recirculation Control* [See page BE-94]	Automatically changes the air inlet mode to the fresh air or recirculation air mode according to the level of harmful elements in the outside air, cabin temperature, and outside temperature.
Removal Pollen Mode Control [See page BE-95]	Activated by the pollen removal switch operation. Switches the air vent to the FACE mode. Sends air which has passed through the clean air filter to the area around the upper part of the bodies of the driver and front passenger. This air filtered by the clean air filter in order to remove pollen.
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 setting for the driver and front passenger is controlled independently in order to provide a separate vehicle interior temperature for the right and left side of the vehicle. 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 the FOOT/DEF mode to prevent the window from becoming fogged when the outside air temperature is low.
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated outlet air temperature that is required.
	Drives the servo motor (for air inlet) according to the operation of the air inlet control switch and moves the dampers to the FRESH or RECIRC position.
Compressor Control	This control turns OFF the magnetic clutch of the A/C compressor when the blower motor is turned OFF at the time the engine coolant temperature is below a predetermined value, an abnormal refrigerant pressure has been detected, or the discharge temperature of the evaporator is below a predetermined value (evaporator too cold).
	A/C ECU turns the compressor off if the engine coolant temperature becomes abnormally hot (115°C [239°F] or above) when driving under a high load.
Glow Plug Control [See page BE-96]	The A/C ECU and Engine ECU operate two glow plugs in engine coolant to reduce the period of increased fuel consumption due to a cold engine, and to improve heater performance.

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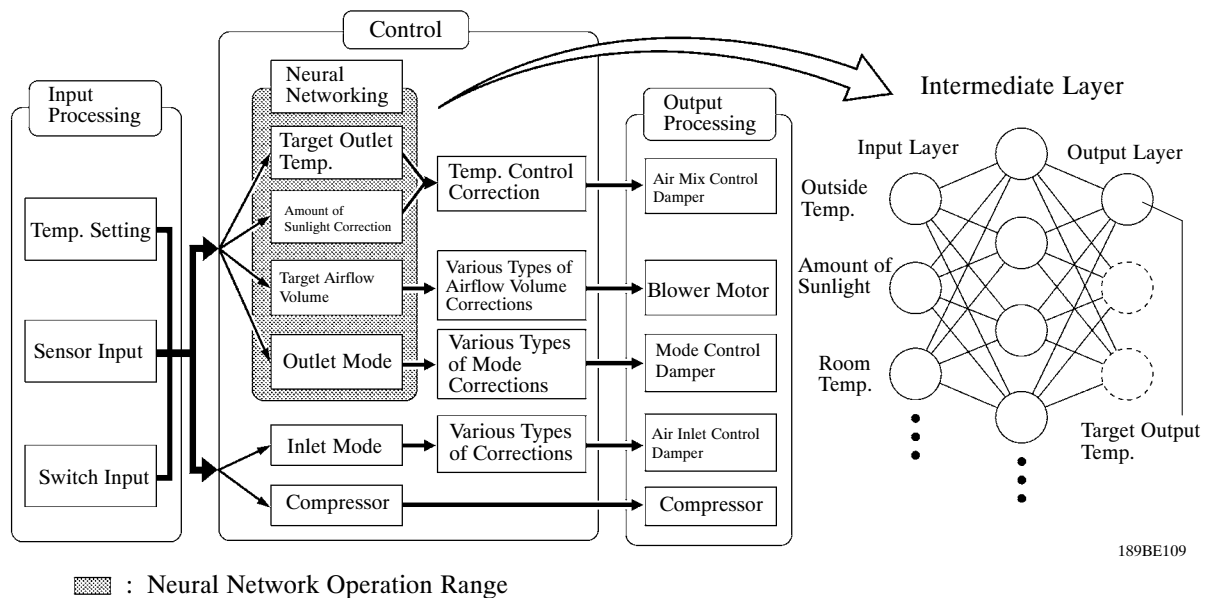
Control	Outline
Rear Window Defogger Control [See page BE-272]	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger button is pressed. Switches them off if the button is pressed while they are operating.
Outside Temperature Indication Control	Based on the signals from the outside temperature sensor, this control calculates the outside temperature, this value is then corrected in A/C ECU, and shown on the multi information display.
Self-Diagnosis [See page BE-96]	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 conditioner 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 has been adopted in the automatic air conditioner 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.

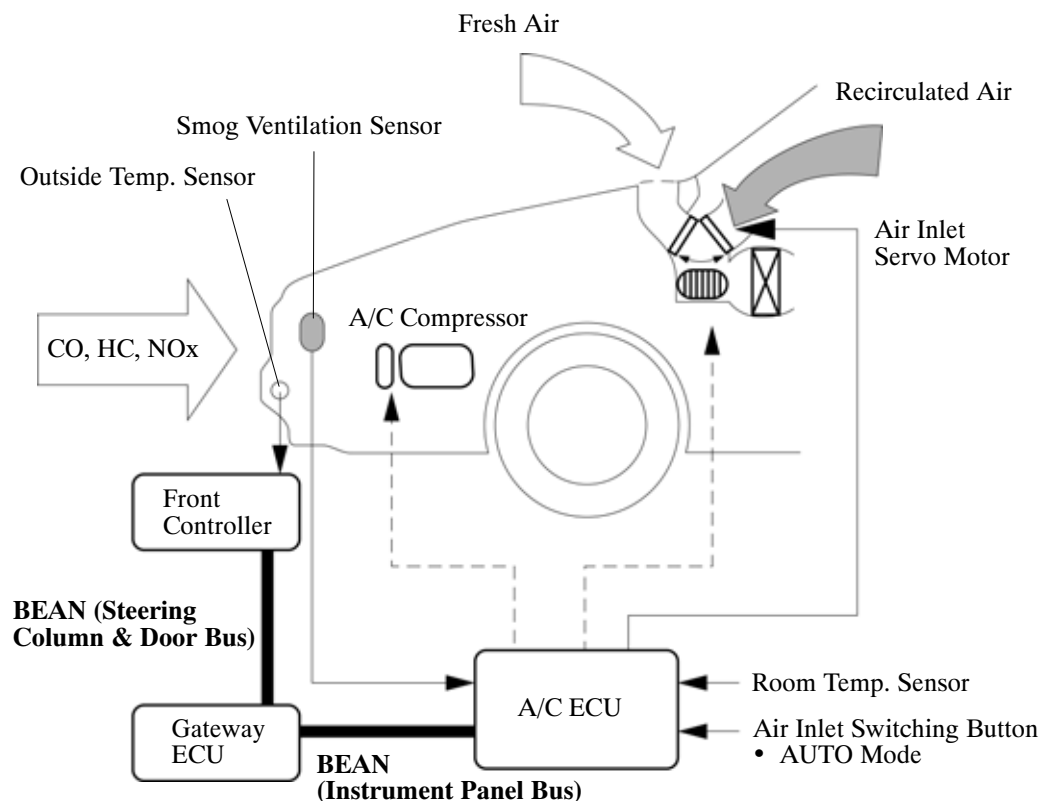
- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the 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.



3. Automatic Recirculation Control

When the automatic recirculation control is operating, the A/C ECU automatically changes the air inlet mode to the fresh air or recirculate air mode based on signals from the smog ventilation sensor, outside temperature, and room temperature sensors when the AUTO air inlet mode is selected.

- The A/C ECU detects harmful elements (CO, HC, and NO_x) based on smog ventilation sensor signals and automatically switches the air inlet mode to the recirculate air mode to prevent such harmful elements from entering the cabin.
- The A/C ECU detects room temperature based on a room temperature sensor signal and automatically switches the air inlet mode to the recirculate air mode to prevent the room temperature from becoming too high.
- The A/C ECU detects the outside temperature based on an outside temperature sensor signal and automatically switches the air inlet mode to the fresh air mode to prevent the windshield from fogging up.



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NOTE:

The smog ventilation sensor cannot detect elements such as the smoke from a bonfire or factory exhaust, foul or animal odors, and dirt or dust particles. Therefore, the air inlet modes are not switched in accordance with those elements.

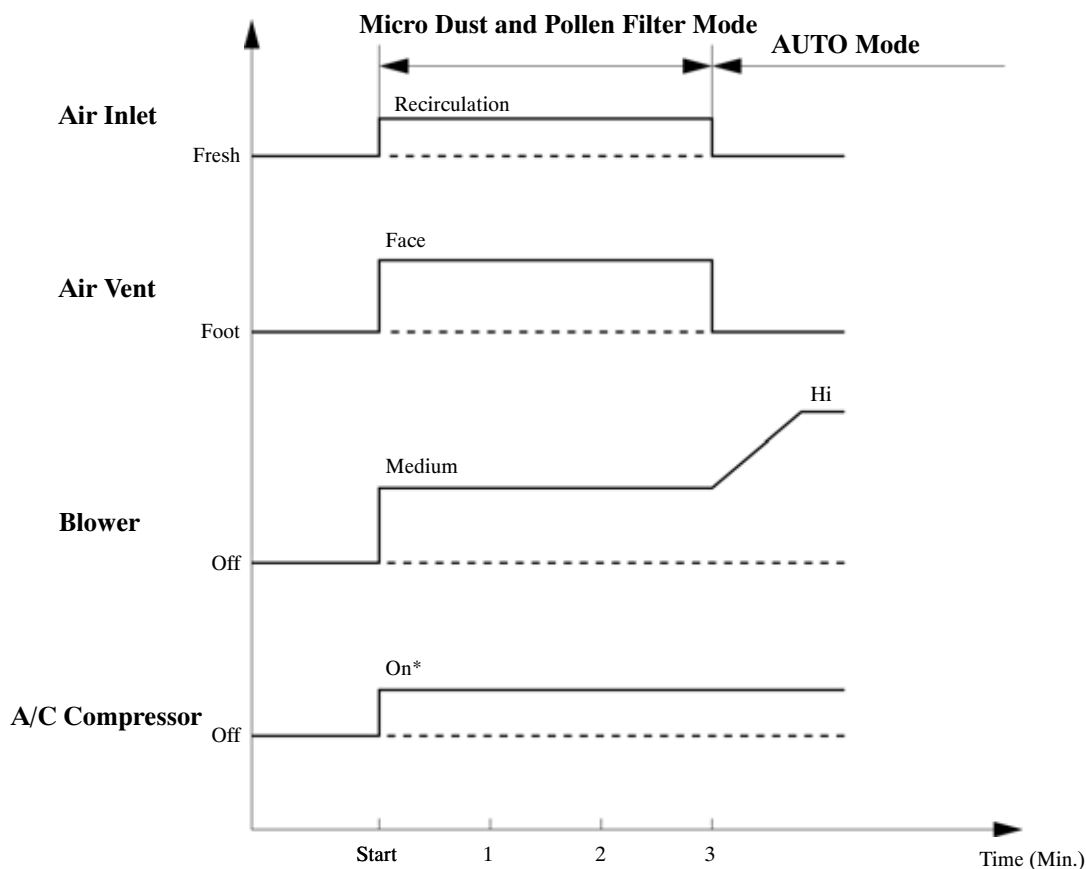
Depending on the direction of the wind, the smog ventilation sensor might not be able to detect the undesirable elements, allowing the odor to enter the cabin.

4. Pollen Removal Mode Control

When the pollen removal switch is pressed, the pollen removal mode control is activated. Then, the air vent is switched to the FACE mode and recirculated pollen free air flows in the area around the upper part of the bodies of the driver and front passenger.

- When the pollen removal switch signal is input to the A/C ECU, the A/C ECU controls the A/C compressor, air inlet servo motor, air vent servo motor and blower motor as shown in the timing chart below.
- This control usually operates for approximately 3 minutes. However, when the outside temperature is low, it will operate for approximately 1 minute.
- After this control stops operating, the A/C ECU controls the air conditioning system using the AUTO mode.

► Sample Timing Chart ◀

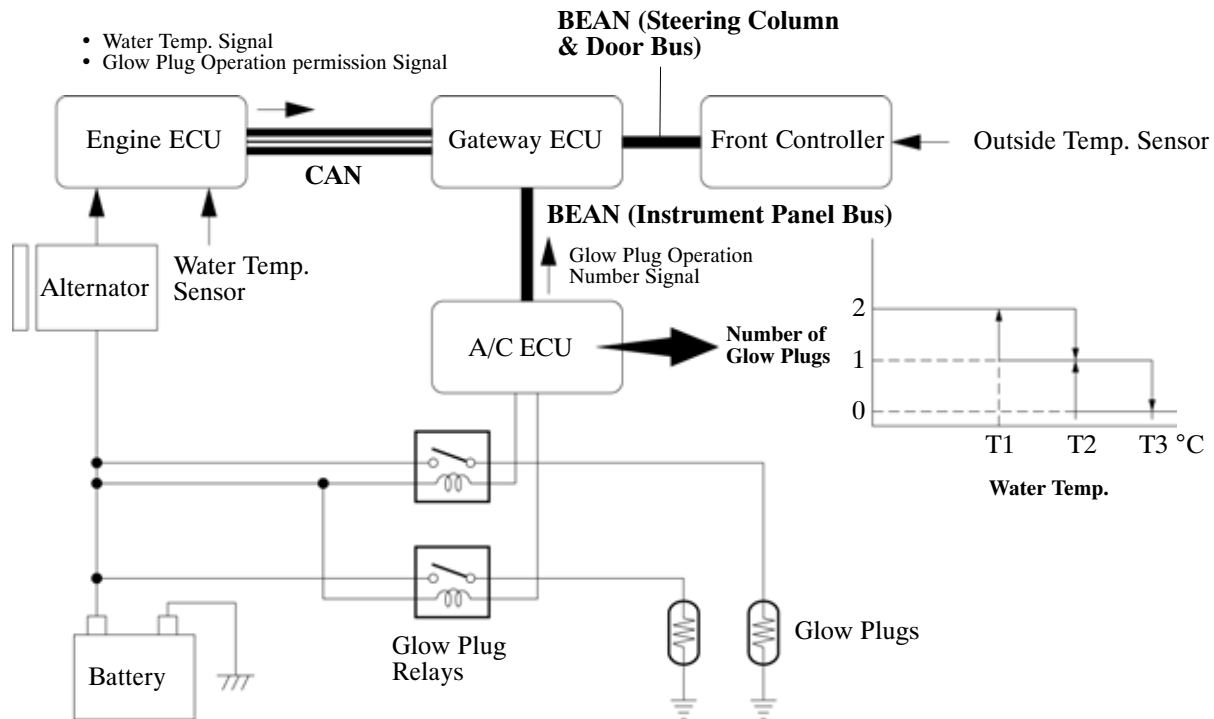


*: The A/C compressor turns on only when the outside temperature is low. The A/C compressor remains on over after the micro dust and pollen filter mode is cancelled.

5. Glow Plug Control

In the glow plug control, the A/C ECU and Engine ECU operate two glow plugs to reduce the period of increased fuel consumption due to a cold engine and to improve heater performance.

- A/C ECU and Engine ECU control this control.
- The A/C ECU determines the glow plug operation number based on the water temperature, the outside temperature and A/C Max. Hot state. The A/C ECU then transmits request signals to the Engine ECU.
- Based on the request signals from the A/C ECU and a voltage generation rate signal from the alternator, the Engine ECU transmits a glow plug operation permission signal to the A/C ECU.



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6. Self-Diagnosis

A/C ECU has a self-diagnostic function. It stores a record of any air conditioning system failures in memory in the form of DTC (Diagnostic Trouble Code).

- There are two methods for reading DTCs. One is to use an intelligent tester II, and the other is to read the DTC on the heater control panel display.

For details, see the LEXUS IS250 Repair Manual (Pub. No. RM0150E).