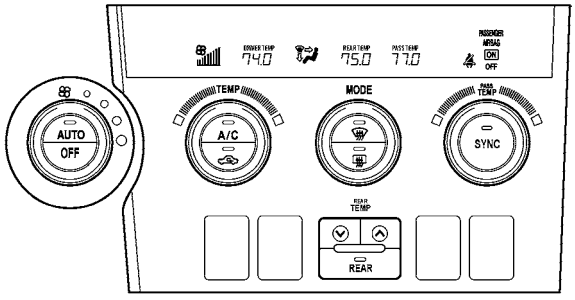
■CONSTRUCTION AND OPERATION

1. Heater Control Panel

Front Heater Control Panel

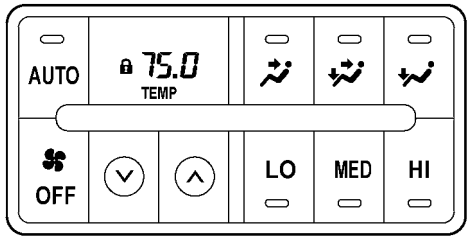
- An electric heater control panel is used.
- The front heater control panel has large switches and knobs, improving ease of use and visibility.



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Rear Heater Control Panel

- The set temperature for rear seats and the operation mode for the rear air conditioning can be adjusted by individually operating the switches arranged on the rear heater control panel located behind the center console.
- The set temperature for the rear air conditioning zone is displayed on the LCD (Liquid Crystal Display) of the rear heater control panel.

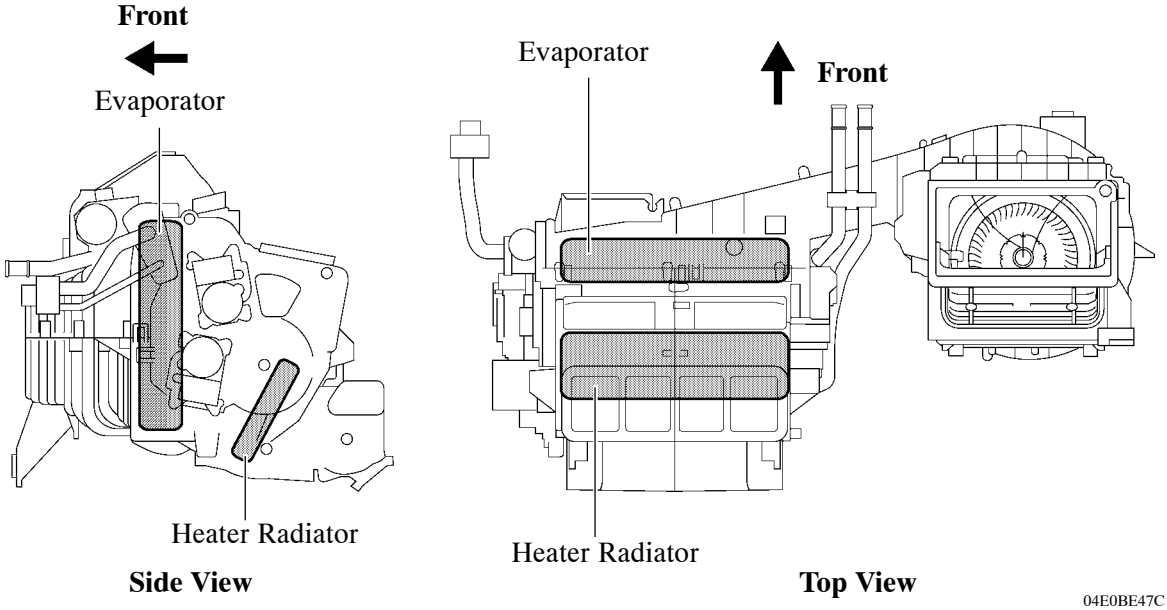


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2. Front Air Conditioning Unit

General

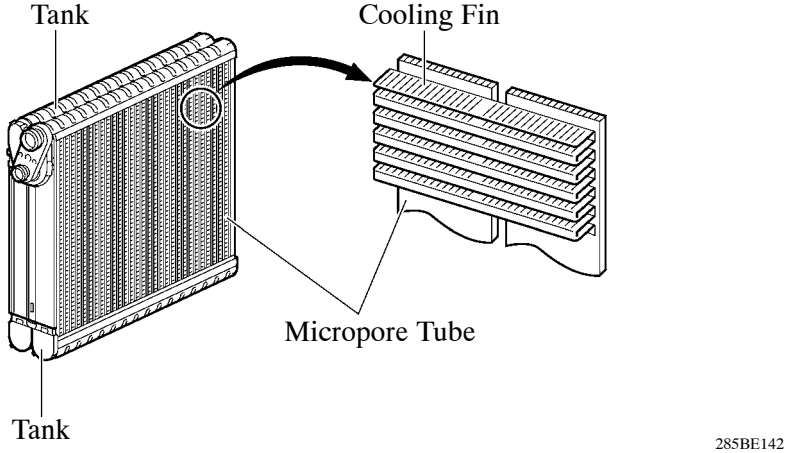
A semi-centrally located air conditioning unit, in which the evaporator and heater radiator are mounted transversely, is used. As a result, the air conditioning unit is made compact and lightweight.



Evaporator

An RS (Revolutionary super-slim Structure) type evaporator is used. Placing the tanks at the top and the bottom of the evaporator and adopting a micropore tube construction have realized the following effects:

- The heat exchange efficiency is improved.
- The temperature distribution is made more uniform.
- The evaporator is made thinner. 90 mm (3.5 in.) → 50 mm (2.0 in.)

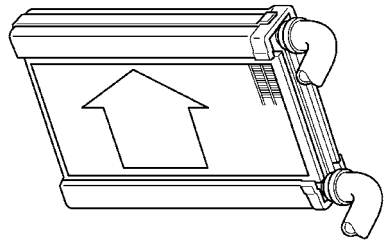


Evaporator Temperature Sensor

The evaporator temperature sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the air conditioning amplifier.

Heater Radiator

A compact, lightweight, and highly efficient SFA (Straight Flow Aluminum)-II type heater radiator is used.



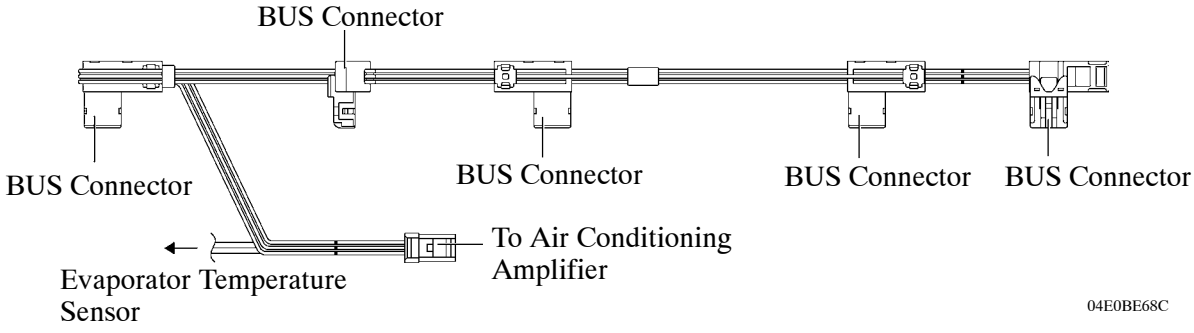
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Blower Motor

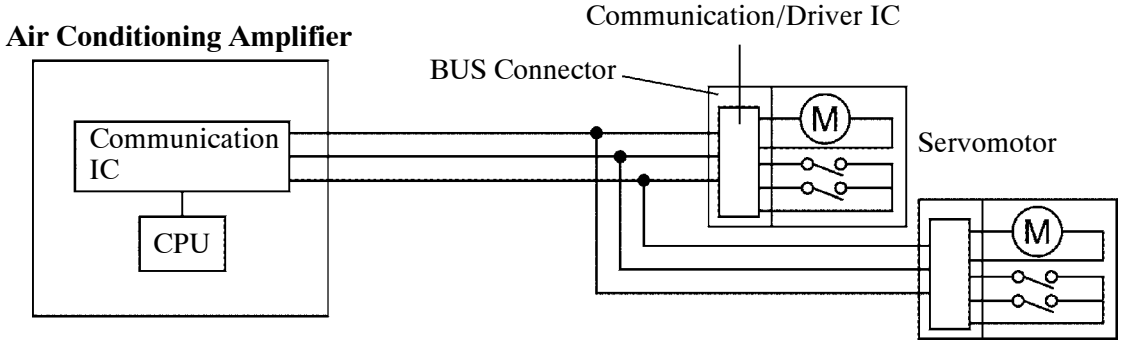
The blower motor has a built-in blower controller, and is controlled using duty control performed by the air conditioning amplifier.

BUS Connector

A BUS connector is used in the wire harness connection that connects the servomotor from the air conditioning amplifier.



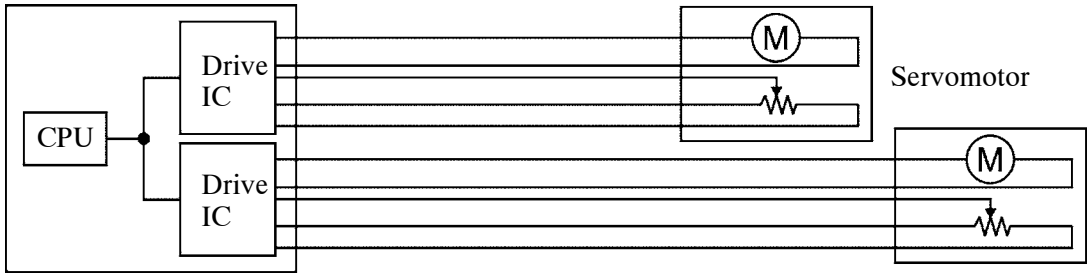
The BUS connector has a built-in communication/driver IC which communicates with each servomotor connector, actuates the servomotor, and has a position detection function. This enables bus communication for the servomotor wire harness to realize a more lightweight construction and a reduced number of wires.



With BUS Connector

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Air Conditioning Amplifier



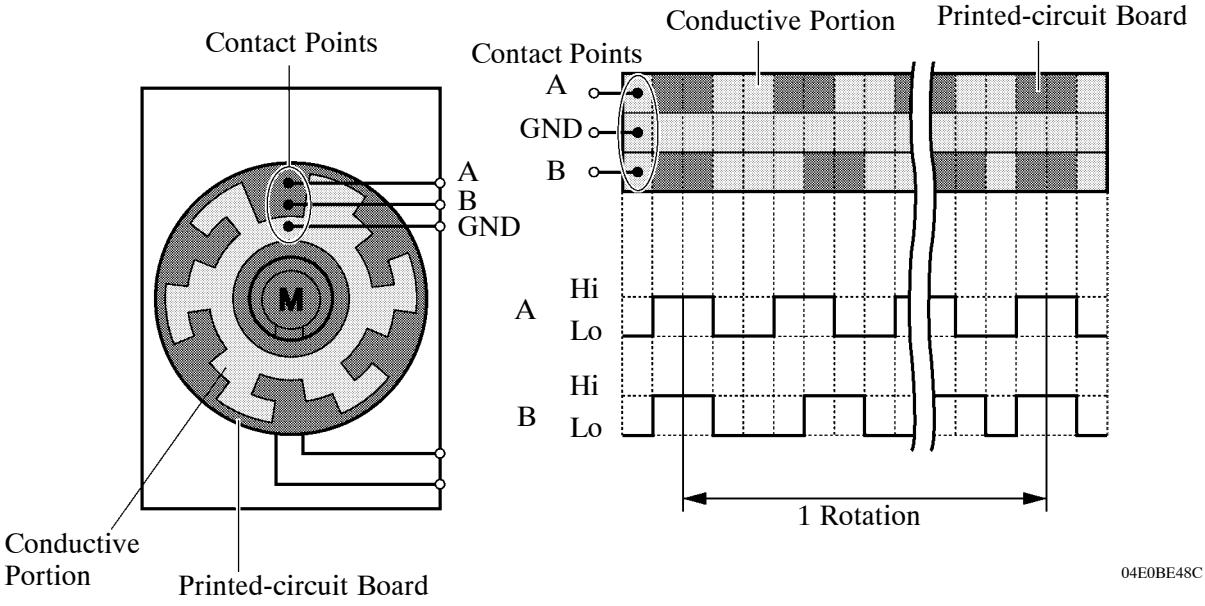
Without BUS Connector

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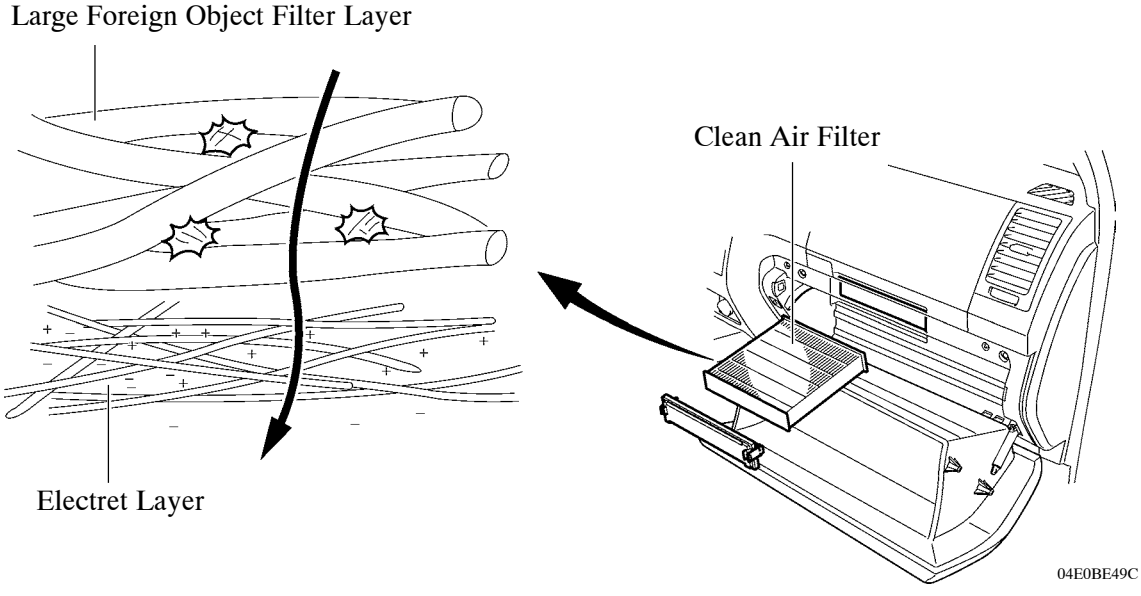
Servomotor

The pulse pattern type servomotor consists of a printed circuit board and a servomotor. The printed circuit board has three contact points, and can transmit two ON-OFF signals to the air conditioning amplifier based on the difference of the pulse phases. The BUS connector can detect the damper position and movement direction with this signal.



Clean Air Filter

A high efficiency type clean air filter is used. This filter excels in the removal of dust and pollen. The filter is made of polyester.
Because the filter is made of polyester, it can be disposed of easily as a non-hazardous combustible material, which is a feature that is provided in consideration of the environment.

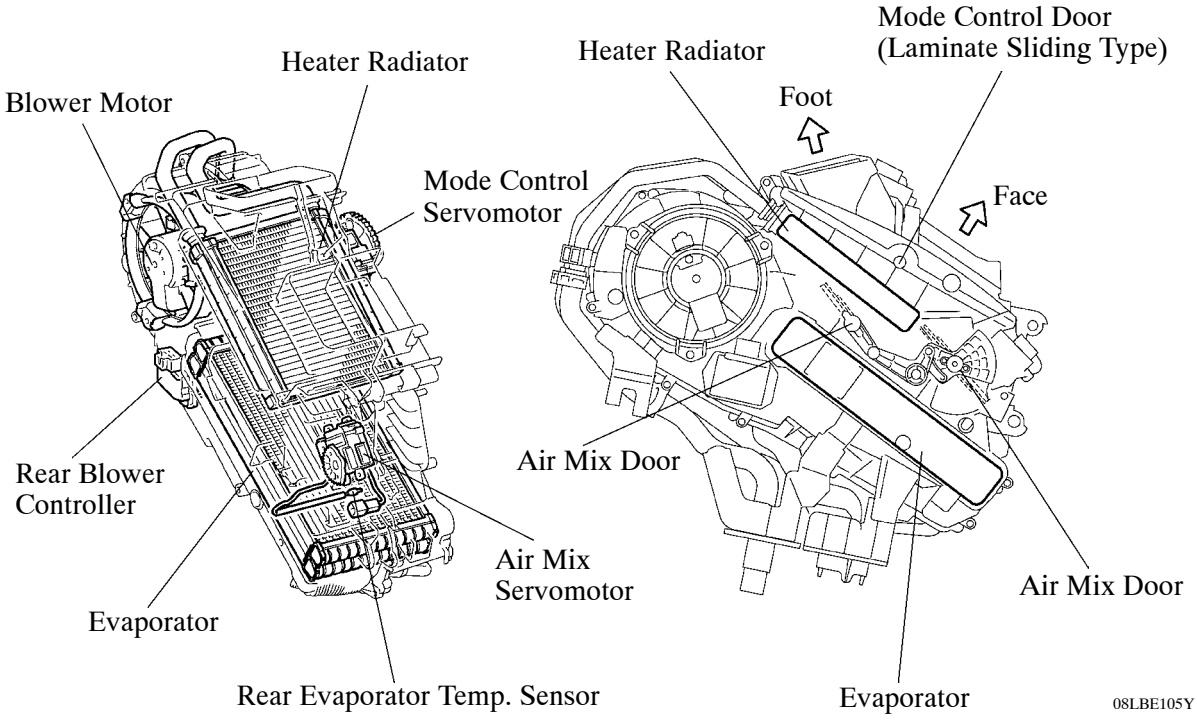


Service Tip

The replacement interval for the clean air filter is 50000 km/h (30000 miles). However, observation of these guidelines should depend on the usage conditions (or environment).

3. Rear Air Conditioning Unit

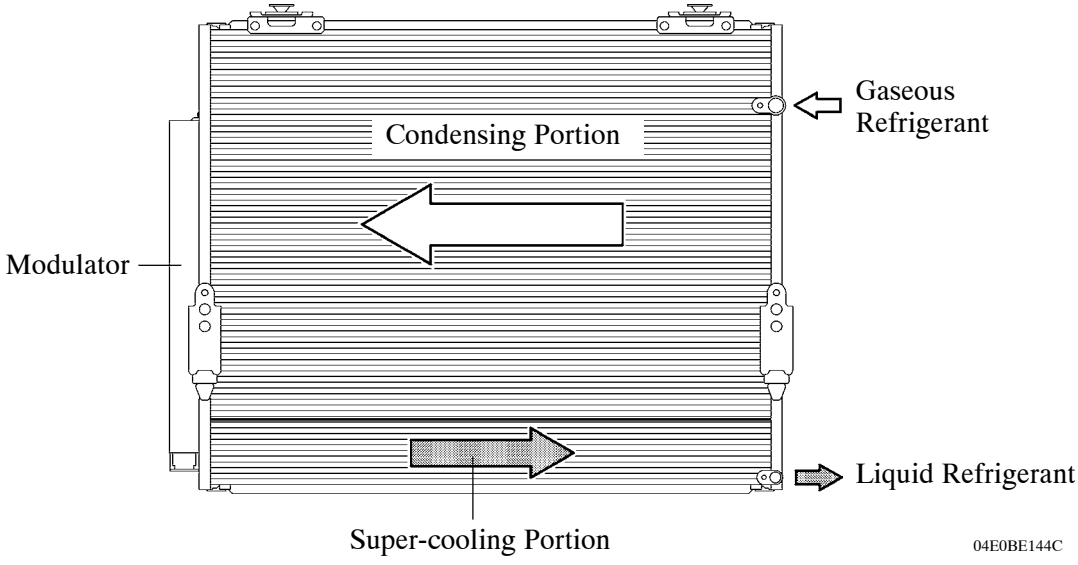
- The rear air conditioning unit is located in the right quarter trim.
- The rear air conditioning unit consists of the evaporator, heater radiator, air mix servomotor, mode control servomotor, evaporator temperature sensor, rear blower controller and rear blower motor.
- The evaporator and heater radiator are arranged horizontally to allow the airflow to be directed smoothly upward.
- The mode control servomotor operates the laminate sliding type mode control door, and the air mix servomotor controls the full air mix type air mix doors.
- The evaporator has the same RS (Revolutionary super-slim Structure) as the front evaporator. For details regarding the evaporator, see page BE-57.
- The heater radiator has the same SFA (Straight Flow Aluminum)-II type as the front heater radiator. For details regarding the heater radiator, see page BE-58.
- The evaporator temperature sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the air conditioning amplifier.
- As in the front air conditioning unit, the servomotor fitted to the rear air conditioning unit is connected to the air conditioning amplifier with the BUS connector due to the lightweight construction and a reduced number of wires. For details regarding the BUS connector, see page BE-59.
  Furthermore, the pulse pattern type is used for both the front and rear air conditioning units. For details regarding the servomotor, see page BE-60.
- The porous duct excellent in sound absorption property is provided in the air inlet duct to improve quietness in the cabin. The cross section of the porous duct consists of three layers. The inner polyethyleneterephtalate layer absorbs noises produced by the air conditioning unit, the central layer prevents the leakage of odor in the cabin, and the outer felt holds the duct shape.



4. Condenser

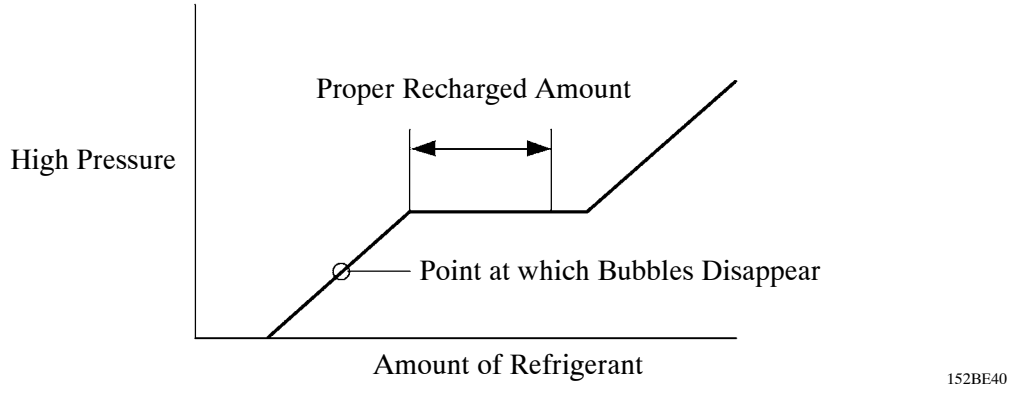
An MF (Multi-Flow) type condenser is used. The condenser consists of three portions: a condensing portion, a super-cooling portion, and a gas-liquid separator (modulator) are integrated together. This condenser uses a sub-cool cycle that offers excellent heat-exchange performance.

- In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



Service Tip

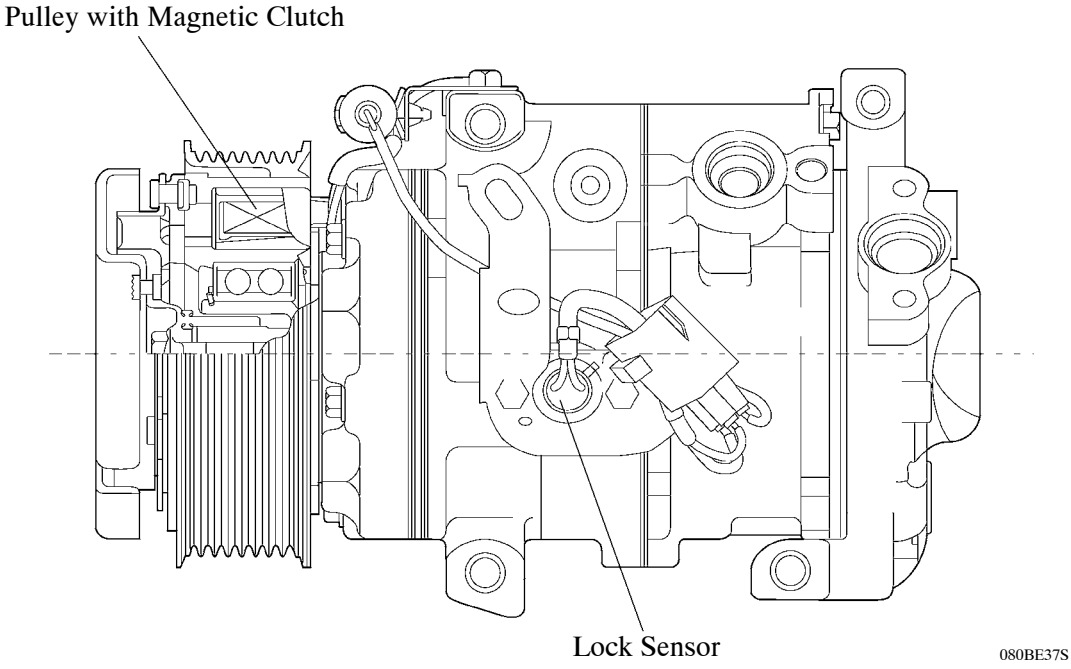
The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system would be affected. If the system is overcharged with refrigerant, this will also lead to reduced performance. For the proper method of verifying the amount of the refrigerant and for instructions on how to recharge the system with refrigerant, see the 2008 Sequoia Repair Manual (Pub. No. RM08L0U).



5. A/C Compressor

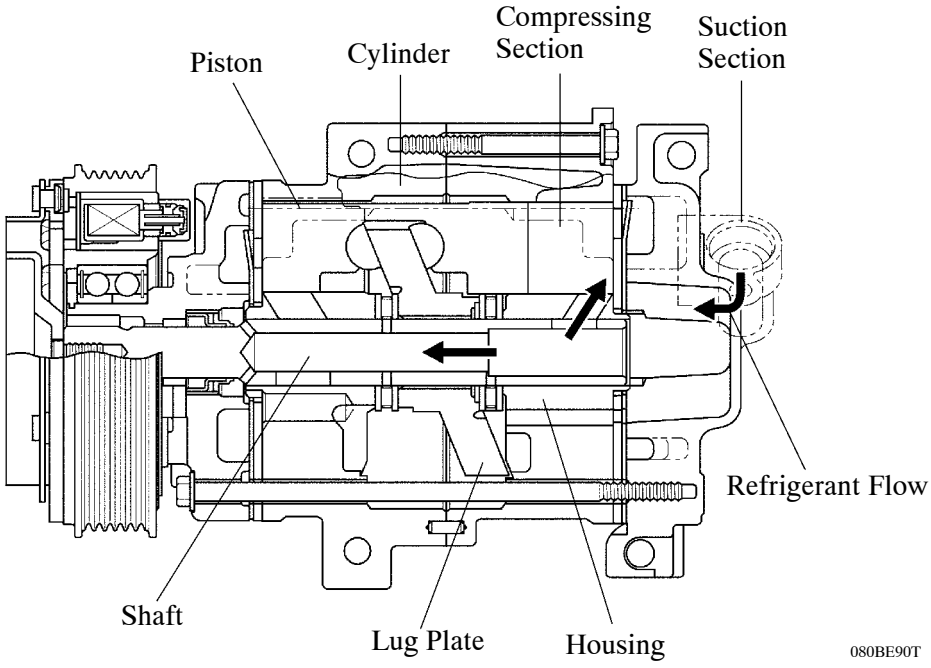
General

- A 10SR19C A/C compressor has been provided, which features a compact, lightweight and low-noise swash plate design.
- The A/C compressor consists of the A/C pulley, shaft, lug plate, swash plate, piston, shoe, crank chamber, cylinder, and lock sensor.
- The lock sensor sends an A/C compressor speed signal to the ECM. The ECM compares this signal with an engine speed signal sent from the crankshaft position sensor. If the ECM determines that the A/C pulley has locked, the ECM turns the magnetic clutch off.
- A rotary valve capable of directing suction refrigerant into the cylinder has been provided.

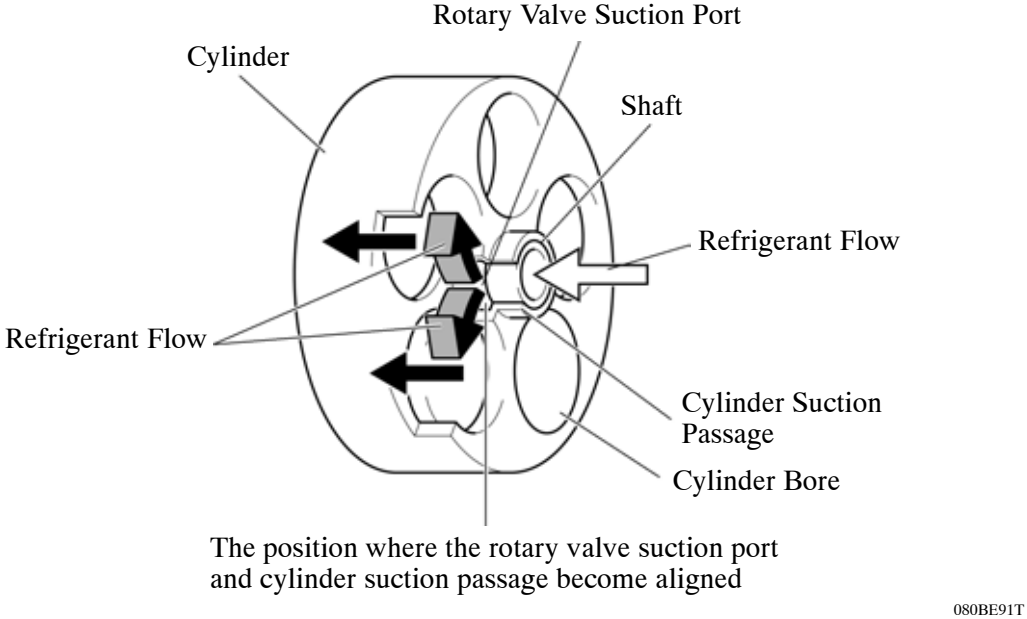


Rotary Valve

- In order to eliminate suction loss, the rotary valve has been replaced with a conventional suction valve.
- A hollow shaft is used in the valve so as to allow refrigerant to be sucked into the compressing section of the cylinder through the hollow section. Holes individually arranged on the shaft and cylinder are designed to align during the rotation of the shaft. When the holes are aligned, refrigerant is sucked into the compressing section.



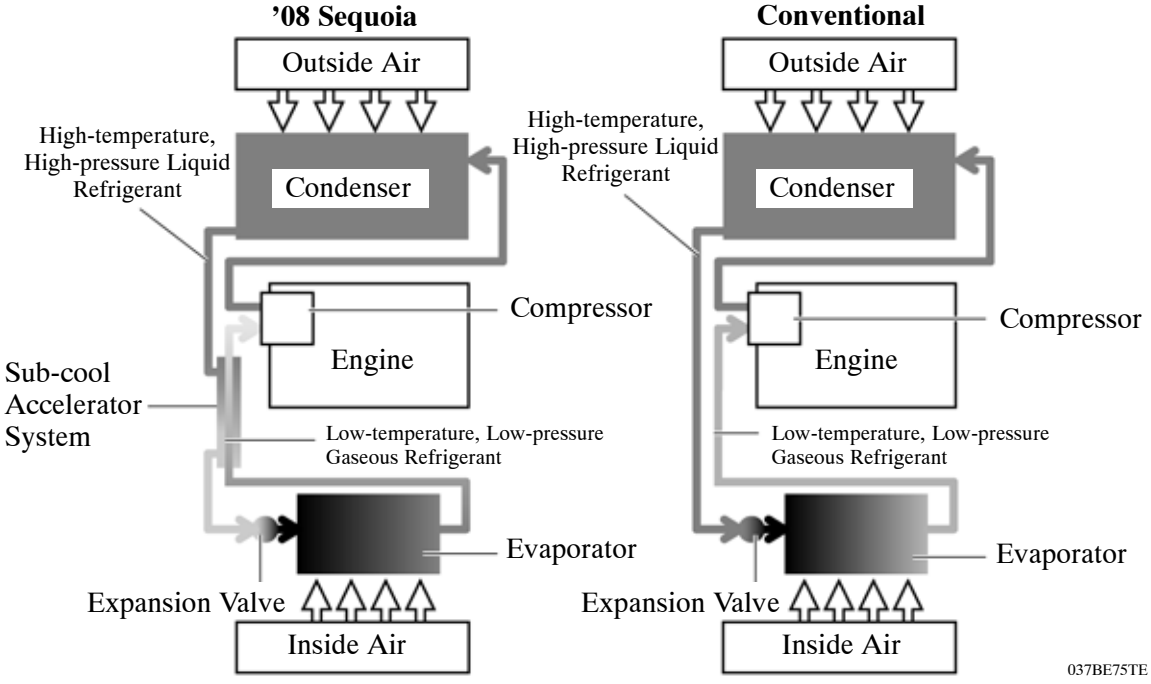
▶ Image of Valve Operational Behavior During Suction ◀



6. Sub-cool Accelerator (Double-pipe Internal Heat Exchanger) System

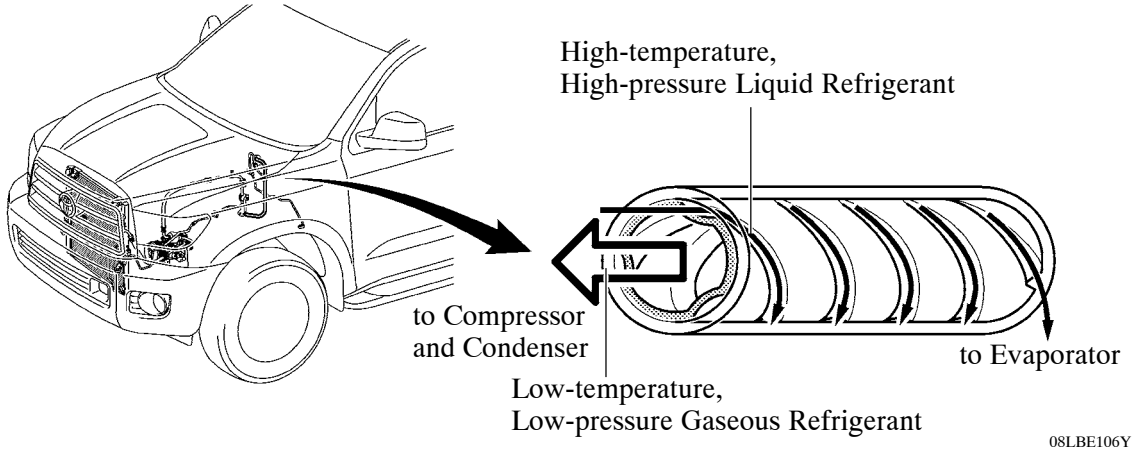
General

- A sub-cool accelerator (double-pipe internal heat exchanger) system has been provided. This system consists of an inner pipe and an outer pipe which are changed from the conventional refrigerant pipes (liquid and gaseous refrigerant pipes).
- The cooling performance can be enhanced by occurring heat exchange by utilizing temperature difference of refrigerant in a refrigeration cycle and further cooling the refrigerant discharged from the condenser.



Refrigerant Pipe

The refrigerant pipe consists of inner and outer pipes, and thus heat exchange can occur by utilizing the temperature difference between low-temperature, low-pressure gaseous refrigerant flowing inside the inner pipe and high-temperature, high-pressure liquid refrigerant flowing between the inner and outer pipes. Furthermore, a spiral groove is formed in the pipe in order to attain further effective heat exchange.



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7. A/C Pressure Sensor

The A/C pressure sensor detects the refrigerant pressure and outputs it to the air conditioning amplifier in the form of voltage changes.

8. Room Temperature Sensor

The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor. This signal is used by the air conditioning amplifier.

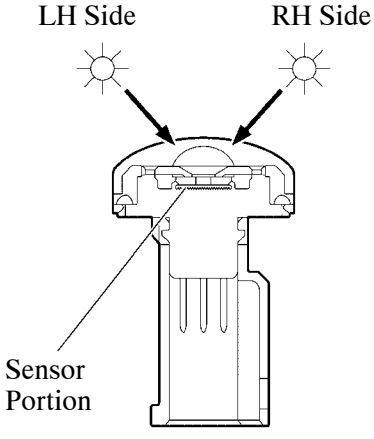
9. Ambient Temperature Sensor

The ambient temperature sensor detects the outside temperature based on changes in the resistance of its built-in thermistor. This signal is used by the air conditioning amplifier.

10. Solar Sensor

The solar sensor consists of a photo diode, two amplifier circuits for the solar sensor, and a frequency converter circuit for the light control sensor.

- The solar sensor detects (in the form of changes in the current that flows through the built-in photo diode) the changes in the amount of sunlight from its LH and RH sides (2 directions) and outputs these sunlight strength signals to the air conditioning amplifier.



Internal Circuit of the Solar Sensor

