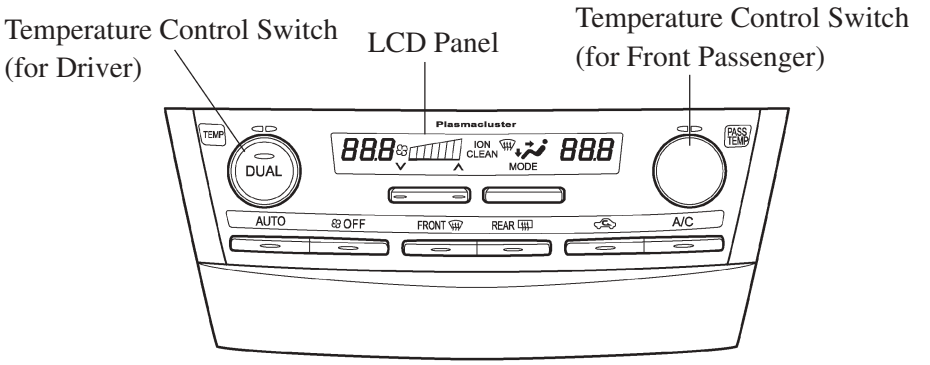
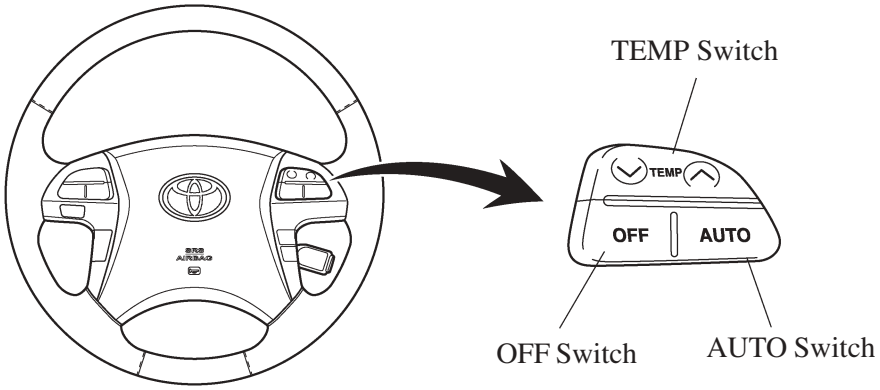
■CONSTRUCTION AND OPERATION

1. Heater Control Panel and Steering Pad Switch

- The air conditioner status is displayed on an LCD (Liquid Crystal Display) panel.
- Along with the use of the right/left independent temperature control, the temperature control switches for the driver and the front passenger have been located closer to the respective seats to enhance their ease of use.
- Some of A/C operations (AUTO operation, A/C OFF and driver side temperature setting) can be performed using the steering pad switches (AUTO, OFF and TEMP) on the steering wheel.



025BE44TE



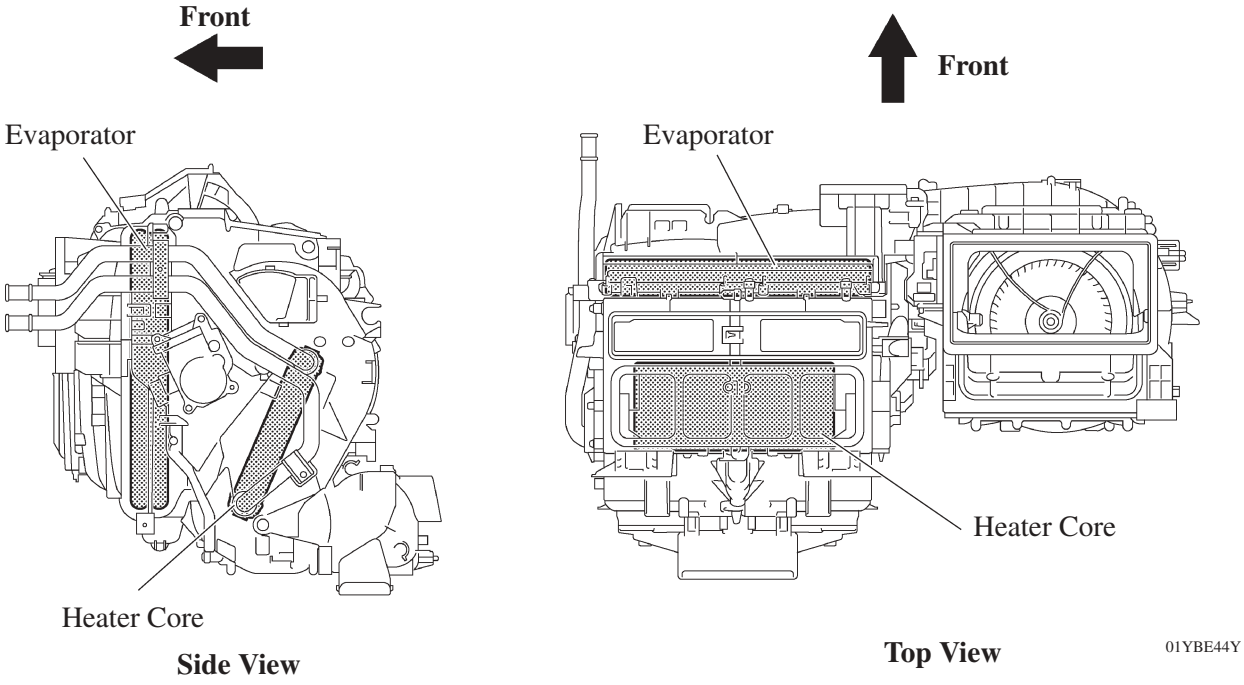
Steering Pad Switch

025BE46Y

2. Air Conditioner Unit

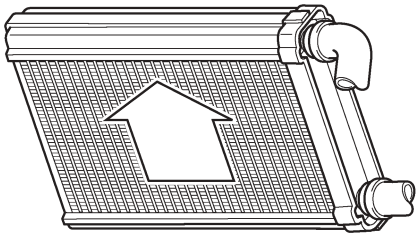
General

A semi-center location air conditioner unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioner unit has been made compact and lightweight.



Heater Core

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



Evaporator

A semi-center location air conditioner unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioner unit has been made compact and lightweight.

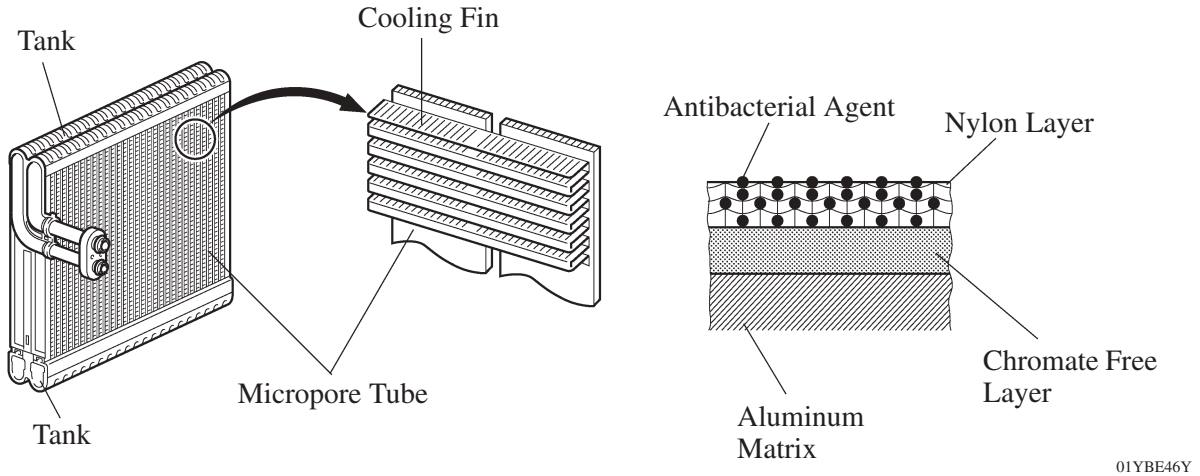
- A revolutionary super-slim structure evaporator is used.
- By placing the tanks at the top and the bottom of the evaporator unit and adopting a micropore tube construction, the following effects have been realized:

  a) The heat exchanging efficiency has been improved.

  b) The temperature distribution has been made more uniform.

  c) The evaporator has been made thinner. 58 mm (2.3 in.) → 38 mm (1.5 in.)

- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimize the source of foul odor and the propagation of bacteria. The substrate below this coating consists of a chromate-free layer to help protect the environment.



Evaporator Temp. Sensor

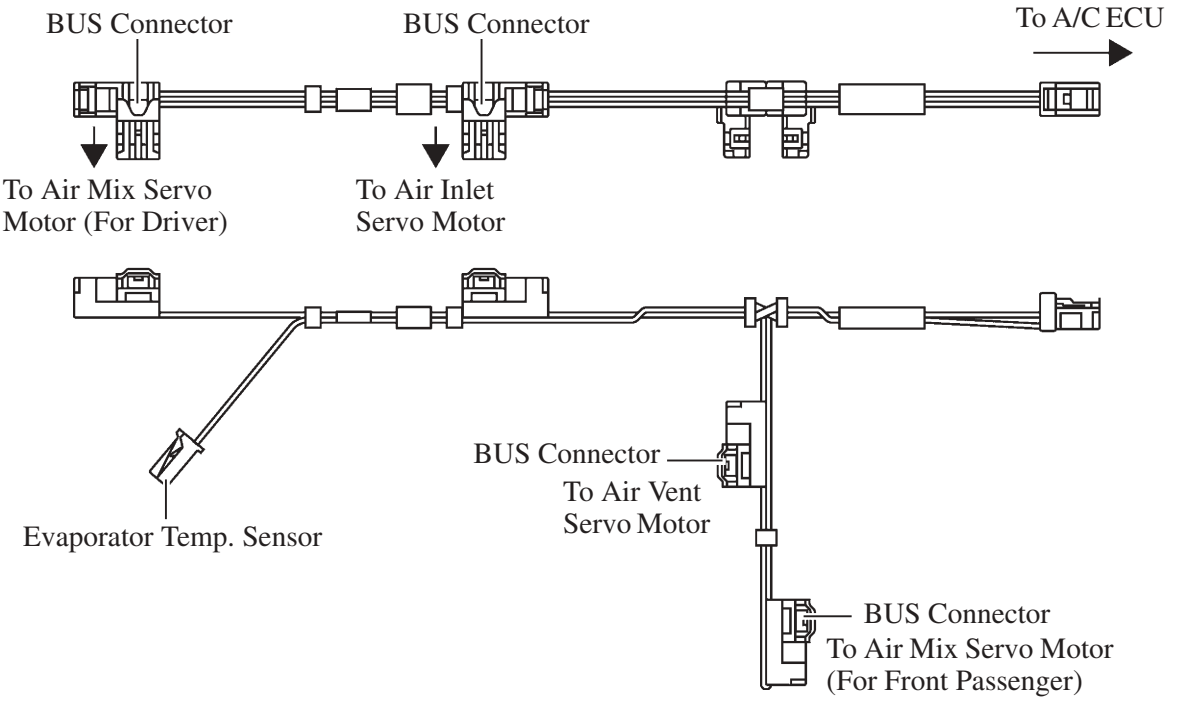
Evaporator temp. sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the A/C ECU.

Blower Motor

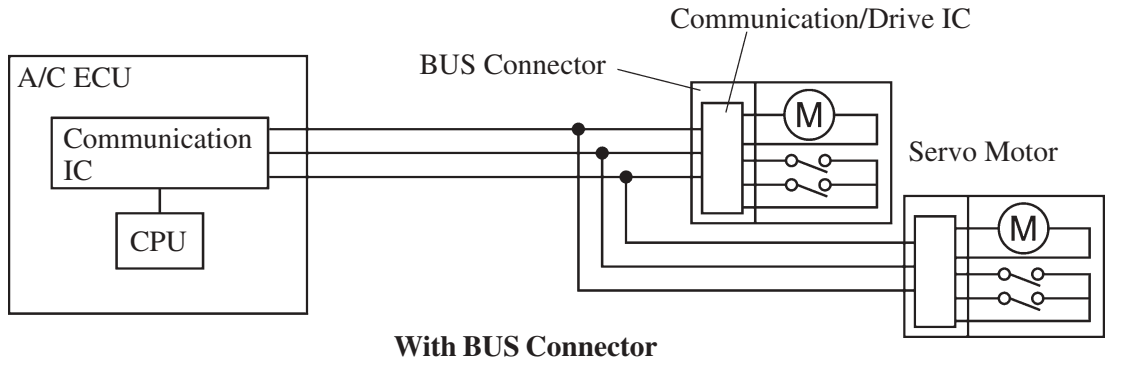
The blower motor has an in-built blower controller, and is controlled with the duty control from the A/C ECU.

BUS Connector

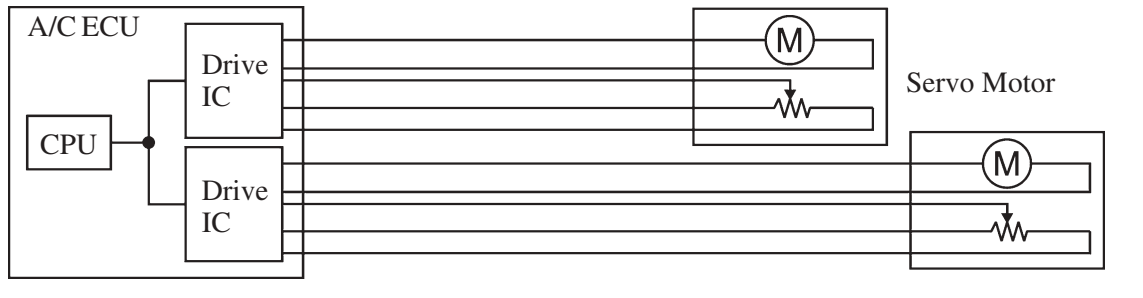
- A BUS connector is used in the wire harness connection that connects the servo motor from the A/C ECU.



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



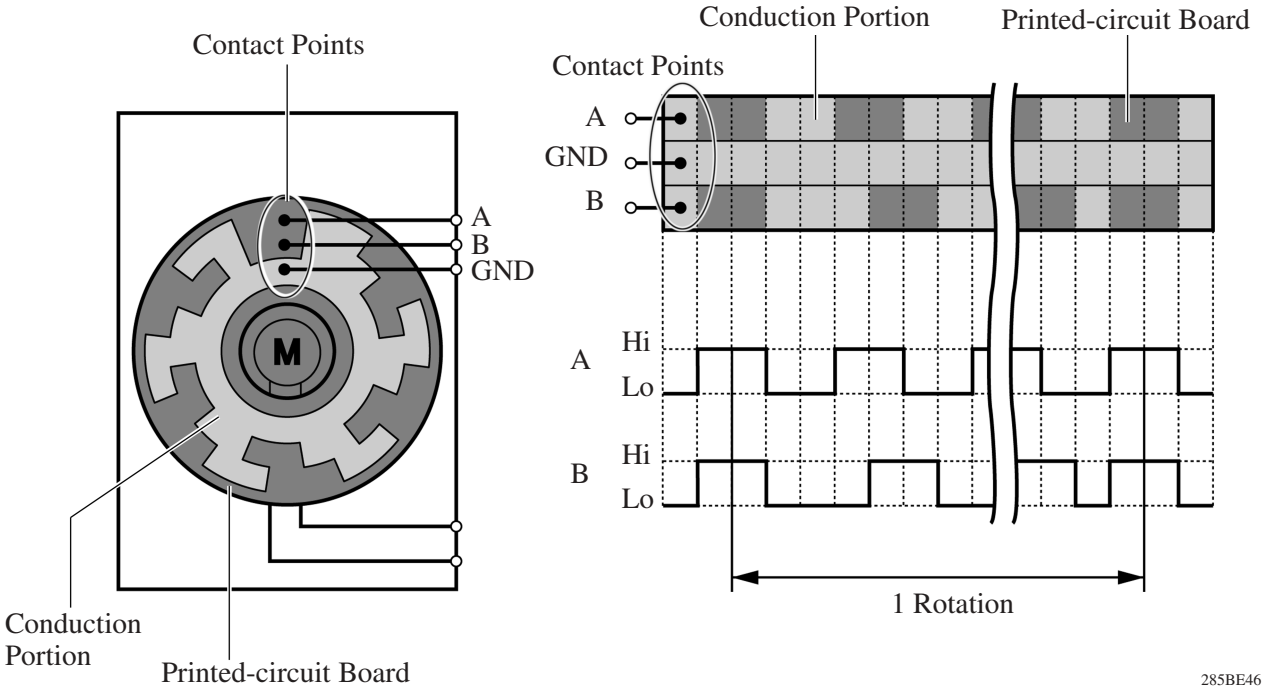
With BUS Connector



Without BUS Connector

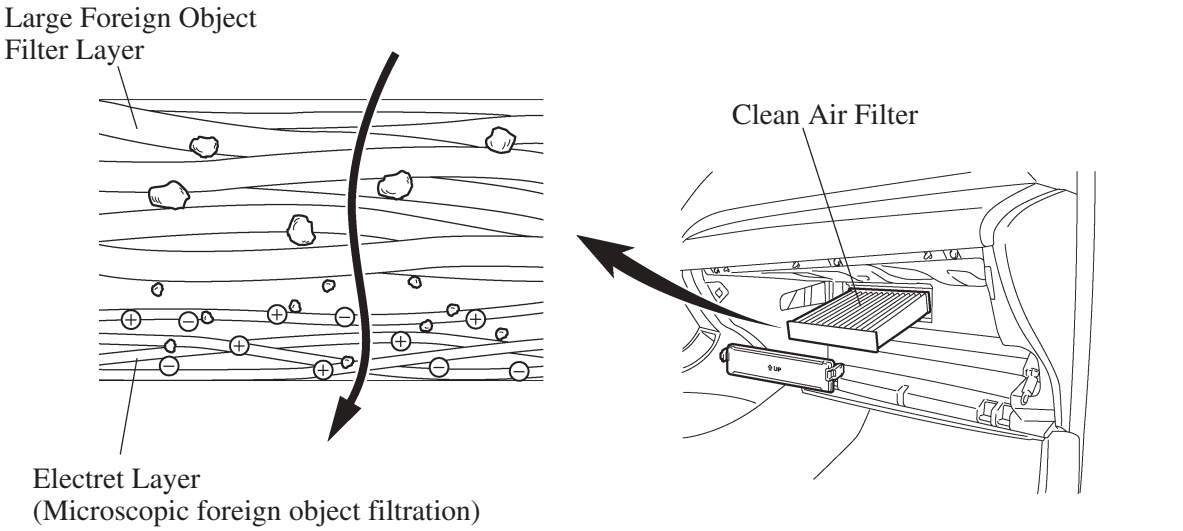
Servo Motor

The pulse pattern type servo motor consists of a printed circuit board and servo motor. The printed circuit board has three contact points, and transmits to the A/C ECU two ON-OFF signals for the difference of the pulse phase. The smart connector detects the damper position and movement direction with this signal.



Clean Air Filter

A micro dust and pollen filter is used. This filter excels in the removal of dust and pollen. The filter is made of polyester. Thus, it can be disposed of easily as a non hazardous combustible material, a feature that is provided in consideration of the environment.

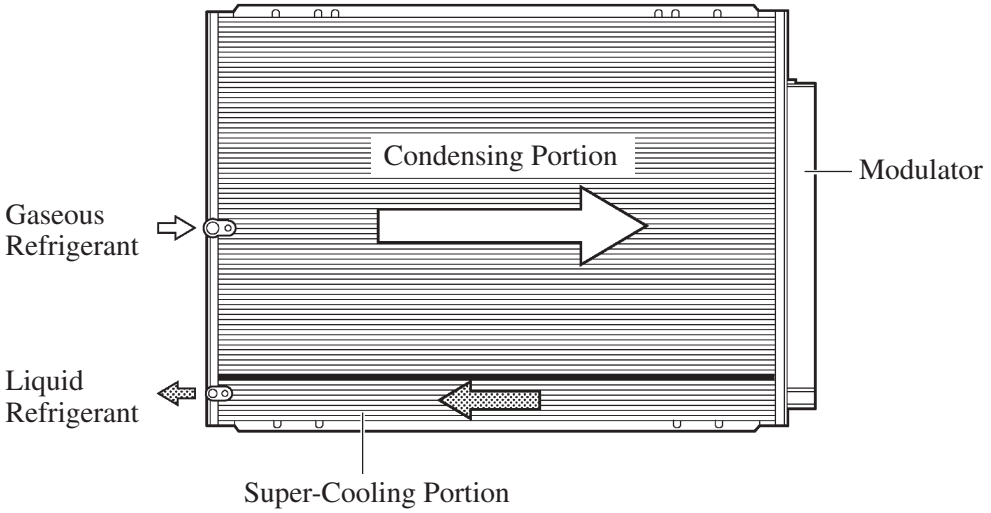


Service Tip

The filter should be changed at 30,000 km under normal conditions (cleaning interval: 10,000 km). Under dusty conditions, the filter should be changed at 15,000 km (cleaning interval: 5,000 km). However, observation of these guidelines should depend on the usage conditions (or environment).

3. Condenser

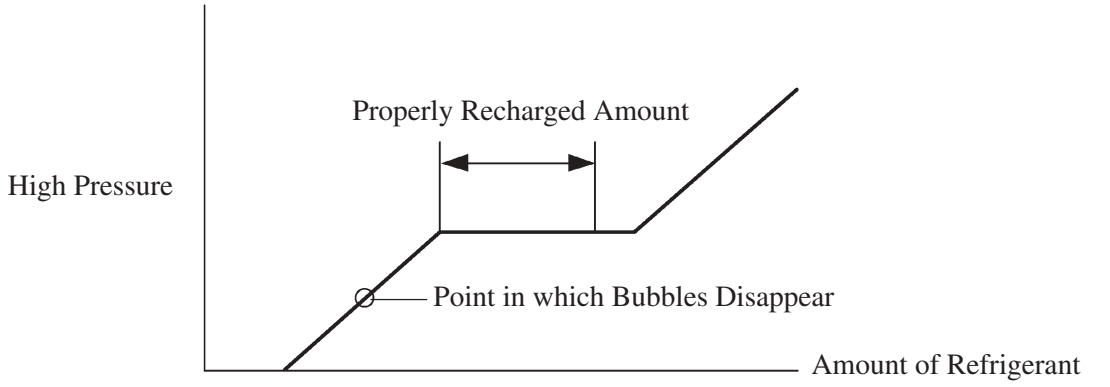
- A MF (Multi-Flow) type condenser is used. The condenser consists of two cooling portions: a condensing portion and a super-cooling portion, and gas-liquid separator (modulator) are integrated together. This condenser uses a sub-cool cycle that offers excellent heat-exchange performance.
- In the sub-cool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



BE

Service Tip

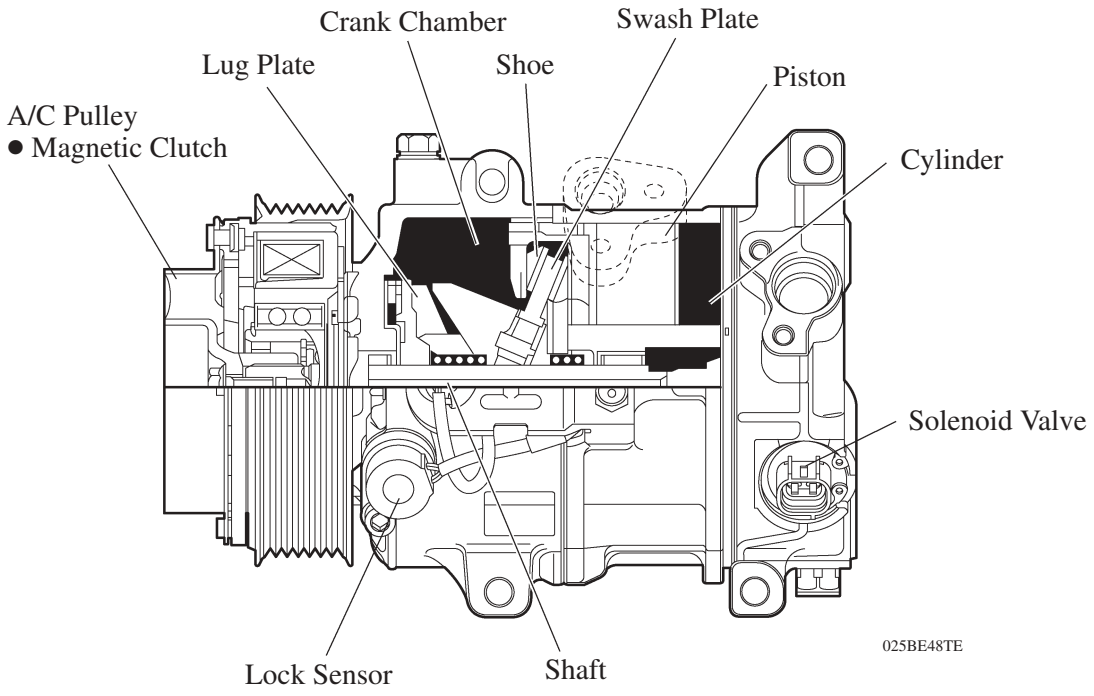
The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a 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 Camry Repair Manual (Pub. No. RM0260E).



4. A/C Compressor

General

- The A/C compressor is a continuously variable capacity type in which its capacity can be varied in accordance with the cooling load of the air conditioner.
- This compressor consists of the A/C pulley, shaft, lug plate, swash plate, piston, shoe, crank chamber, cylinder, and solenoid valve.
- The A/C pulley with built-in magnetic clutch and the lock sensor that detects whether the magnetic clutch is locked are installed on models with the 2GR-FE engine.
- The DL (Damper Limiter) type A/C pulley is installed on models with the 2AZ-FE engine.
- A solenoid valve that adjusts the suction pressure so that the compressor capacity can be controlled as desired is provided.
- The internal valve is provided on models with 2AZ-FE engine to improve the A/C compressor durability under the high speed and large thermal load conditions. The internal valve is integrated into the solenoid valve.



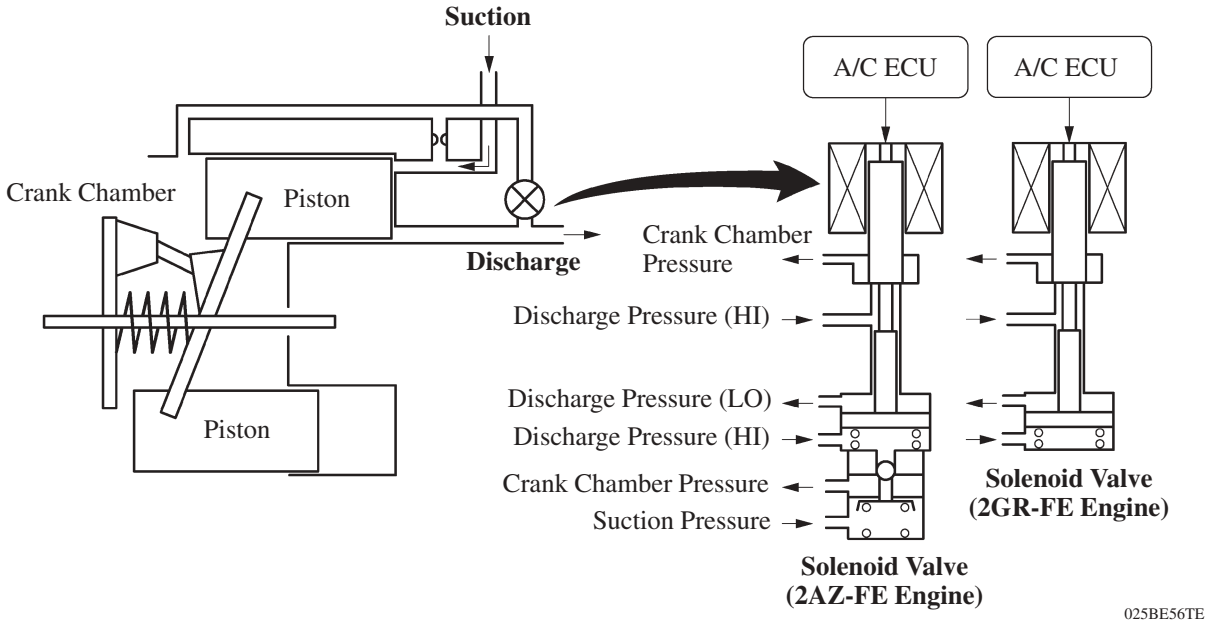
A/C Compressor for Models with 2GR-FE Engine

Lock Sensor (Only for Models with 2GR-FE Engine)

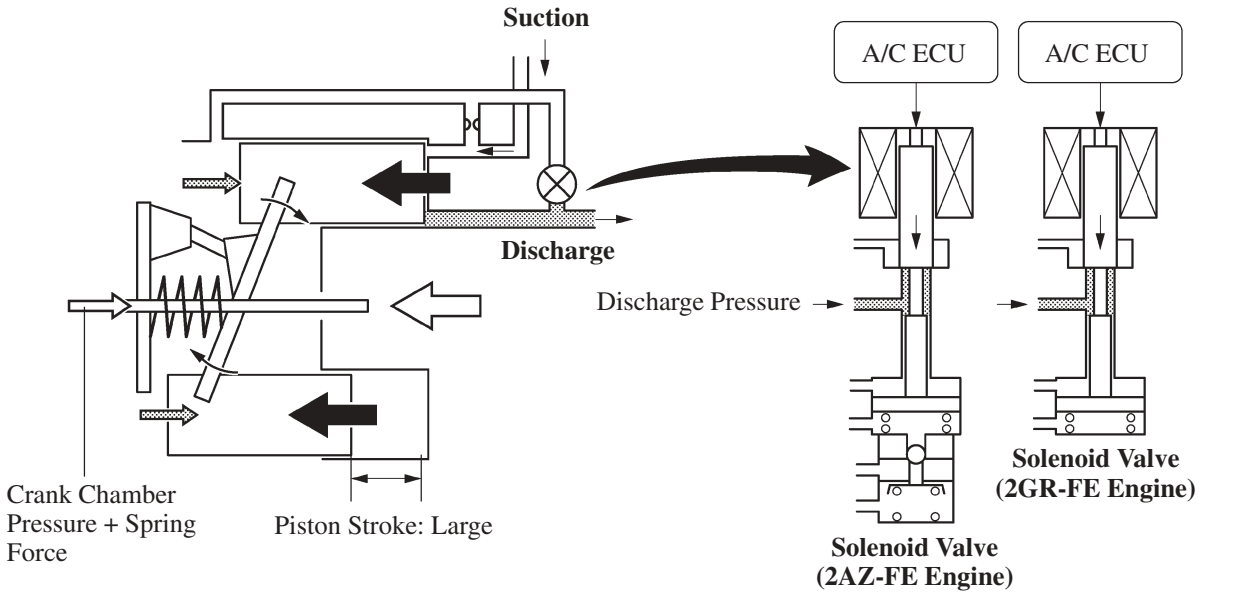
The lock sensor sends A/C pulley speed signals to the A/C ECU. The A/C ECU determines whether the magnetic clutch is locked or not by using those signals and engine speed signals.

Solenoid Valve Operation

- The crank chamber is connected to the discharge passage. A solenoid valve is provided between the discharge passage (LO pressure) and the discharge passage (HI pressure).
- The solenoid valve operates under duty cycle control in accordance with the signals from A/C ECU.

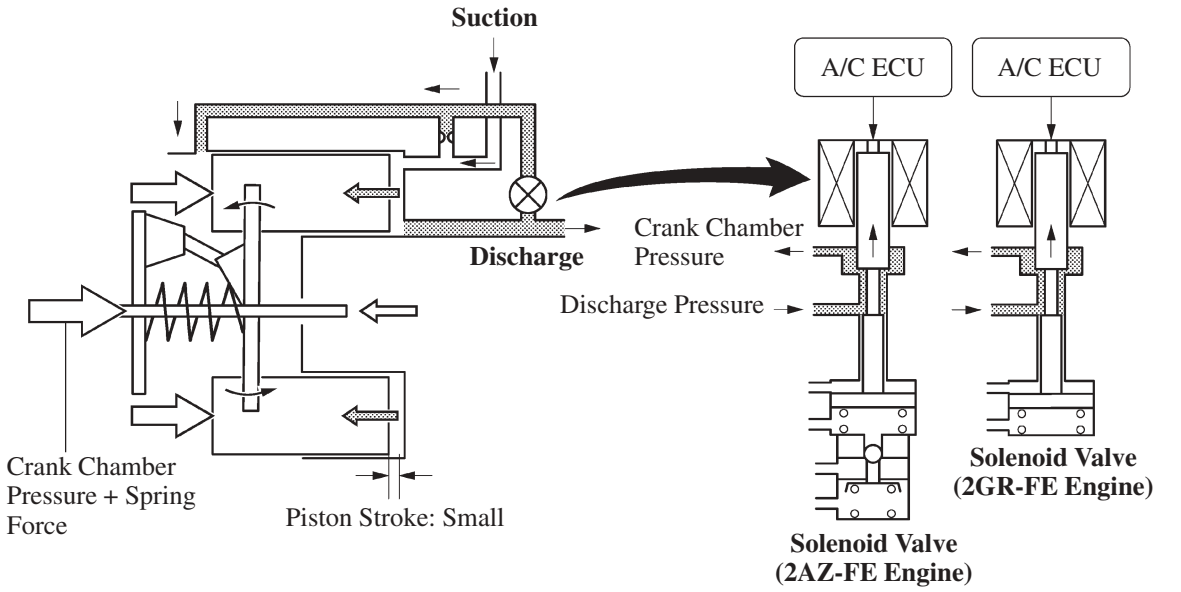


- When the solenoid valve closes (solenoid coil is energized), a difference in pressure is created and the pressure in the crank chamber decreases. Then, the pressure that is applied to the right side of the piston becomes greater than the pressure that is applied to the left side of the piston. This compresses the spring and tilts the swash plate. As a result, the piston stroke increases and the discharge capacity increases.



BE

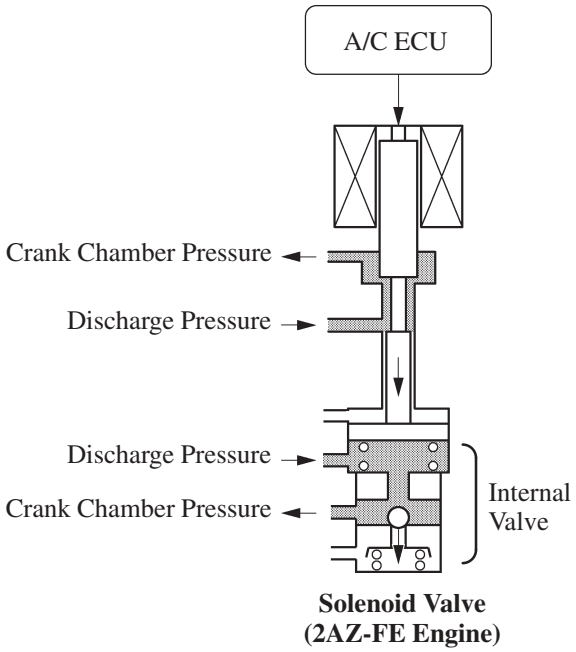
- When the solenoid valve opens (solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the tilt of the swash plate. As a result, there is no piston stroke and the discharge capacity is reduced.



025BE58TE

Internal Valve Operation (Only for Models with 2AZ-FE Engine)

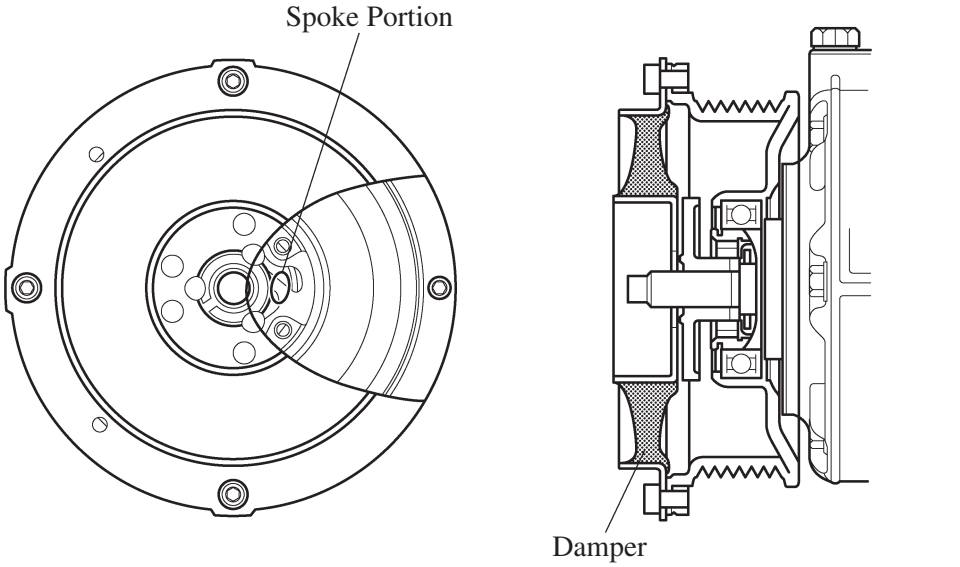
The internal valve operates when the A/C compressor speed has increased rapidly, the A/C compressor speed is high, or when thermal load has suddenly changed. As a result, the A/C compressor capacity is reduced, increasing the durability of the A/C compressor.



0280BE11C

DL type A/C Pulley (Only for Models with 2AZ-FE Engine)

This pulley contains a damper to absorb the torque fluctuations of the engine and a limiter mechanism to protect the drive belt in case the compressor locks. In the event that the compressor locks, the limiter mechanism causes the spoke portion of the pulley to break, thus separating the pulley from the compressor.



Limiter Mechanism

5. A/C Pressure Sensor

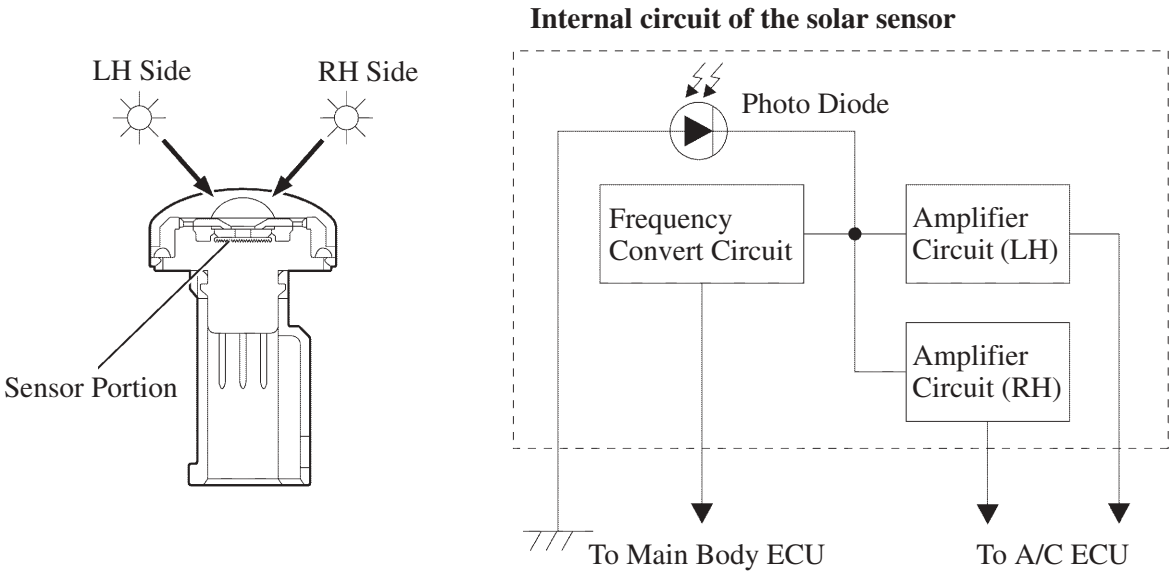
A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C ECU in the form of voltage changes.

6. Room Temp. Sensor and Outside Temp. Sensor

- The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C ECU.
- The outside temperature sensor detects the outside temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C ECU.

7. 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.
- A 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 the LH and RH sides (2 directions) and outputs these sunlight strength signals to the A/C ECU.

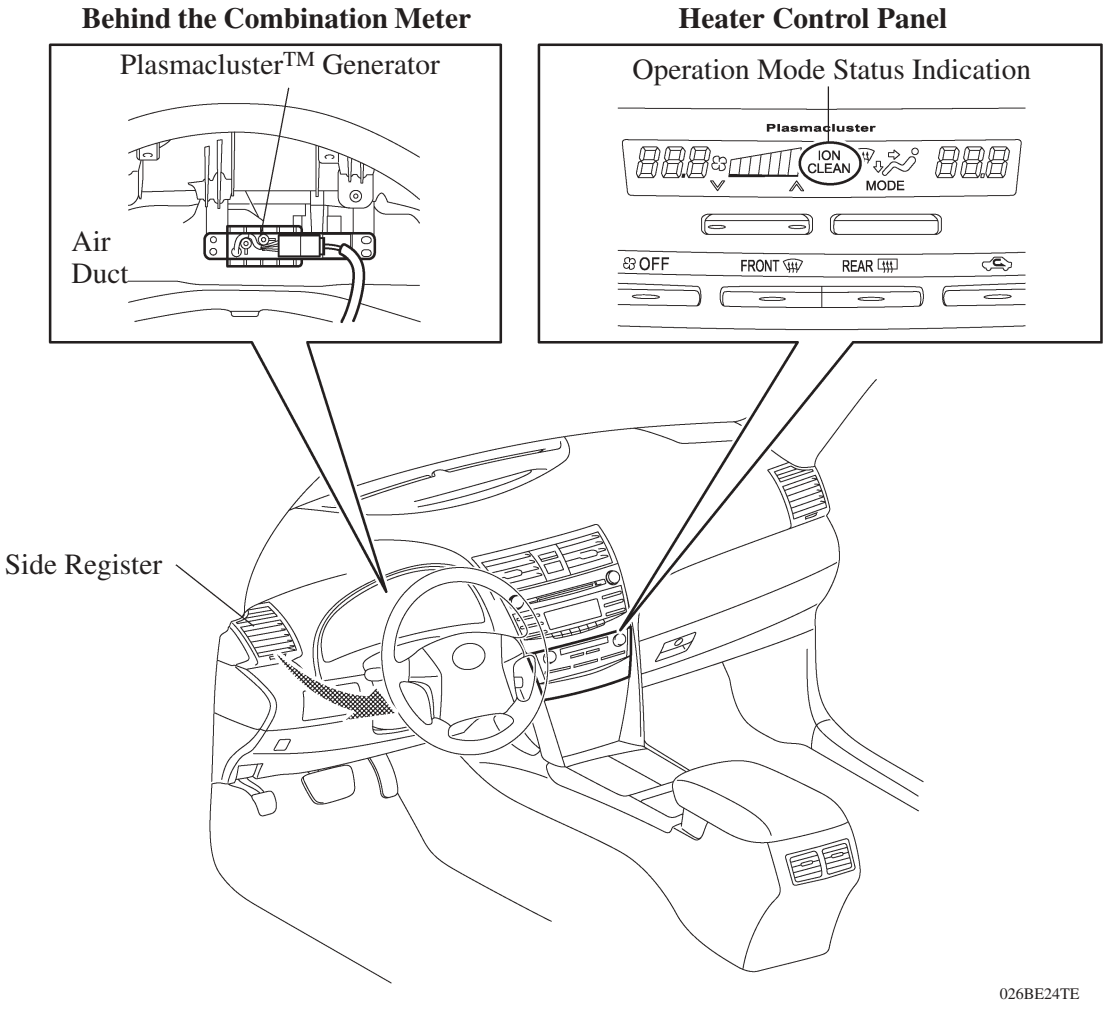


0140BE235C

8. Plasmacluster™ Generator

General

- A Plasmacluster™ generator is installed inside the air duct of the side register on the driver seat side to improve the air quality and comfort in the cabin.
- This generator is controlled by the A/C ECU and operates in conjunction with the blower motor.



NOTE:

- The Plasmacluster™ generator uses a high voltage, which is hazardous. Therefore, if the Plasmacluster™ generator requires repairs, be sure to have them done at a Toyota dealer.
- Do not apply any type of spray (such as a cleaning solvent or hair spray) or stick any foreign matter into the Plasmacluster™ ion outlet, as this could cause improper operation or a malfunction.
- After use, dust may accumulate around the side register on the driver seat side. If this occurs, press the OFF switch on the heater control panel to stop the blower motor before cleaning the area.
- It is normal for the Plasmacluster™ generator to emit a slight sound during operation. This sound is created when electrons collide with the electrode while Plasmacluster™ ions are being generated.

Operation

- The Plasmacluster™ generator produces positive and negative ions from the water molecules (H_2O) and oxygen molecules (O_2) in the air and emits them into the air.
- The following 2 operation modes are available for the Plasmacluster™ generator, and these modes are switched alternately by the A/C ECU at intervals of 15 minutes. The operation mode status is indicated on the LCD in the heater control panel.

▶ Operation Modes ◀

ION	Generates negative ions and emits them into the air, thus providing the air quality in the cabin similar to the natural air, such as in forests or near waterfalls.
CLEAN	Generates positive and negative ions. When positive and negative ions are emitted into the air, they are quickly surrounded by water molecules and form cluster ions called Plasmacluster™ ions. Plasmacuster™ ions disperse around the cabin and bond with airborne particulates and molecules.

