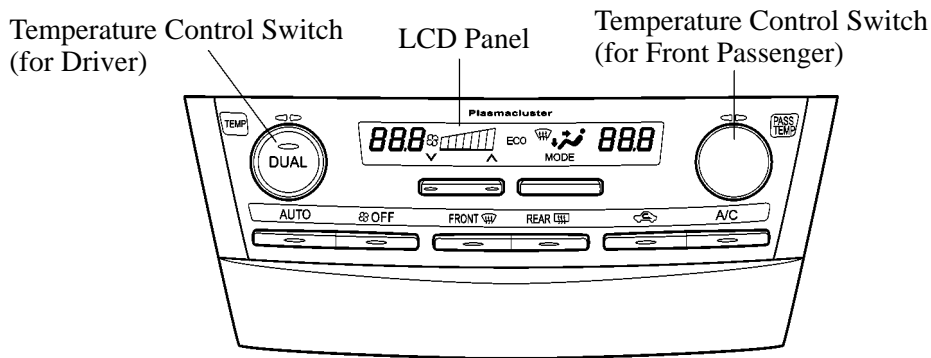


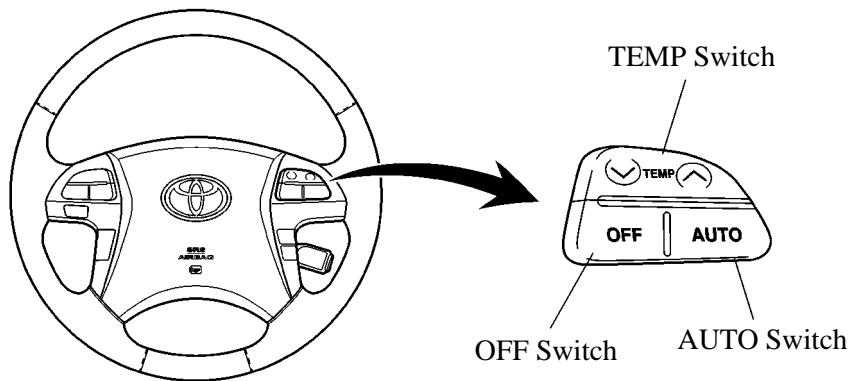
■ CONSTRUCTION AND OPERATION

1. Heater Control Panel and Steering Pad Switch

- The air conditioning status is displayed on an LCD (Liquid Crystal Display) panel.
- 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.
- 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.



Heater Control Panel

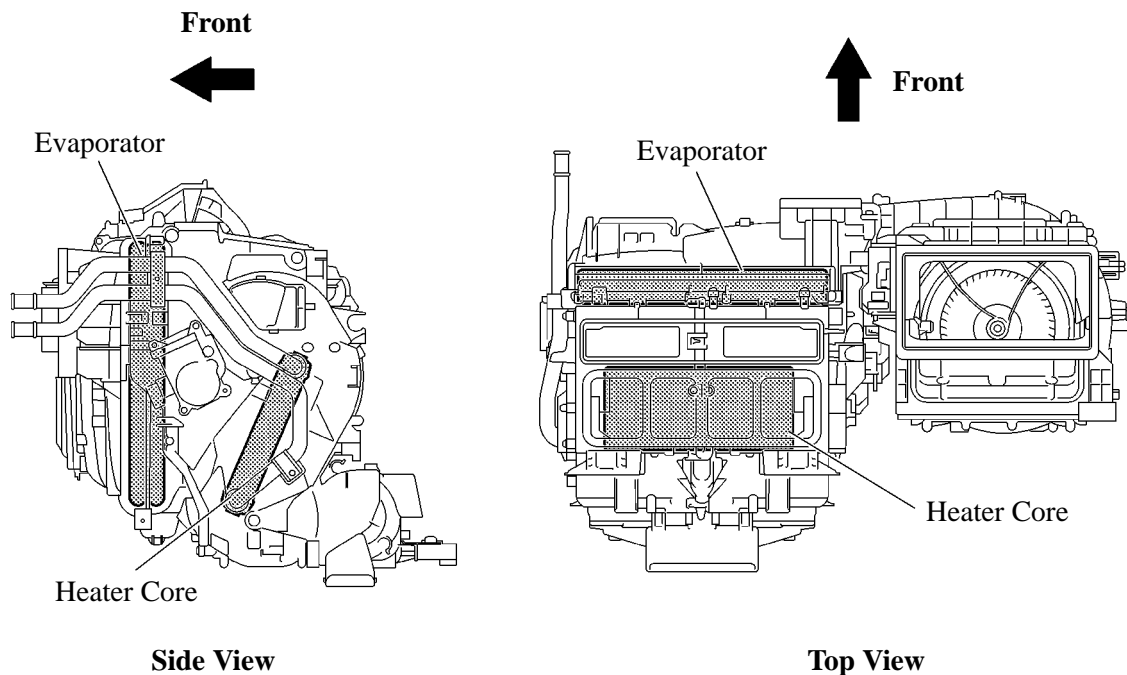


Steering Pad Switch

2. Air Conditioning Unit

General

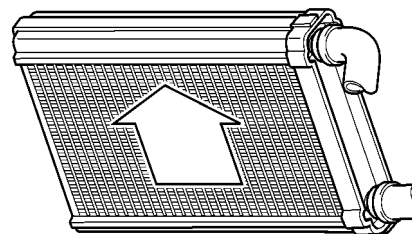
A semi-center location air conditioning unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioning unit has been made compact and lightweight.



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Heater Core

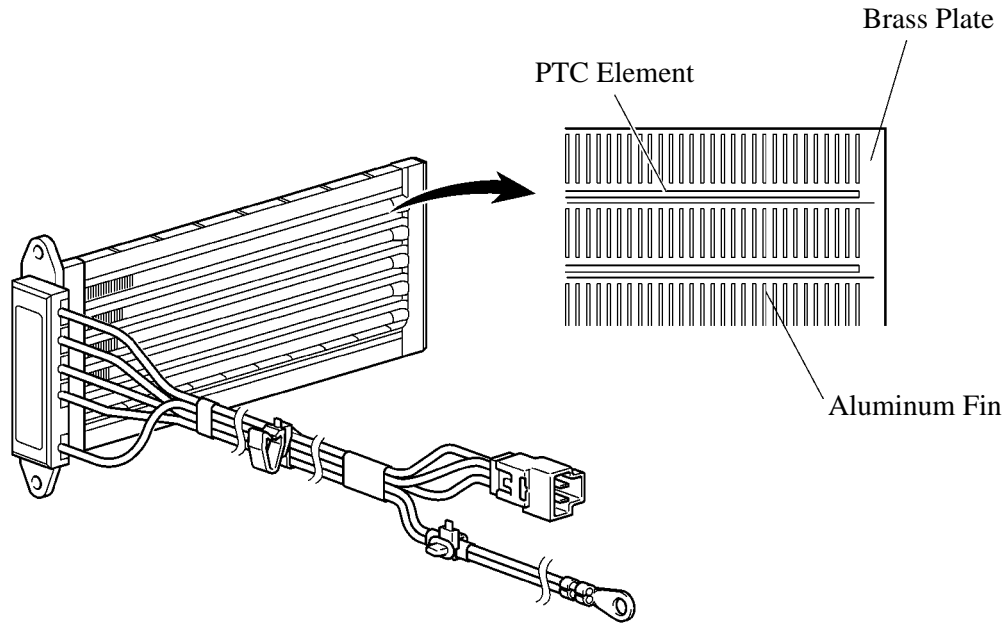
A compact, lightweight, and highly efficient SFA (Straight Flow Aluminum)-II type heater core is used.



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PTC Heater

- The PTC heater is located above the heater core in the air conditioning unit.
- The PTC heater consists of a PTC element, aluminum fin, and brass plate. When current is applied to the PTC element, it generates that to warm the air that passes through the unit. For details, PTC heater control on page BE-57.

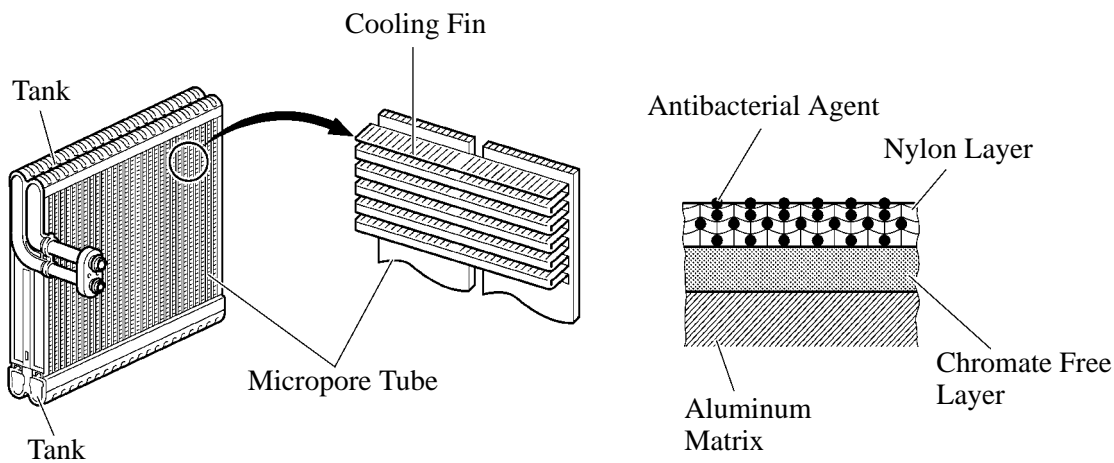


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Evaporator

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



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Evaporator Temp. Sensor

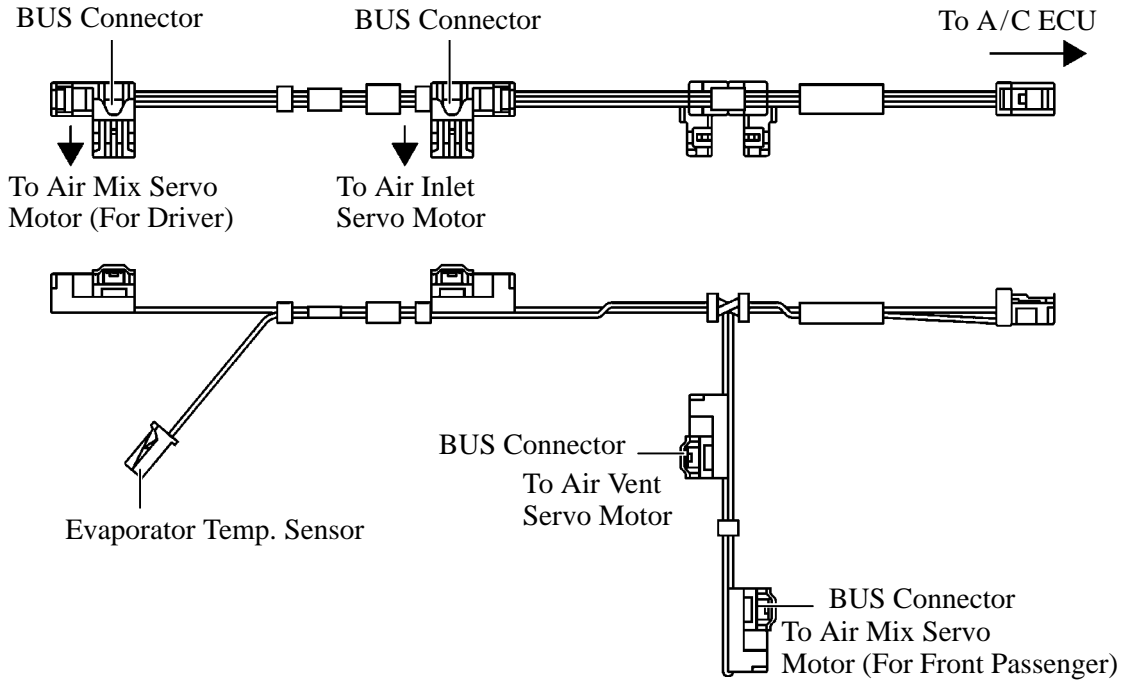
Evaporator temp. sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the A/C ECU.

Blower Motor

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

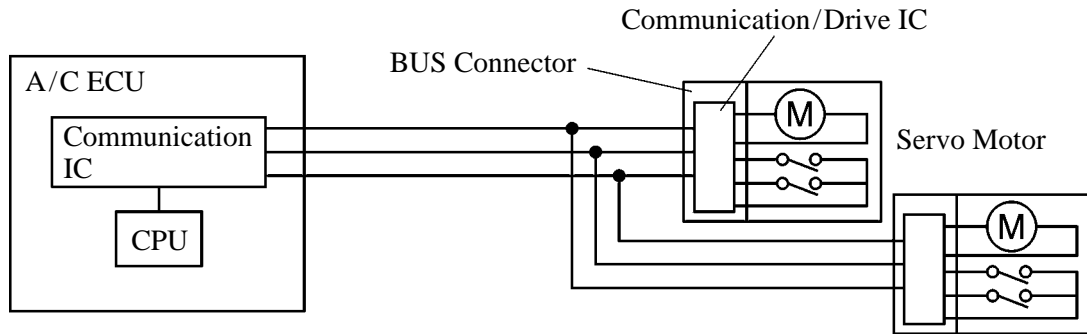
BUS connector

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



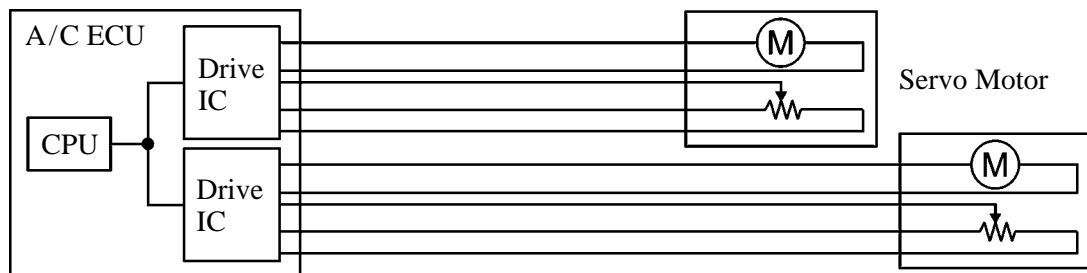
285BE43

- 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

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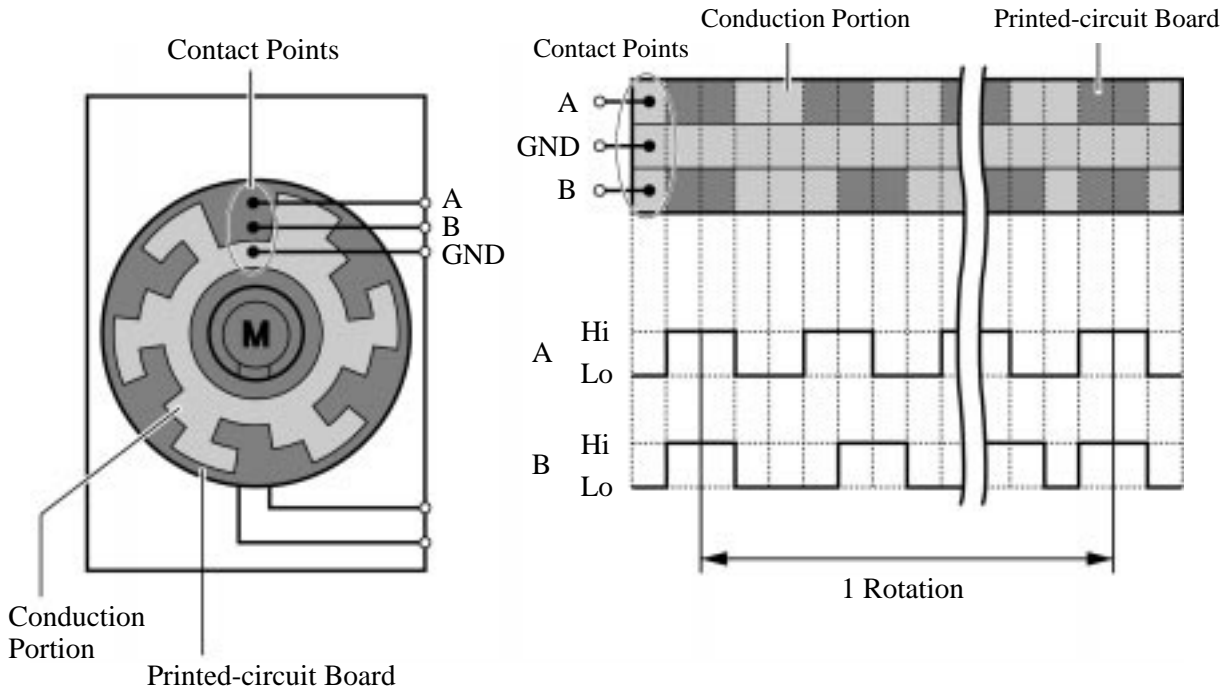


Without BUS Connector

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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.

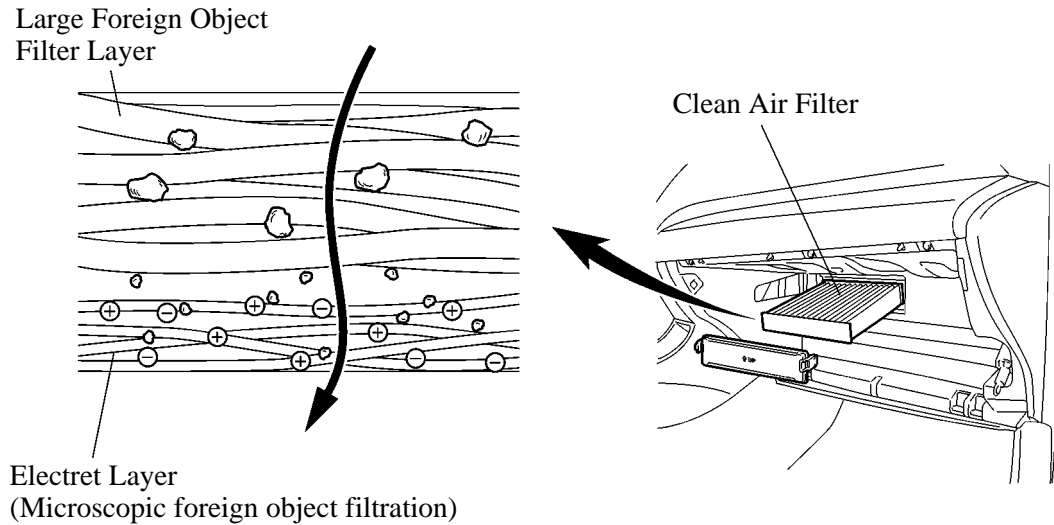


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NOTE: If the A/C ECU is reset after the auxiliary battery or A/C ECU is removed and installed, or the auxiliary battery voltage decreases, the A/C ECU automatically performs the initialization to detect the original positions of servo motors when the power source is switched to IG-ON. Although the DEF indicator on the heater control panel blinks during the initialization, this does not indicate a malfunction.

Clean Air Filter

A pollen removal type 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.



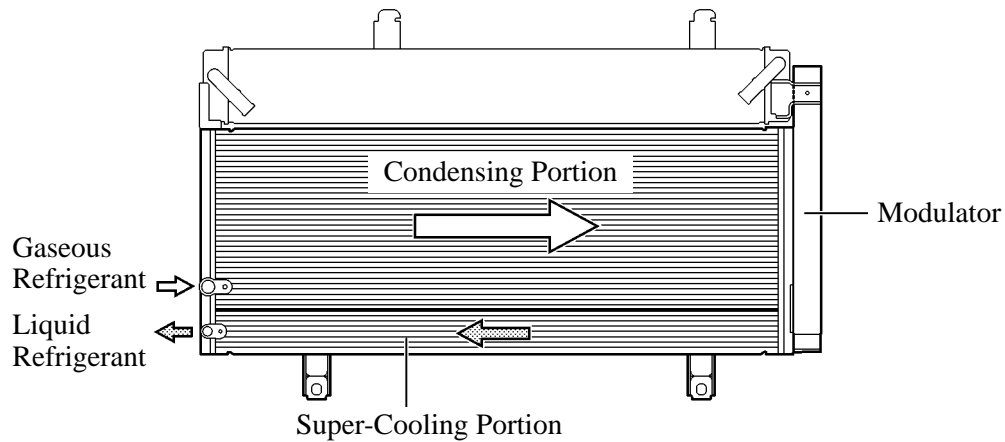
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Service Tip

- The filter used on U.S.A. models should be changed at 30,000 miles (cleaning interval: 15,000 miles).
 - The filter used on Canadian package models should be changed at 16,000 km (cleaning interval: 8,000 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.

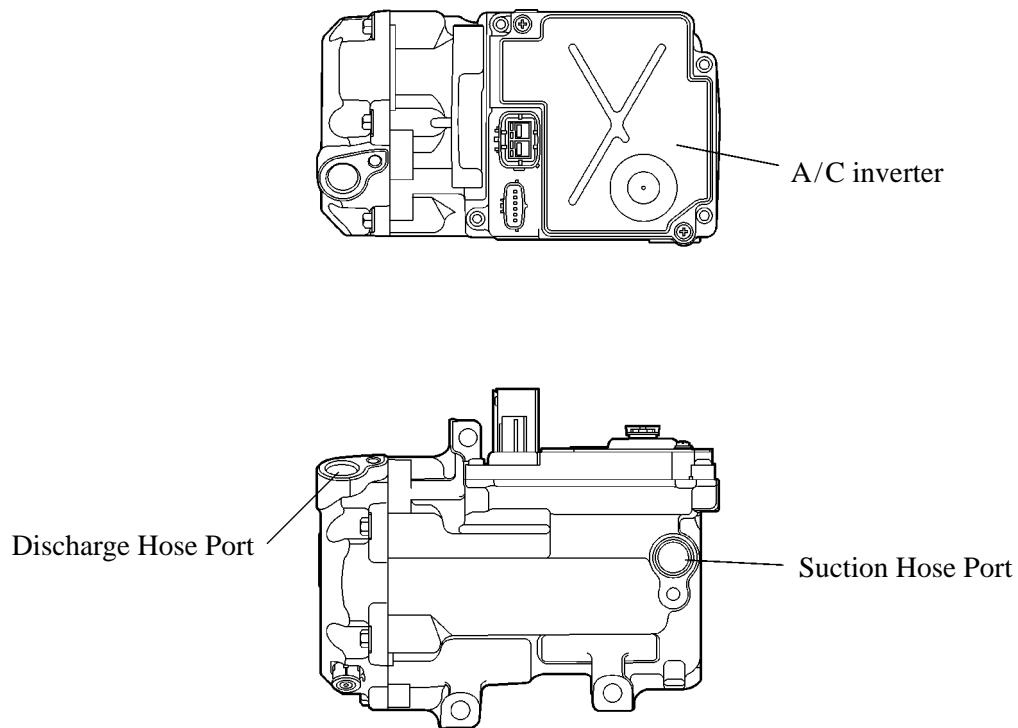


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4. A/C Compressor

General

- Along with the installation of the hybrid unit on the '07 Camry Hybrid model, an ES27 electric inverter compressor that is driven by a motor is used. The basic construction and operation of this compressor are the same as the ordinary scroll compressor, except that it is driven by an electric motor.
- The Air Conditioning (A/C) inverter is integrated with the compressor.
- The electric motor is actuated by 3-phase alternating current (244.8 V) supplied by the A/C inverter. As a result, the air conditioning control system on the '07 Camry Hybrid model is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
- Due to the use of an electric inverter compressor, the compressor speed can be controlled at the required speed calculated by the A/C ECU. Thus, the cooling and dehumidification performance and power consumption have been optimized.
- Low-moisture permeation hoses are used for the suction and discharge hoses at the compressor in order to minimize the entry of moisture into the refrigeration cycle.
- The compressor uses high-voltage alternating current. If a short or open circuit occurs in the compressor wiring harness, the THS ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor.
- For details on the electric inverter compressor control effected by the A/C ECU, see page BE-59.



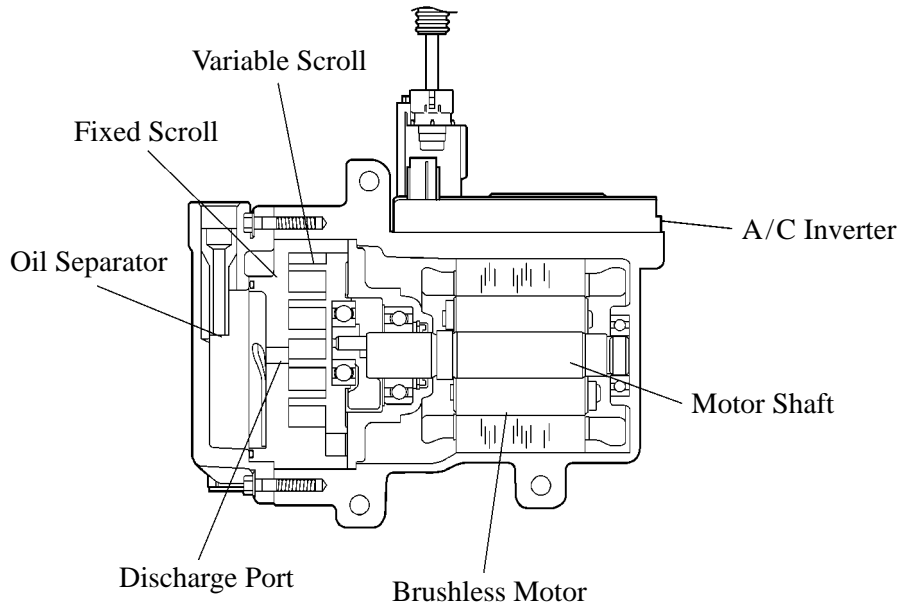
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Service Tip

In order to ensure the proper insulation of the internal high-voltage portion of the compressor and the compressor housing, the '07 Camry Hybrid model has adopted a compressor oil (ND11) with a high level of insulation performance. Therefore, never use a compressor oil other than the ND11 type compressor oil or its equivalent.

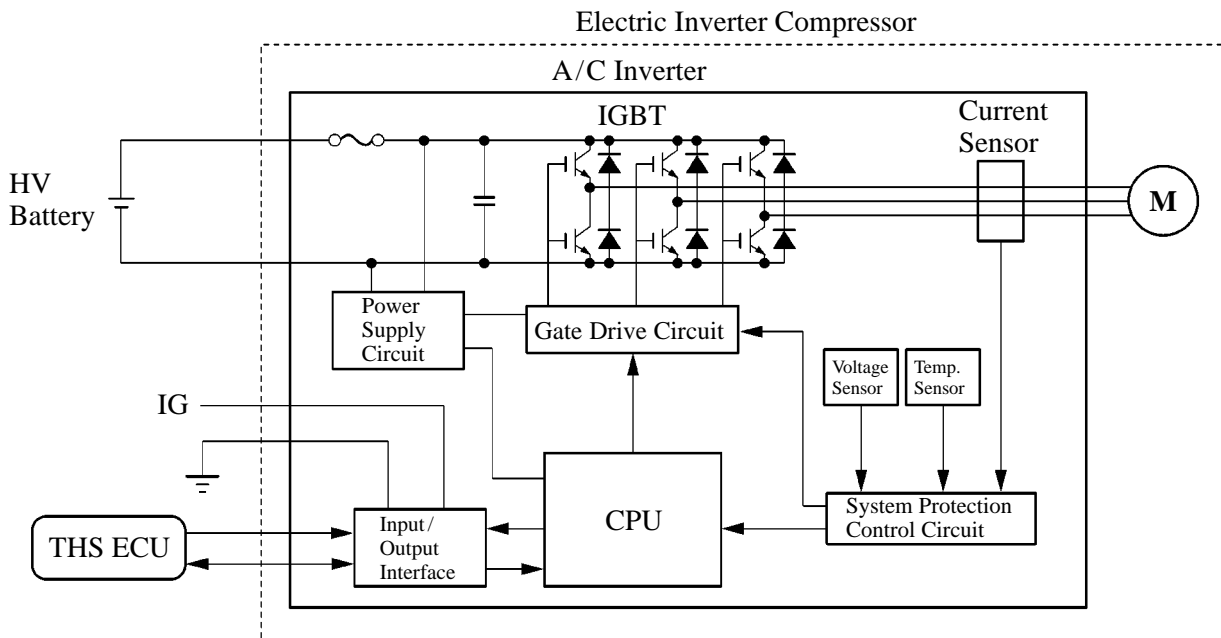
Construction

- The electric inverter compressor consists of a spirally wound fixed scroll and variable scroll that form a pair, a brushless motor, an oil separator, a motor shaft and A/C inverter.
- The fixed scroll is integrated with the housing. Because the rotation of the shaft causes the variable scroll to revolve while maintaining the same posture, the volume of the space that is partitioned by both scrolls varies to perform the suction, compression, and the discharge of the refrigerant gas.
- Locating the suction port directly above the scrolls enables direct suction, thus realizing improved suction efficiency.
- Containing a built-in oil separator, this compressor is able to separate the compressor oil that is intermixed with the refrigerant and circulates in the refrigeration cycle, thus realizing a reduction in the oil circulation rate.
- This inverter converts the HV battery's nominal voltage of DC 244.8 V into AC and supplies power to operate the compressor.



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► **System Diagram** ◀



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Operation

1) Suction

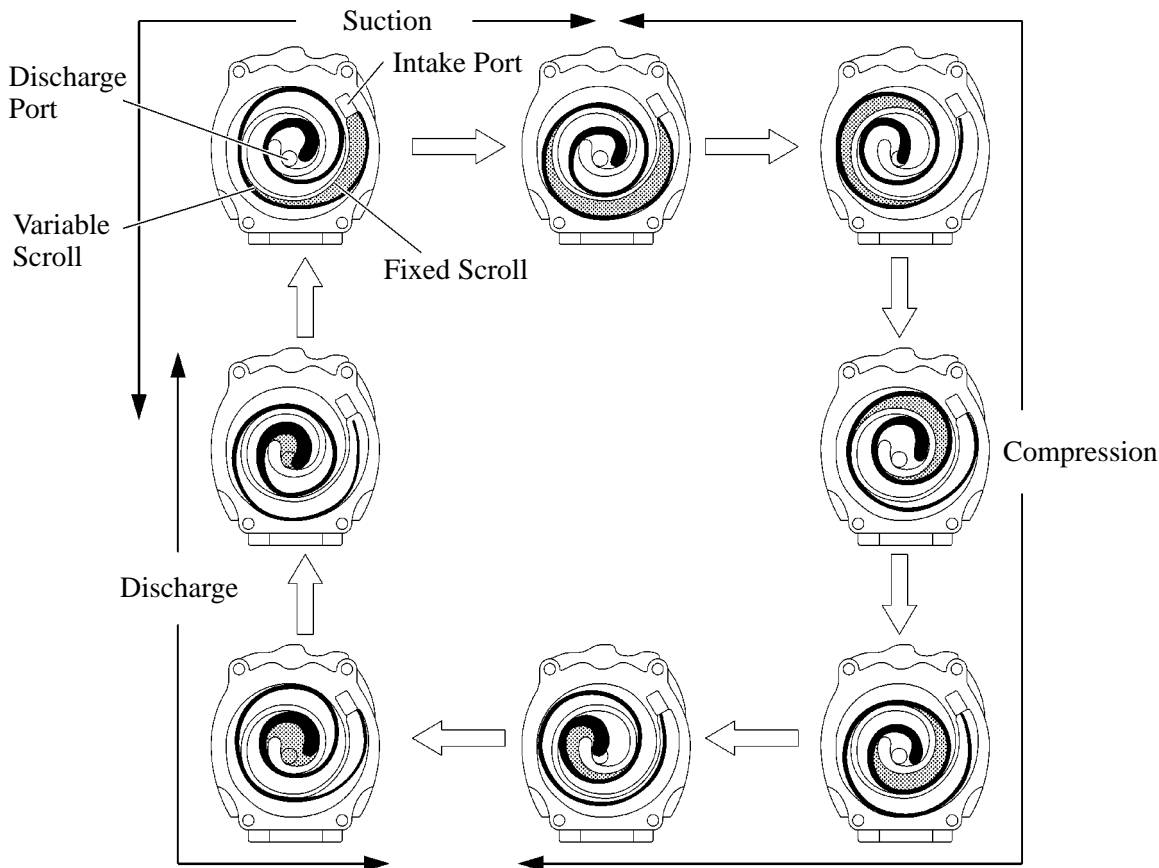
As the capacity of the compression chamber, which is created between the variable scroll and the fixed scroll, increases in accordance with the revolution of the variable scroll, refrigerant gas is drawn in from the intake port.

2) Compression

From the state at which the suction process has been completed, as the revolution of the variable scroll advances further, the capacity of the compression chamber decreases gradually. Consequently, the refrigerant gas that has been drawn in becomes compressed gradually and is sent to the center of the fixed scroll. The compression of the refrigerant gas is completed when the variable scroll completes approximately 2 revolutions.

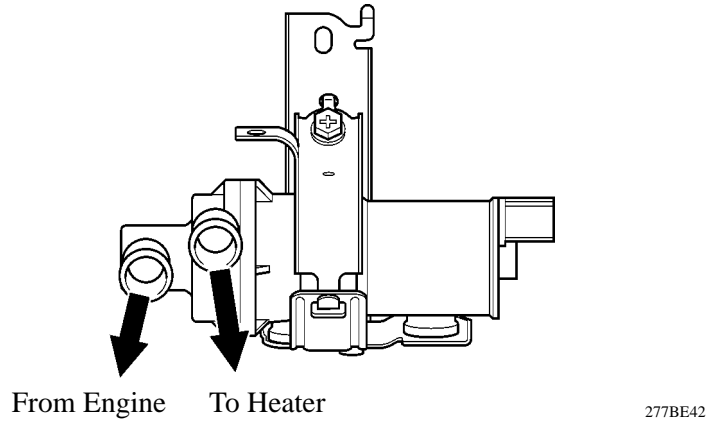
3) Discharge

When the compression of the refrigerant gas is completed and the refrigerant pressure becomes high, the refrigerant gas discharges through the discharge port located in the center of the fixed scroll by pushing the discharge valve.



5. Electric Water Pump

- The '07 Camry Hybrid model uses an electric water pump for air conditioning. This provides a stable heater performance even if the engine is stopped because of a function of the THS-II.
- The '07 Camry Hybrid model uses a new type of electrical water pump in which the water flow resistance has been reduced.



6. A/C Pressure Sensor

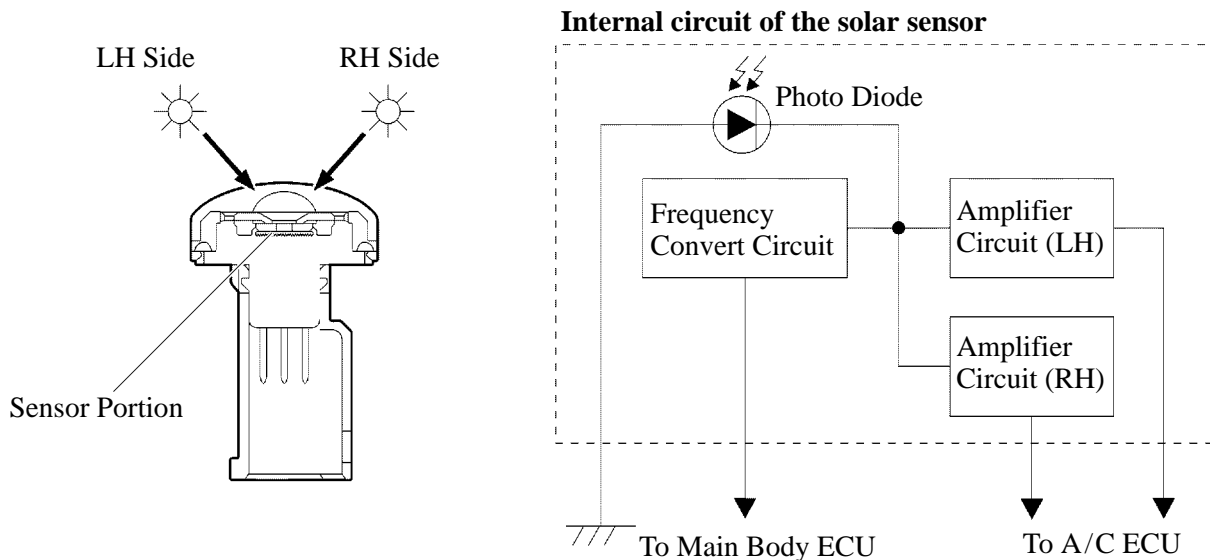
A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C ECU in the form of voltage changes.

7. Room Temp. Sensor and Outside Temp. Sensor

- The room temp. 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 temp. 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.

8. Solar Sensor

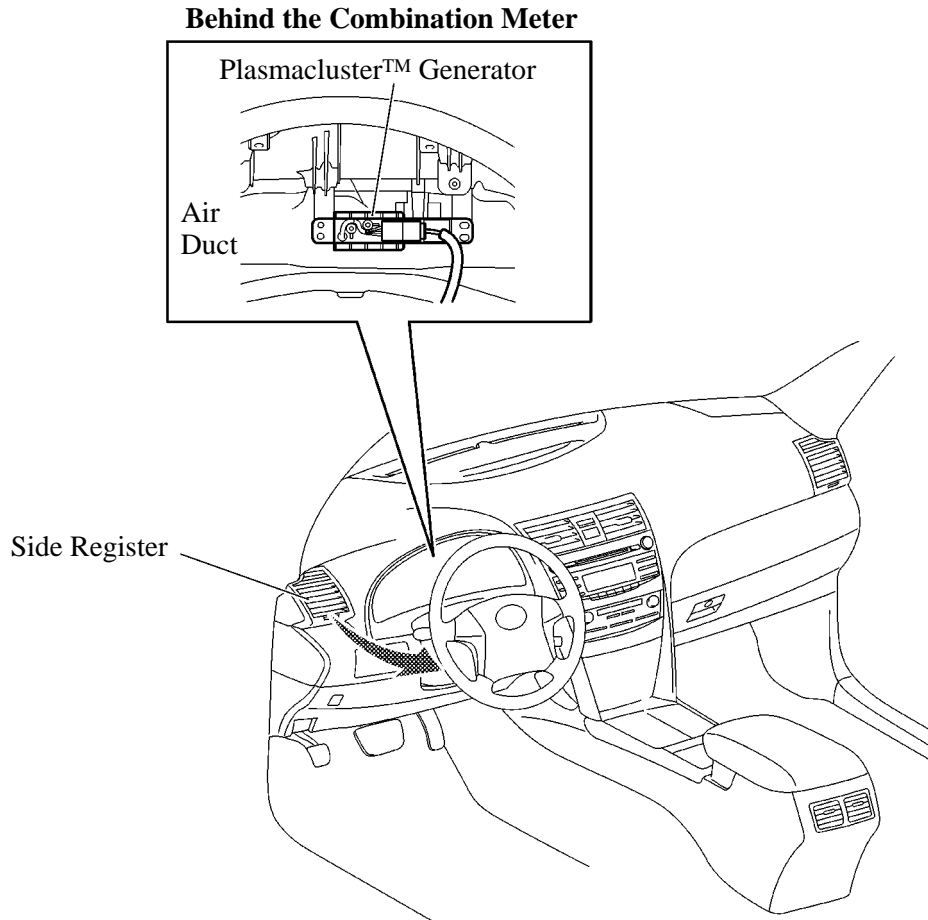
- The solar sensor consists of a photo diode, two amplifier circuits for the solar sensor, and a frequency converter circuit for the light control sensor.
- A solar sensor detects (in the form of changes in the current that flows through the built-in photo diode) the changes in the amount of sunlight from the LH and RH sides (2 directions) and outputs these sunlight strength signals to the A/C ECU.



9. Plasmacluster™ Generator

General

- A Plasmacluster™ generator is provided 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.



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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 (H₂O) and oxygen molecules (O₂) in the air, and emits them into the air. These ions reduce airborne germs.

