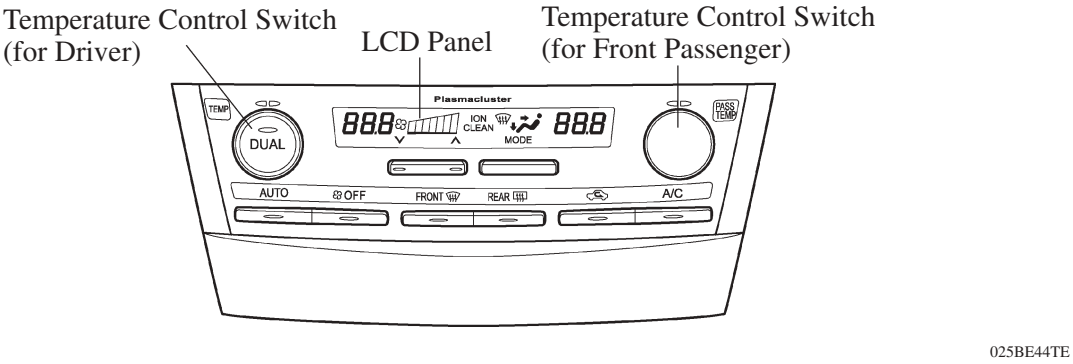
■CONSTRUCTION AND OPERATION

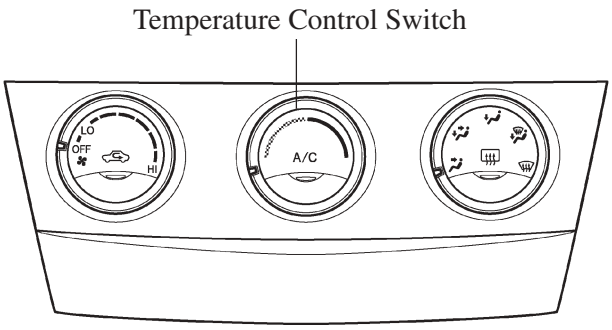
1. Heater Control Panel, Steering Pad Switch and Rear Seat Control Switch

- 2 types of heater control panel are used on the new Camry, differing between models with the automatic air conditioner and those with the manual air conditioner.
- On models with the automatic air conditioner, the air conditioner status is displayed on an LCD (Liquid Crystal Display) panel.
- On models with the automatic air conditioner, as part 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 for enhanced ease of use.
- On some models with the automatic air conditioner, some 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 or the rear seat control switches (AUTO, OFF and TEMP) on the rear armrest.
  For details, refer to Steering Pad Switch (page BE-272) and Rear Seat Control Switch (page BE-256).



025BE44TE

Models with the automatic air conditioner using Plasmacluster™ Generator



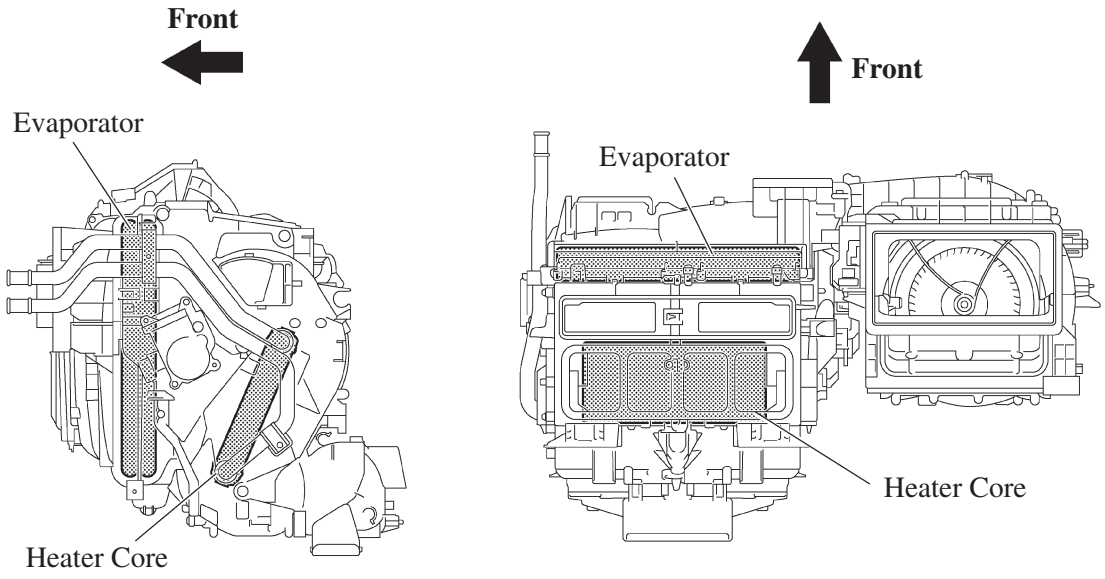
02KBE123TE

Manual Air Conditioner for LHD Models

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.

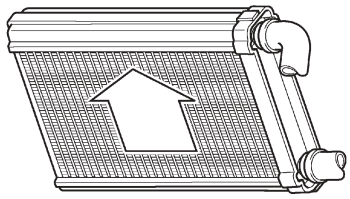


01YBEA44Y

BE

Heater Core

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

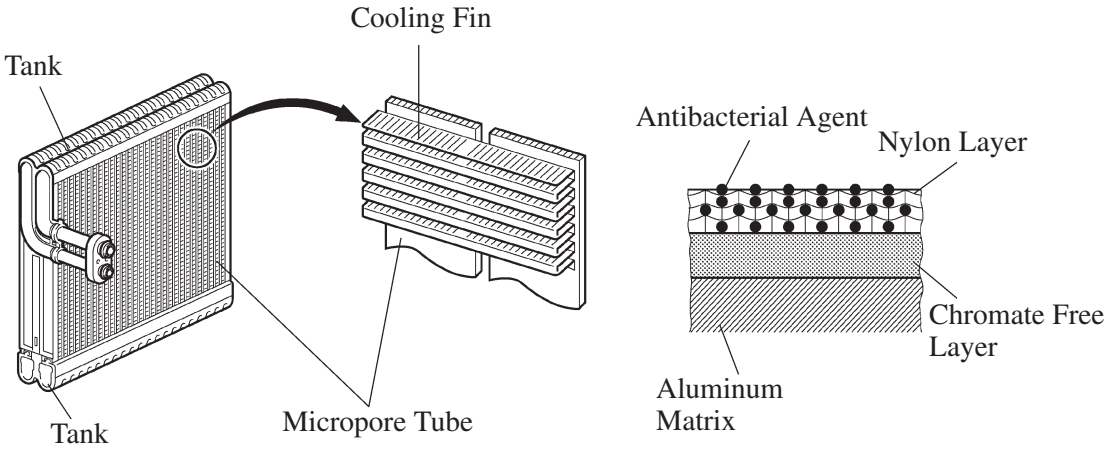


01YBE45Y

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

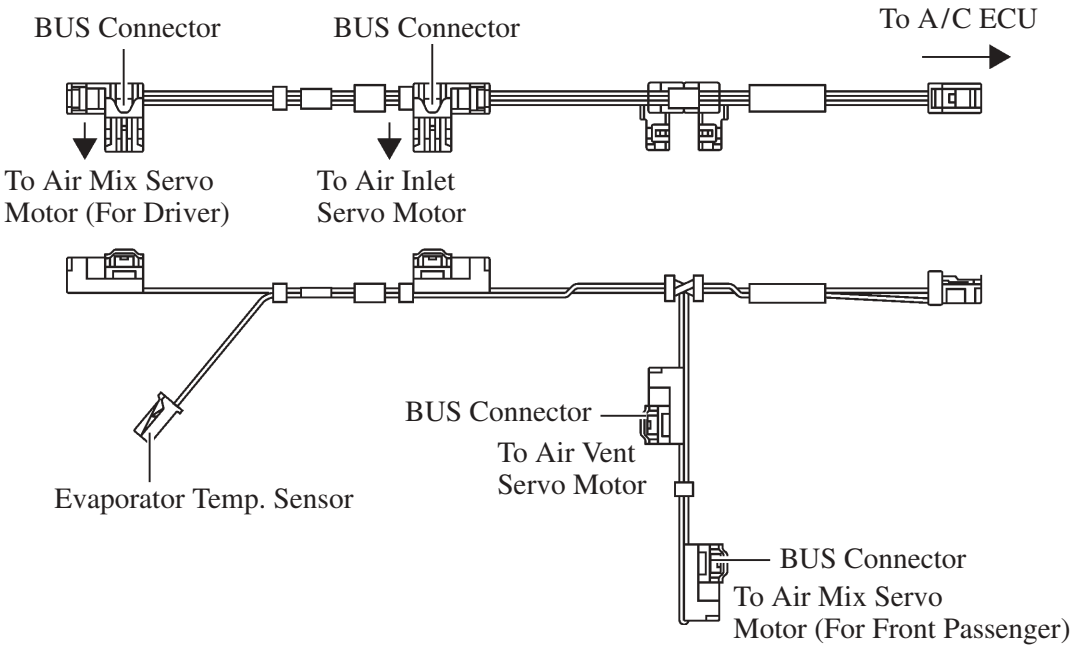
The evaporator temp. sensor detects the temperature of the cool air immediately past the evaporator by measuring resistance changes, and outputs it to the A/C ECU.

Blower Motor

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

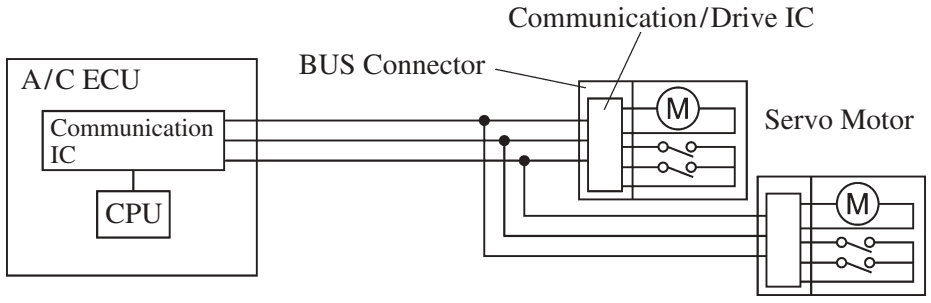
BUS Connector

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



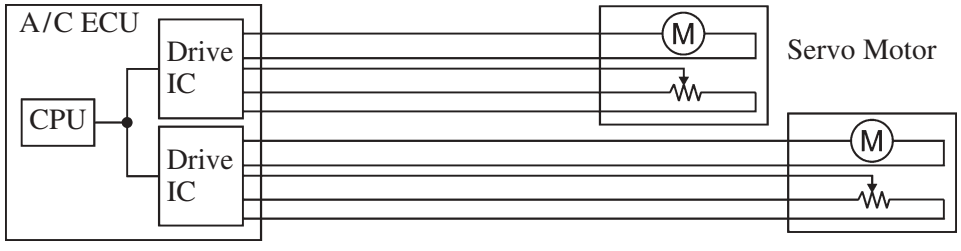
285BE43

- 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

285BE44

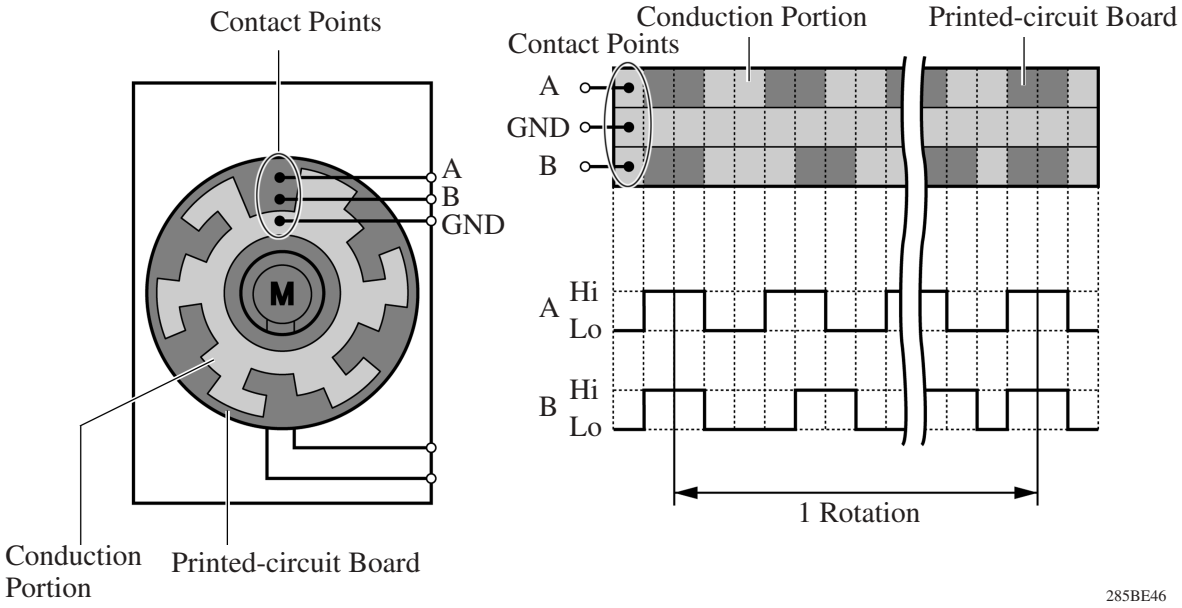


285BE45

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 each change in the pulse phase. The smart connector detects the damper position and movement direction with this signal.



NOTE: When one of the following operations is conducted, the A/C ECU automatically performs the initialization to detect the original positions of the servo motors. Although either the front DEF indicator*1 or the rear DEF indicator*2 on the heater control panel blinks during the initialization, this does not indicate a malfunction.

- After the battery terminal has been disconnected, the power source*3 is switched to IG-ON or the engine is started*4.
- The engine starts and stops repeatedly in a short period of time.
- The engine starts when the battery voltage is low.

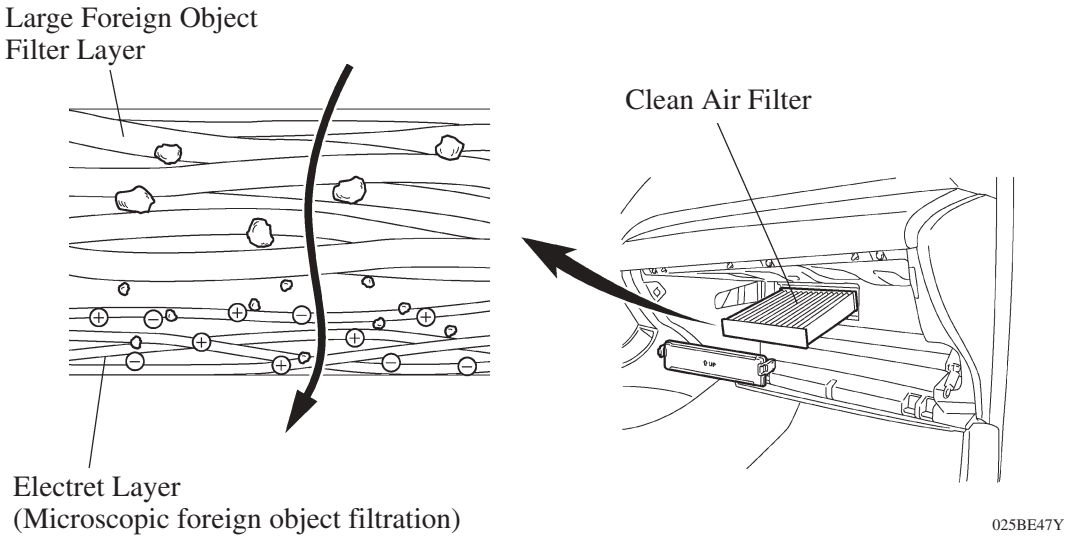
*1: Models with the automatic air conditioner
*2: Models with the manual air conditioner
*3: The power source condition can be changed by operating the engine switch on models with the smart entry and start system, and the ignition switch on models without the smart entry and start system.
*4: Only for models without the smart entry and start system

Clean Air Filter

- A clean air filter is used.
- 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.
- The clean air filter types and dust removal functions vary in accordance with the destinations as follows:

Destination	Taiwan, Thailand, The Philippines, Vietnam, Indonesia, Malaysia	Australia and G.C.C. Countries	China
Clean Air Filter Type	Semi-standard Type	Pollen-removal Type	High efficiency Type
Filter Function	Relatively large dust particles such as fibers	Dust and pollen	Minute dust particles

▶ Australia and G.C.C. Country Models ◀



Service Tip

The replacement interval of the filter varies in accordance with the destination as follows:

Destination	Cleaning Interval [km (miles)]		Replacement Interval [km (miles)]	
	Normal Condition	Dusty Condition	Normal Condition	Dusty Condition
Taiwan, Thai, Vietnam, Philippines and Malaysia	—	←	20,000 (12,400)	←
Australia and G. C. C. Countries	10,000 (6,200)	5,000 (3,000)	30,000 (18,600)	15,000 (9,300)
China	—	—	20,000 (12,400)	—

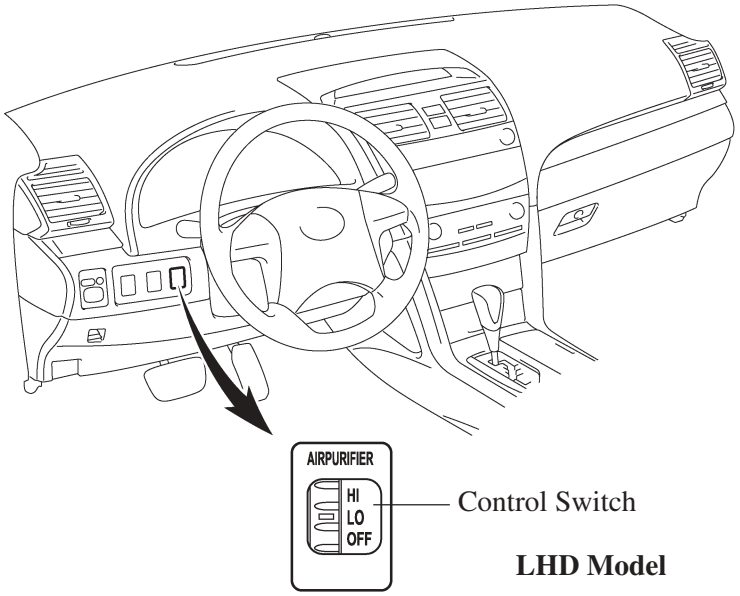
However, observation of these guidance should depend on the usage conditions (or environment).

BE

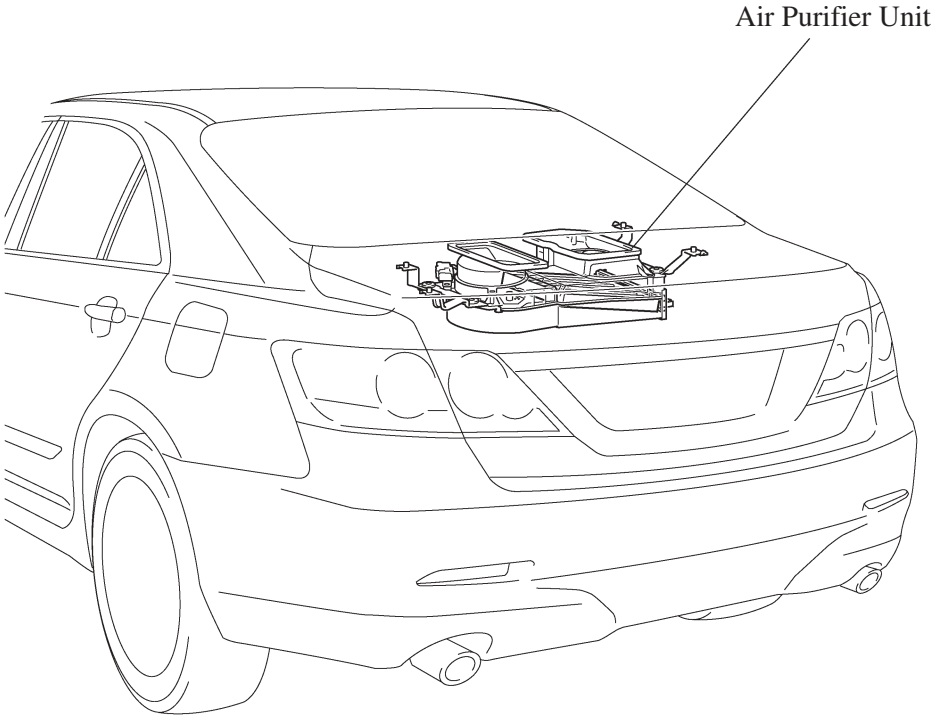
Air Purifier

1) General

- The air purifiers are used on some Taiwanese and Chinese models. The settings vary in accordance with the grades and engine types. For details, see the equipment list in Model Outline (see page MO-42).
- A photo-catalytic deodorizing function has been provided to refresh the air in the cabin. A filter with a photo catalyst and a xenon light that emits ultraviolet rays are used to perform this function.



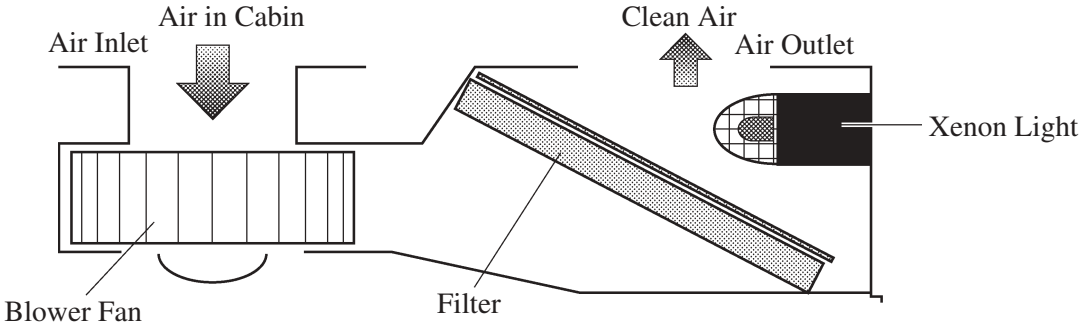
LHD Model



02KBE34Y

2) Construction and Operation

- The air purifier unit consists mainly of the control dial, filter with the photo catalyst, blower fan and xenon light. The xenon light that emits ultraviolet rays is enclosed in the air purifier unit, and is not serviceable.
- The filter inside the air purifier unit consists of active charcoal with a photo catalyst. The air taken in from the cabin through the air inlet by the blower fan passes through the filter and is photo-deodorized by the xenon light. The clean air is then blown back out through the air outlet.
- When the photo catalyst is expose to ultraviolet rays, it converts the oxygen and water vapors in the air into active oxygen. This oxygen oxidizes, brakes down, and removes the foul odor from the filter.

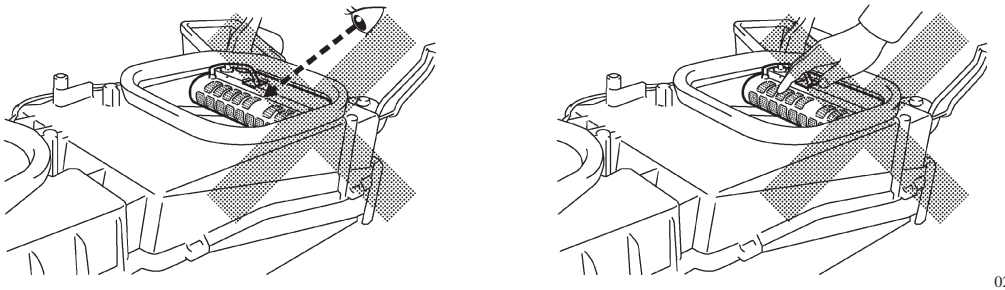


02KBE35Y

NOTICE

The following precautions pertain to the use of the xenon lamp and air purifier filter with photo catalyst.

- The xenon light illuminates constantly when the ignition switch*1/engine switch*2 is turned ON, and it outputs ultraviolet rays. The wavelength of the ultraviolet rays is less than the 300 mm that is considered harmful to humans. However, the ultraviolet rays could occasionally cause eye pain, blurred vision or skin inflammation. Therefore, never look directly at the xenon light or allow it to come into direct contract with your skin during its operation.



02KBE36Y

- When the air purifier filter with a photo catalyst is exposed to the ultraviolet rays that are contained in indoor lighting or sunlight, the surface of the filter could discolor from gray to yellow. However, this will not affect its function.

Service Tip

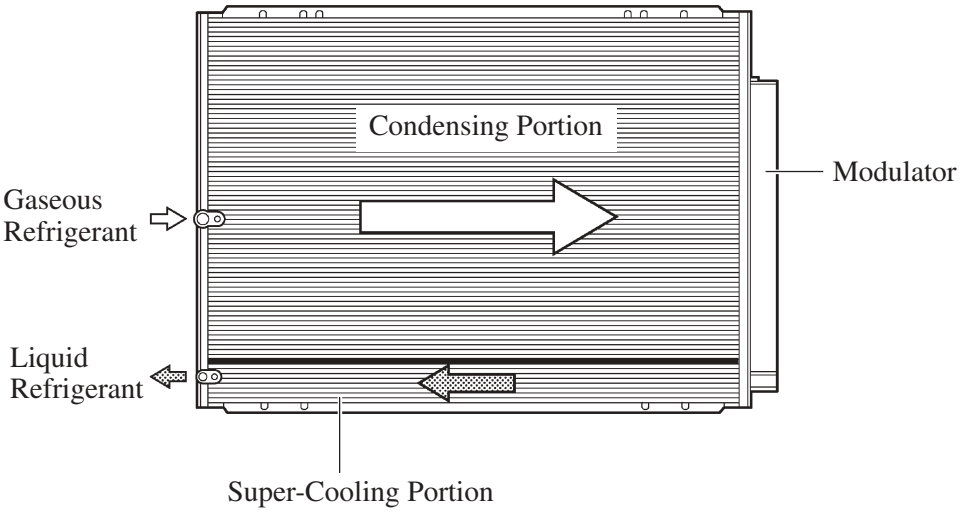
- The replacement interval for the filter is 15,000 km (9,300 miles) or 12 months. For Chinese models, the filter must be inspected every 10,000 km (6,200 miles) and cleaned as necessary, and must be replaced annually.
- Replace the air purifier filter after the ignition*1/engine*2 switch is turned OFF.

*1: Models without the smart entry and start system
*2: Models with the smart entry and start system

BE

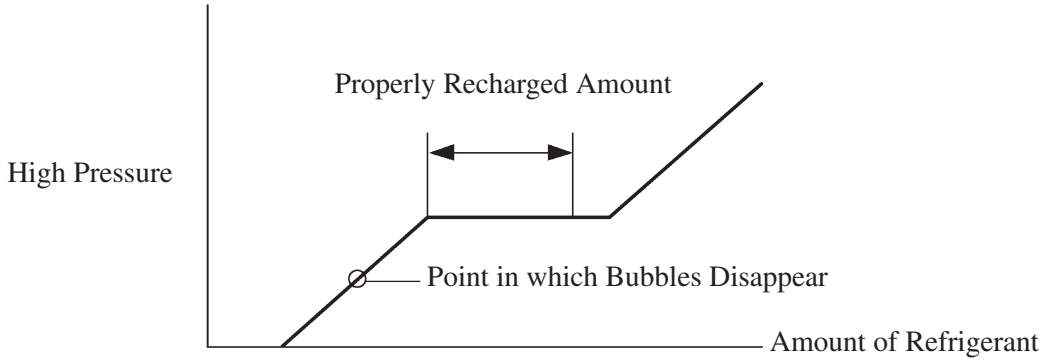
3. Condenser

- An MF (Multi-Flow) type condenser is used. The condenser consists of two cooling portions; a condensing portion and a super-cooling portion, which are integrated together with a gas-liquid separator (modulator). 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

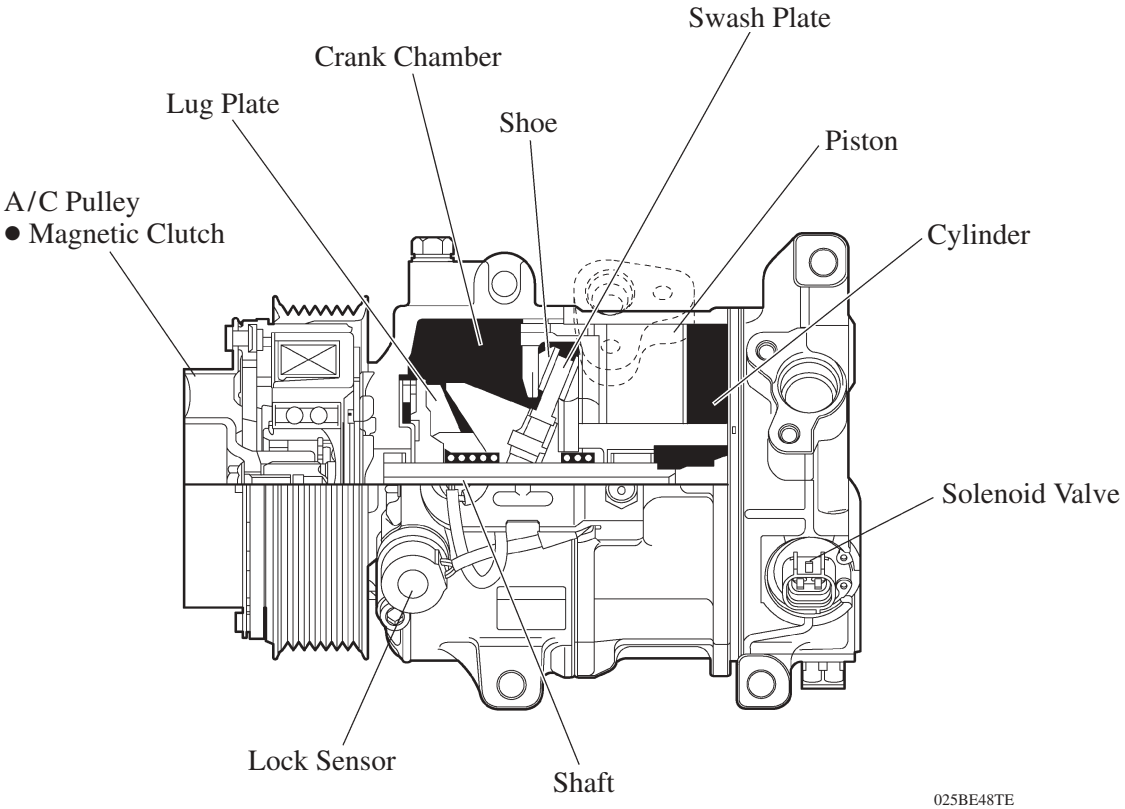
The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system 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.



4. A/C Compressor

General

- The A/C compressor is a continuously variable capacity type, of which the 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 1AZ-FE and 2AZ-FE engines.
- A solenoid valve that adjusts the suction pressure so that the compressor capacity can be controlled as desired is provided.
- The internal valve is installed on Chinese, Taiwanese, Thai and Malaysian models with the 1AZ-FE engine, G.C.C. Country models with the 2AZ-FE engine, and Australian MT models with the 2AZ-FE engine to improve the A/C compressor durability at high speeds and under heavy thermal load conditions. The internal valve is integrated into the solenoid valve.
- A temperature switch, which turns ON/OFF in accordance with the refrigerant temperature, has been provided on the A/C compressor of models for G.C.C. Countries. This switch is located in series with the solenoid valve drive circuit. When the refrigerant temperature increases abnormally, the switch turns OFF to forcibly terminate the compressor control.



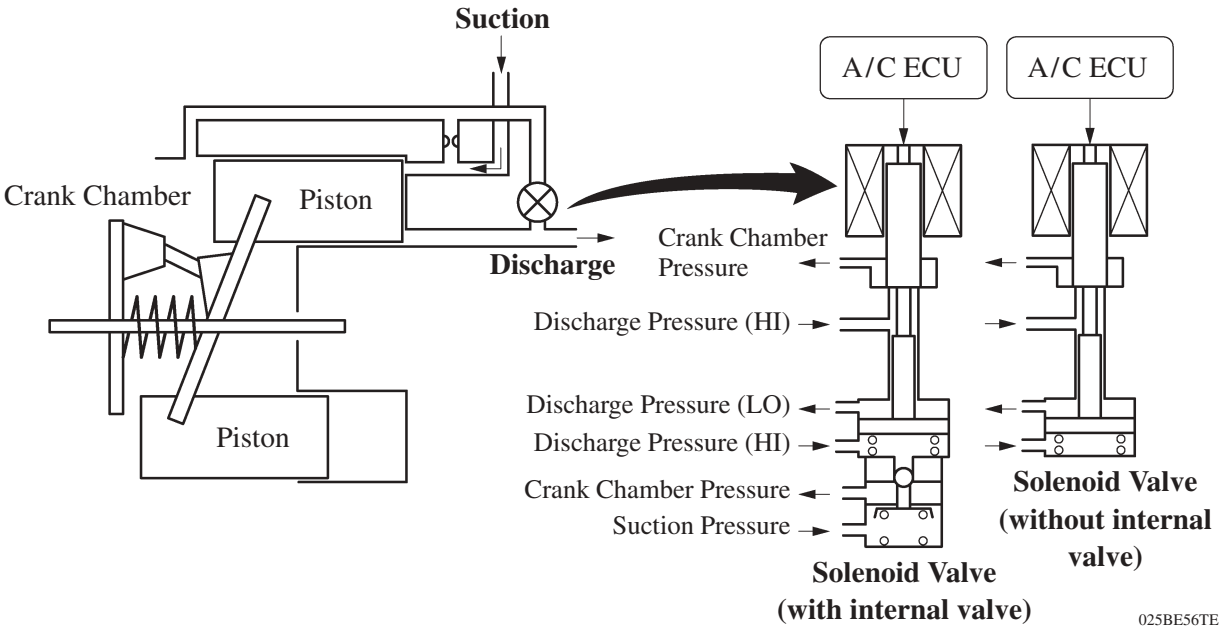
A/C Compressor for Models with 2GR-FE Engine

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

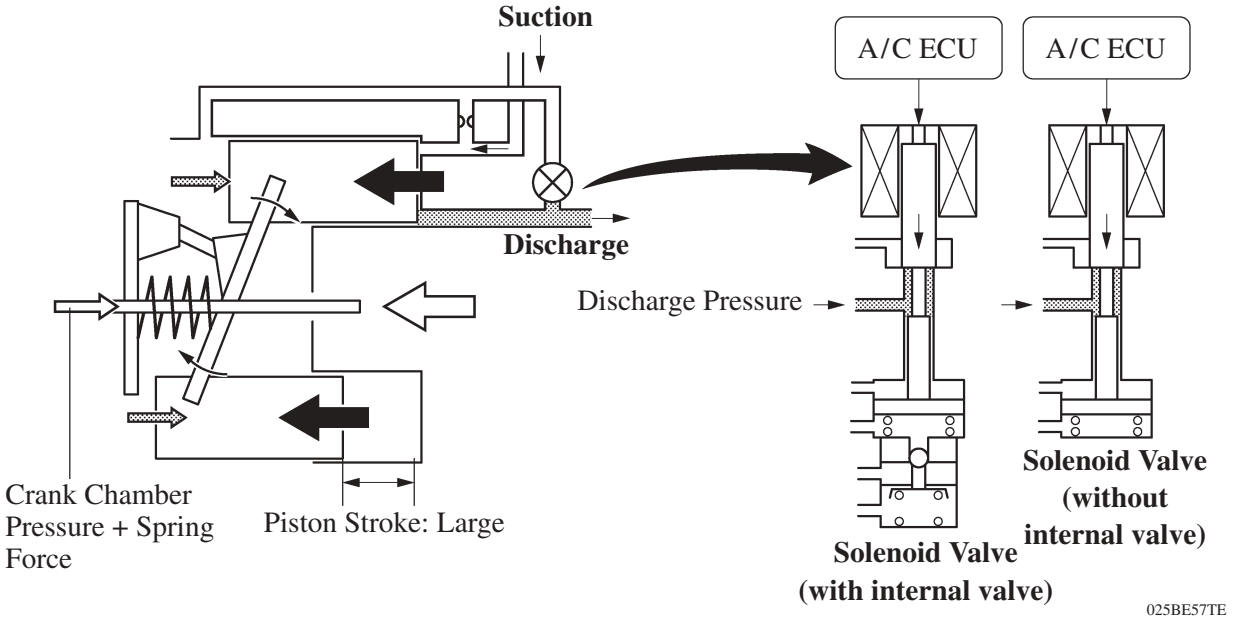
The lock sensor sends A/C pulley speed signals to the A/C ECU. The A/C ECU determines whether the magnetic clutch is locked or not by using those signals and engine speed signals.

Solenoid Valve Operation

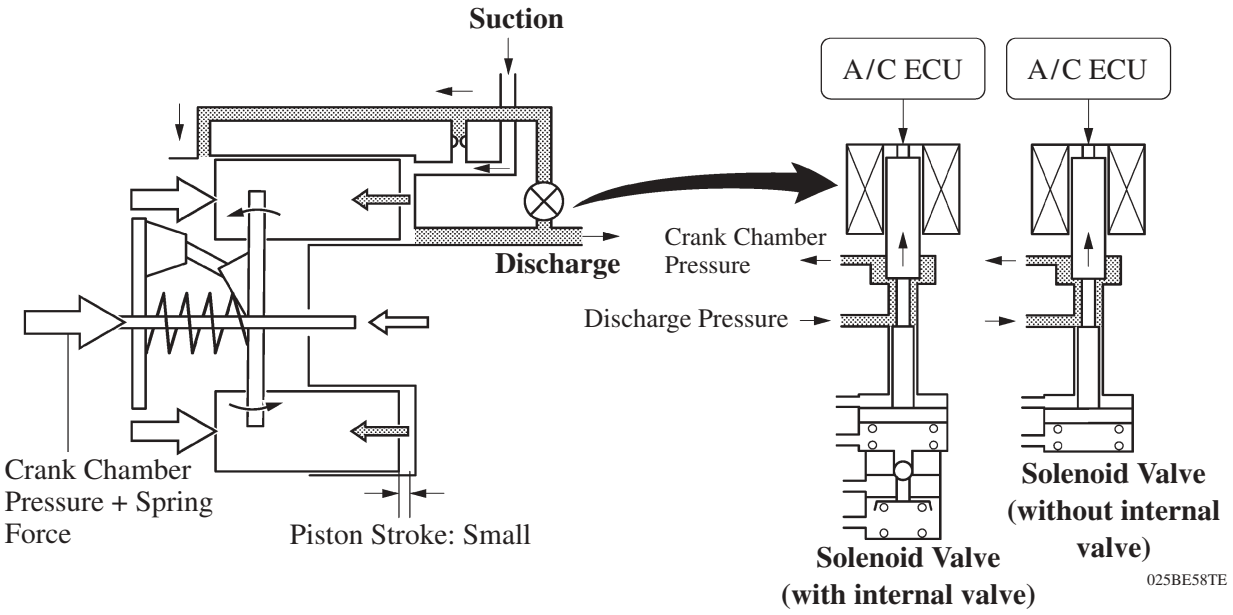
- The crank chamber is connected to the discharge passage. A solenoid valve is provided between the discharge passage (LO pressure) and the discharge passage (HI pressure).
- The solenoid valve operates under duty cycle control in accordance with the signals from A/C ECU.



- When the solenoid valve closes (the 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 length increases and the discharge capacity increases.

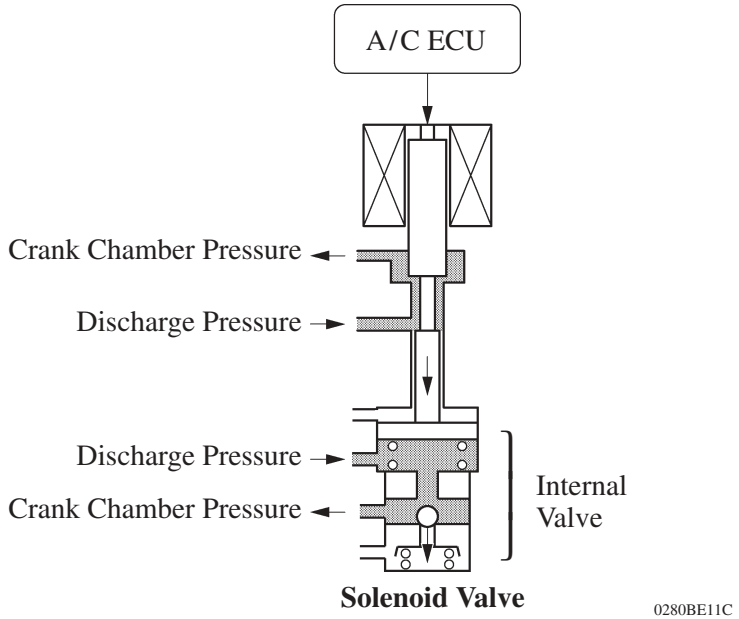


- When the solenoid valve opens (the solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the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



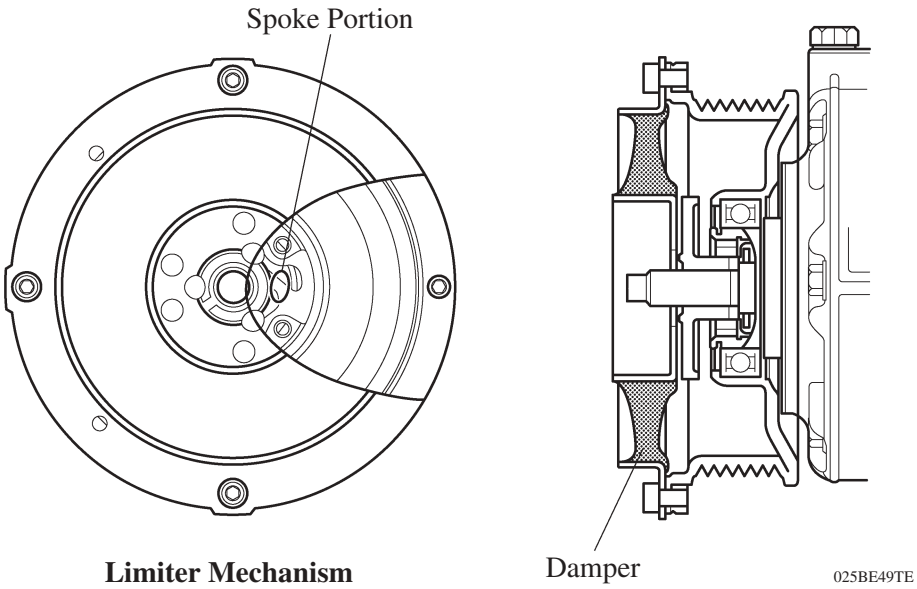
Internal Valve Operation (Models with Internal Valve)

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



DL type A/C Pulley (Only for Models with 1AZ-FE and 2AZ-FE Engines)

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

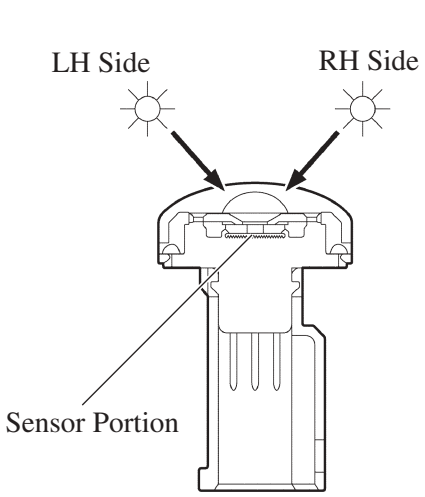
The A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C ECU in the form of voltage changes.

6. Room Temp. Sensor and Outside Temp. Sensor

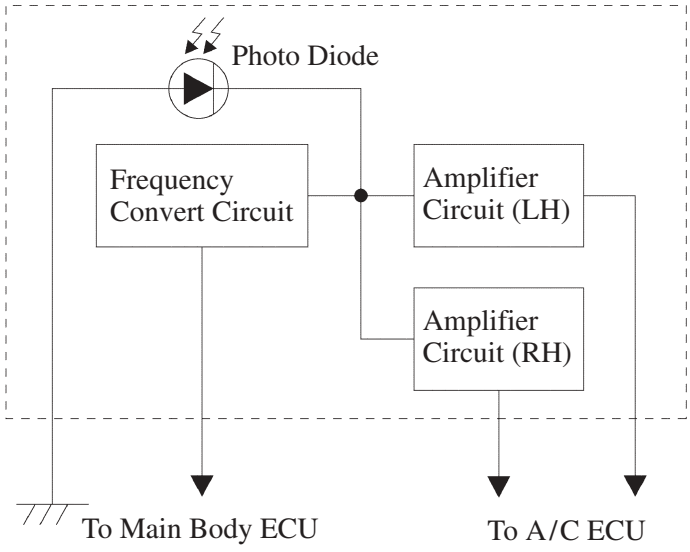
- The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C ECU. This sensor is used on models with automatic air conditioner.
- The outside temperature sensor detects the outside temperature based on changes in 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. This sensor is used on models with automatic air conditioner.
- 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.



Internal circuit of the solar sensor



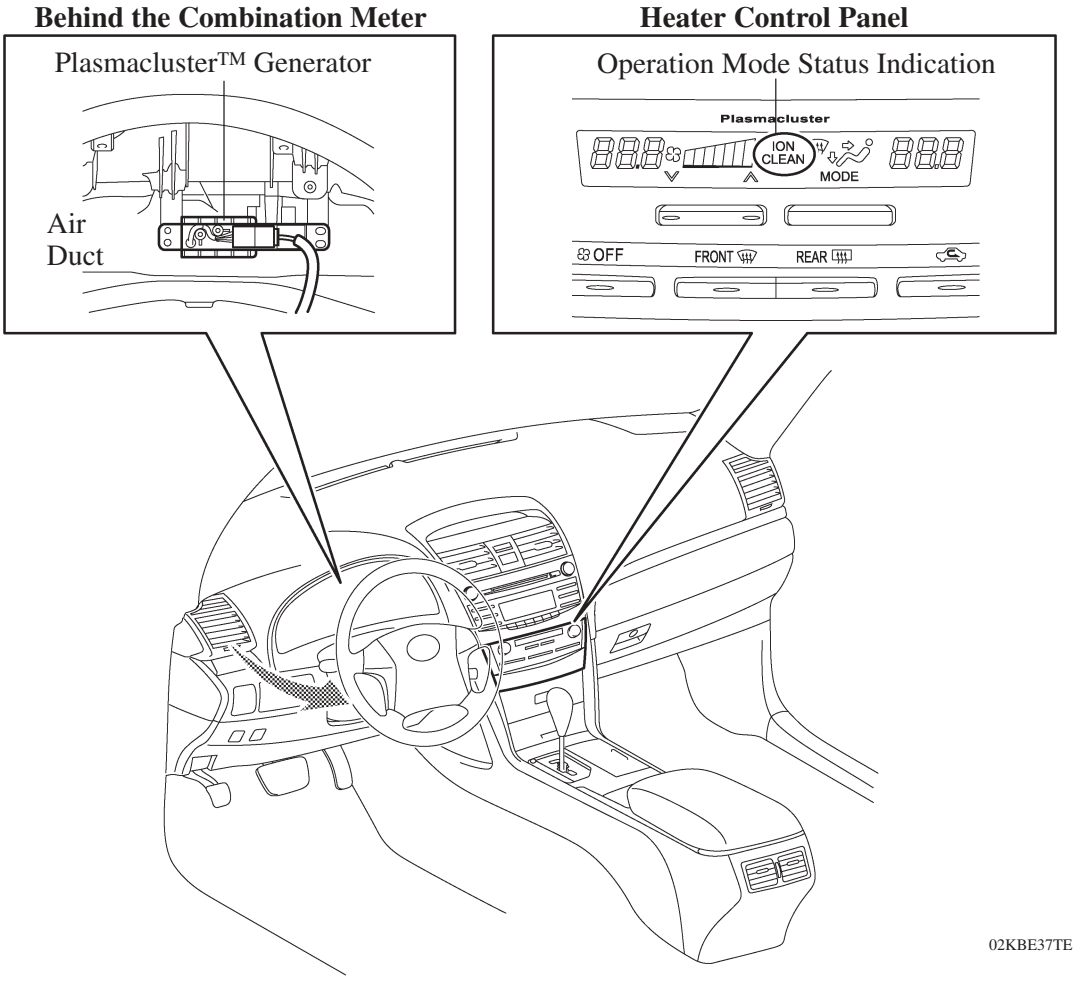
0140BE235C

BE

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.

