

GROUP 55

HEATER, AIR CONDITIONING AND VENTILATION

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GENERAL DESCRIPTION

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The blower, heater, and evaporator have been integrated with the heater and A/C system to achieve a greater fan power and noise reduction. Manual A/C is installed on LS models; automatic A/C is installed on XLS models.

FEATURES**IMPROVEMENTS IN COMFORT**

- The outside/inside air circulation switching, air outlet, and outlet air temperature are automatically controlled according to the ambient temperature, solar radiation, and passenger compartment temperature so that the optimum air conditioning has been achieved. <Automatic A/C>
- By the adoption of clean air filter, the air quality inside the passenger compartment has been improved.

**IMPROVEMENTS IN OPERATION
PERFORMANCE**

- Operability has been improved by the adoption of large triple dial.
- Customize function has been added for the improved convenience.

IMPROVEMENTS IN FUEL ECONOMY

- The high efficiency compressor with a 2-step profile oil separator has been installed, thus improving the fuel economy.
- The idle-up speed is controlled in two steps to secure the air cooling performance during summer and to improve the fuel economy in the seasons with moderate temperature.
- Improvement of fuel economy by the cooling fan control depending on the refrigerant pressure and vehicle speed.

GLOBAL ENVIRONMENT PROTECTION

- New refrigerant system (HFC134a) has been adopted.
- By the optimization of A/C system, the refrigerant charging amount has been reduced.
- Clean air filter media and its cover are separated to reduce waste materials.

IMPROVEMENTS IN SERVICE QUALITY

- Reduction of refrigerant gas leakage and improvement in serviceability by incorporating condenser and receiver
- Clean air filter is installed to the backside of glove box to facilitate the filter replacement.

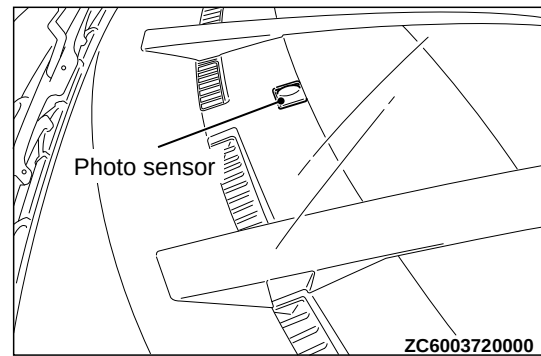
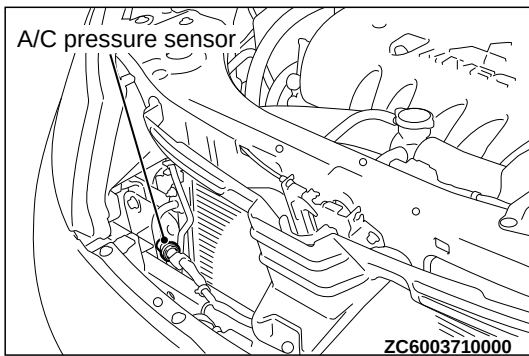
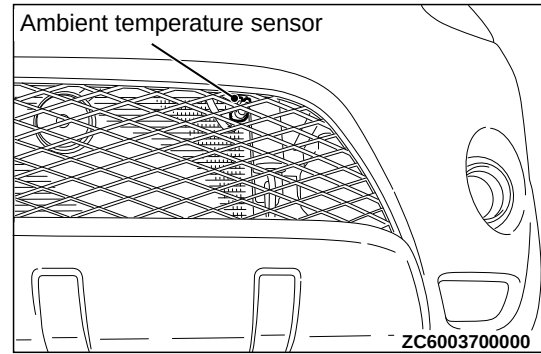
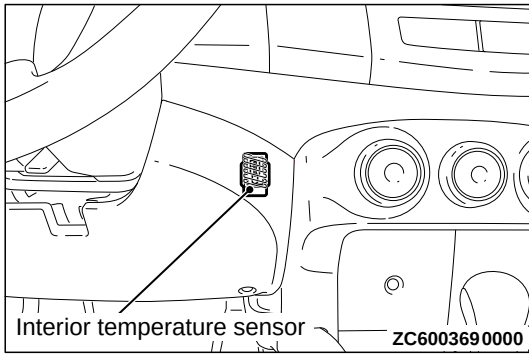
IMPROVEMENTS IN RESPONSIBILITY

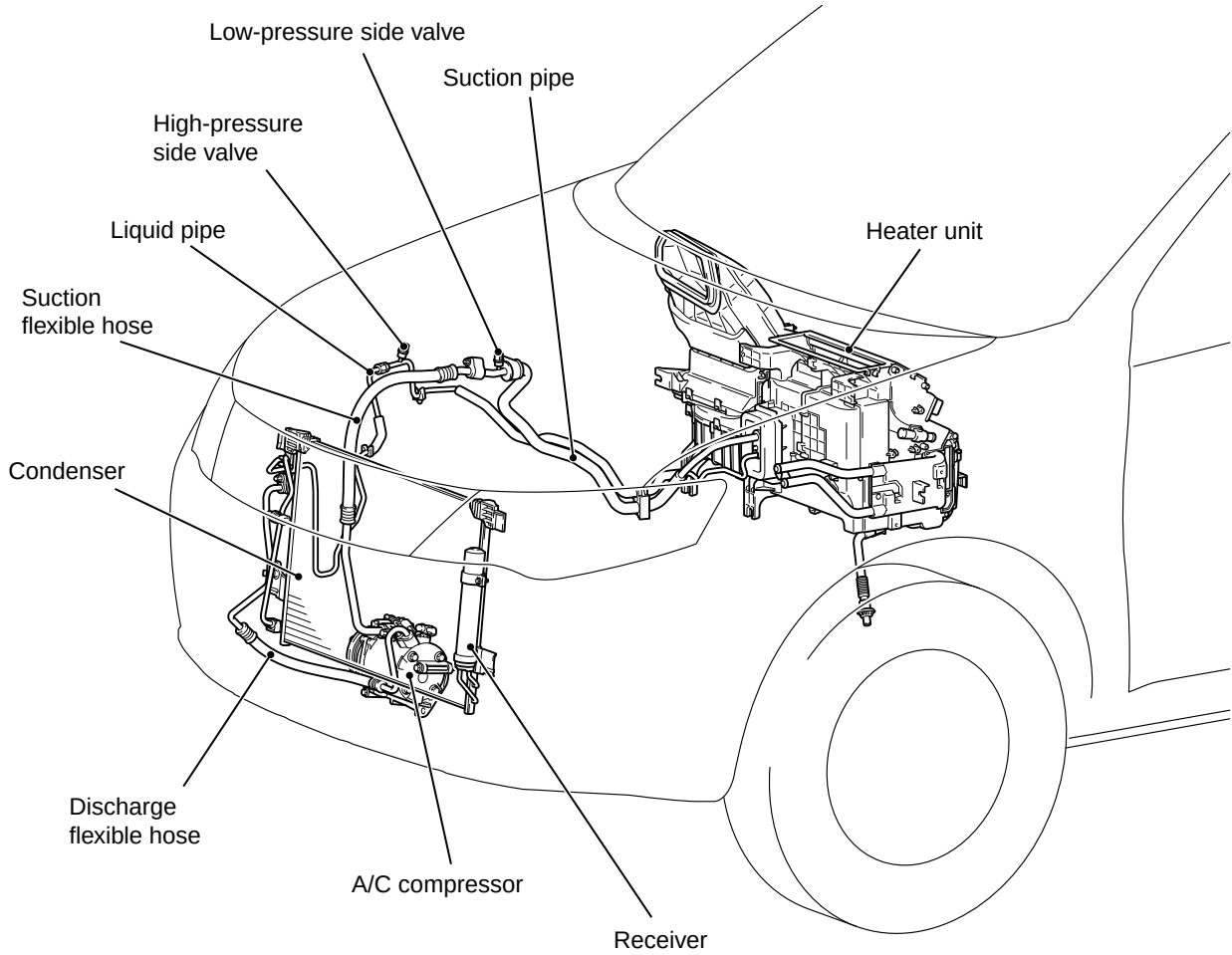
Reliable information transmission is achieved by connecting A/C-ECU and each ECU via CAN communication.

SPECIFICATIONS

Item		Specification
Air conditioning switch type		Rotary type
Compressor type		MSC90CAS
Cooling output		5.5 kW
Heating output		5.7 kW
Refrigerant	Type	R134a (HFC-134a)
	Charge quantity g (oz)	480 - 520 (16.9 - 18.3)

CONSTRUCTION DIAGRAM

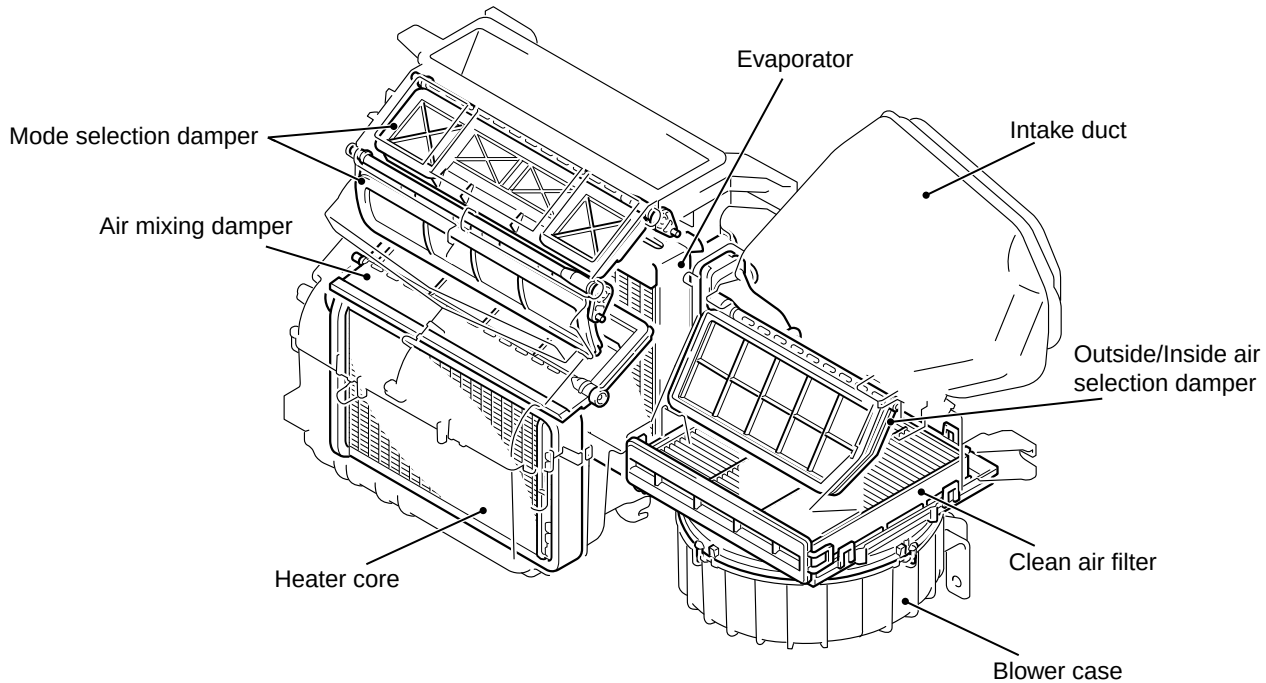




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HEATER UNIT

HEATER UNIT



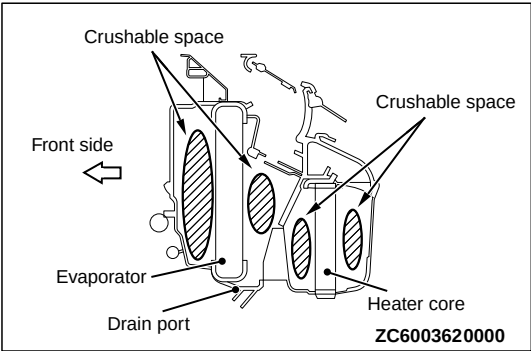
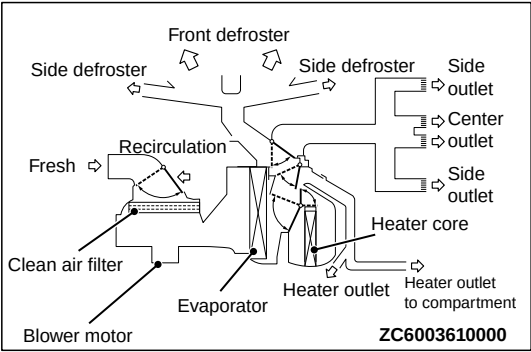
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The following new unit integrated blower, heater and evaporator to increase the air flow, reduce noise, and improved cooler and heater performance;:

- Integrated heater/cooling unit has been adopted for large air flows and low noise.
- Crushable space has been secured to reduce the risk of passenger injuries.
- Air mix damper that is also used as a reheating prevention damper has been adopted to improve the air cooling performance.
- The A/C condensate water outlet (drain port) has been installed to behind the evaporator to restrain the clogging of drain by foreign materials.
- The outlet air temperature of the defroster has been set lower than that of foot to prevent overheating the driver's face.

- Fin thermo sensor to directly measure evaporator temperature reduces occurrence risk of an evaporator freeze which will lead to the compressor lock.
- Clean air filter has been introduced as standard to protect the unit from the intrusion of foreign materials (fallen leaves and others). and, it removes the pollen and dust, and improves the air quality inside the passenger compartment.
- Clean air filter media and cover have been separated to reduce the waste material amount generated during the filter replacement.
- The installation position of clean air filter has been set to the backside of glove box to facilitate the filter replacement operation. And, the one-touch tab structure has been adopted for the cover installation to enable the replacement operation without tools.

OPERATION



CRUSHABLE SPACE

The evaporator and heater core has been longitudinally installed in the vehicle length, and the crushable space has been adopted so that the structure absorbs the impact in case of a collision and reduces the risk of passenger injuries.

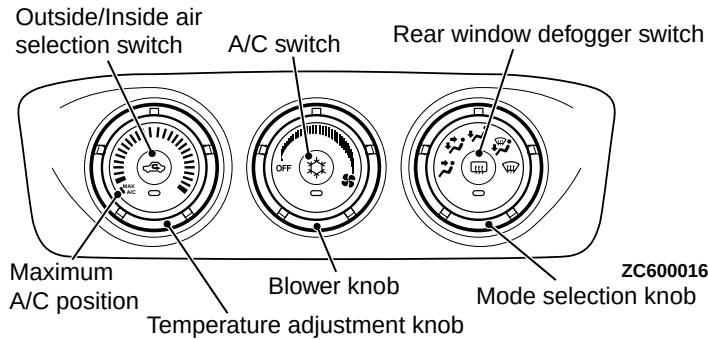
HEATER CONTROL

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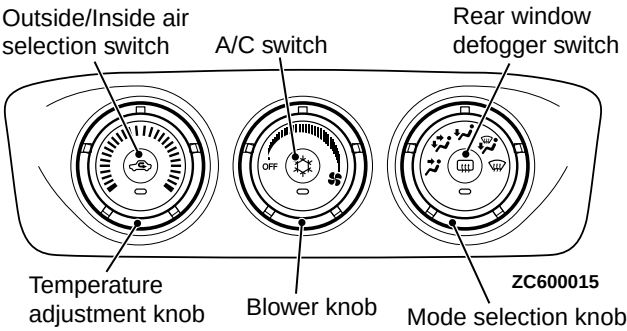
HEATER CONTROLLER

<MANUAL A/C>

<VEHICLES FOR USA>

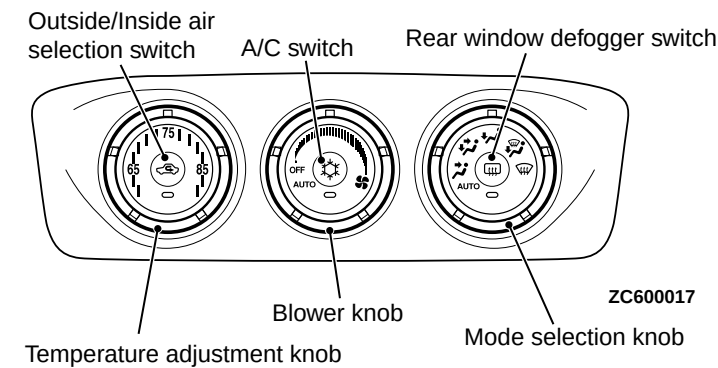


<VEHICLES FOR CANADA>

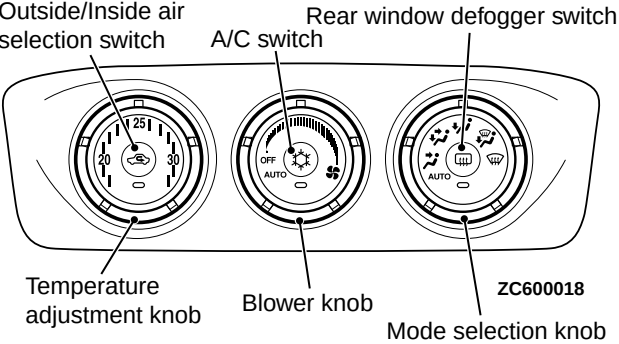


<AUTOMATIC A/C>

<VEHICLES FOR USA>



<VEHICLES FOR CANADA>



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The features of the heater controller described below have been designed for better appearance, easier operation, and improved visibility.

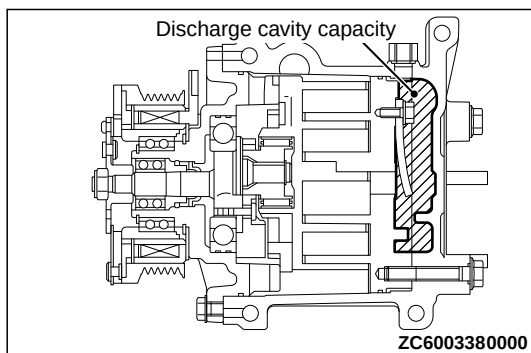
- Each dial for the air outlet switching, fan volume control, and temperature adjustment has been enlarged to improve operability.
- Ring lights have been adopted to inside the dials to improve appearance during nighttime.
- A confirmation sound at switch operation has been added.
- AUTO and OFF positions of the fan volume control dial have been exchanged with one another. This

change prevents the dial to pass the AUTO position when the fan volume control is turned OFF, and eliminates the necessity of manual reselection when switching the inside/outside air selection manually, thus improving the operability. <Vehicles with automatic A/C>

- When the air outlet switching dial and fan volume control dial are turned to the AUTO position, the A/C switch has been made to automatically turn ON to improve convenience. (Using the customize function, this function can be cancelled.) <Vehicles with automatic A/C>

A/C COMPRESSOR

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High-efficiency scrolling compressor built into the oil separation enhance the cooling performance. Compressor discharge cavity capacity has been expanded to reduce discharge pulse, vibration, and noise.

A/C COMPRESSOR CLUTCH WITH THERMAL FUSE

A thermal fuse is installed in the A/C compressor field core. If the compressor fails, the thermal fuse will be blown due to friction heat produced by the drive belt and locked compressor. This deenergizes the A/C compressor clutch and allows the compressor to run freely.

A/C-ECU

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CONTROL

FORCED DEF CONTROL

When air outlet position is switched to DEF, A/C is automatically turned ON, and outside/inside air selection damper is set to the fresh air position to quickly defrost the windshield screen.

MAX A/C CONTROL <Vehicles with manual A/C>

When the preset temperature is set to the maximum cooling, the control status becomes as described below.

Subject to control	Control status
Air mix damper	MAX COOL position
Air outlet mode	Selected position
Air volume	Selected position
Outside/inside air selection damper	Air recirculation position
A/C switch	ON

MAX COOL, MAX HOT CONTROL <Vehicles with automatic A/C>

When the set temperature is at 18.0 °C <61°F> (MAX COOL) or at 32.0 °C <89°F> (MAX HOT) with the air outlet and air volume at the AUTO positions, the following controls are made automatically by the A/C-ECU.

Subject control	to	MAX COOL	MAX HOT
Air mix damper		MAX COOL position	MAX HOT position
Air outlet mode		FACE position	FOOT position
Air volume		Maximum	Maximum
Outside/inside air selection damper		Air recirculation position*	Fresh air position*
A/C switch		ON*	OFF*

NOTE: "" indicates that when the automatic control is cancelled because of the customize function, the automatic control is not performed.*

IDLE-UP CONTROL

A/C-ECU and the ECM communicate with each other through the CAN communication. The idle-up speed of the engine is controlled in two steps depending on the A/C load to secure the air cooling performance during summer and to improve fuel economy in seasons with moderate temperature.

DETECTION CONTROL FOR REFRIGERANT LEAKS

A/C-ECU determines if the refrigerant amount is less than specified or refrigerant pressure is abnormal by using the ambient temperature (ambient temperature sensor to measure refrigerant inflation rate) and refrigerant pressure (measured by the A/C pressure sensor). When refrigerant amount or refrigerant pressure is judged abnormal, the compressor is cut-off to protect the A/C system.

NOTE: When abnormality occurs, the A/C indicator flashes.

REAR WINDOW DEFOGGER TIMER CONTROL

To reduce electrical load to battery, the defogger is automatically turned OFF, 20 minutes after it is turned ON or while engine is stopped.

PROTECTION CONTROL AT AIR BAG DEPLOYMENT (DURING COLLISION)

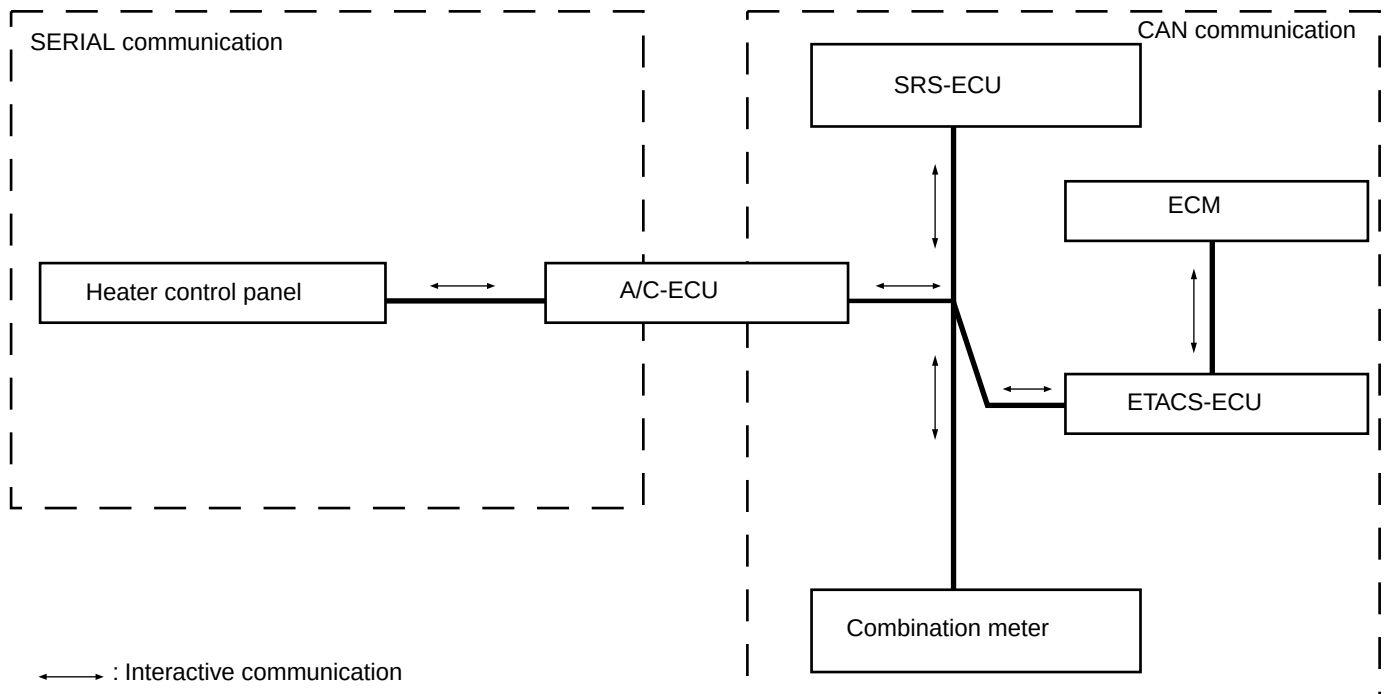
When the air bag deployment is detected, the A/C system is shut down.

CUSTOMIZE FUNCTION

Depending on the user's preference, the following functions can be adjusted. The programmed information is held even when the battery is disconnected.

- Automatic control for inside/outside air selection
Press and hold (approximately for 10 seconds) the inside/outside air selection switch to cancel the automatic control for inside/outside air selection.
- A/C automatic control
Press and hold (approximately for 10 seconds) the A/C switch to cancel the A/C automatic control.

COMMUNICATION



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A/C-ECU performs the signal transmission and reception with each ECU via CAN (Controller Area Network)*¹. Also, with the heater control panel, it

transmits and receives signals via serial communication.

NOTE: : For details of CAN communication, refer to GROUP 54D - Controller Area Network P.54D-2.

CAN COMMUNICATION INPUT SIGNALS TABLE

Signal	Transmitter ECU
Engine coolant temperature signal	ECM
Vehicle speed signal	
Engine speed signal	
Ambient temperature signal	ETACS-ECU
Wiper signal	
Ignition key signal	
Average ambient temperature signal	COMBINATION METER

DIAGNOSTIC FUNCTION

A/C-ECU has the following functions for easier system checks.

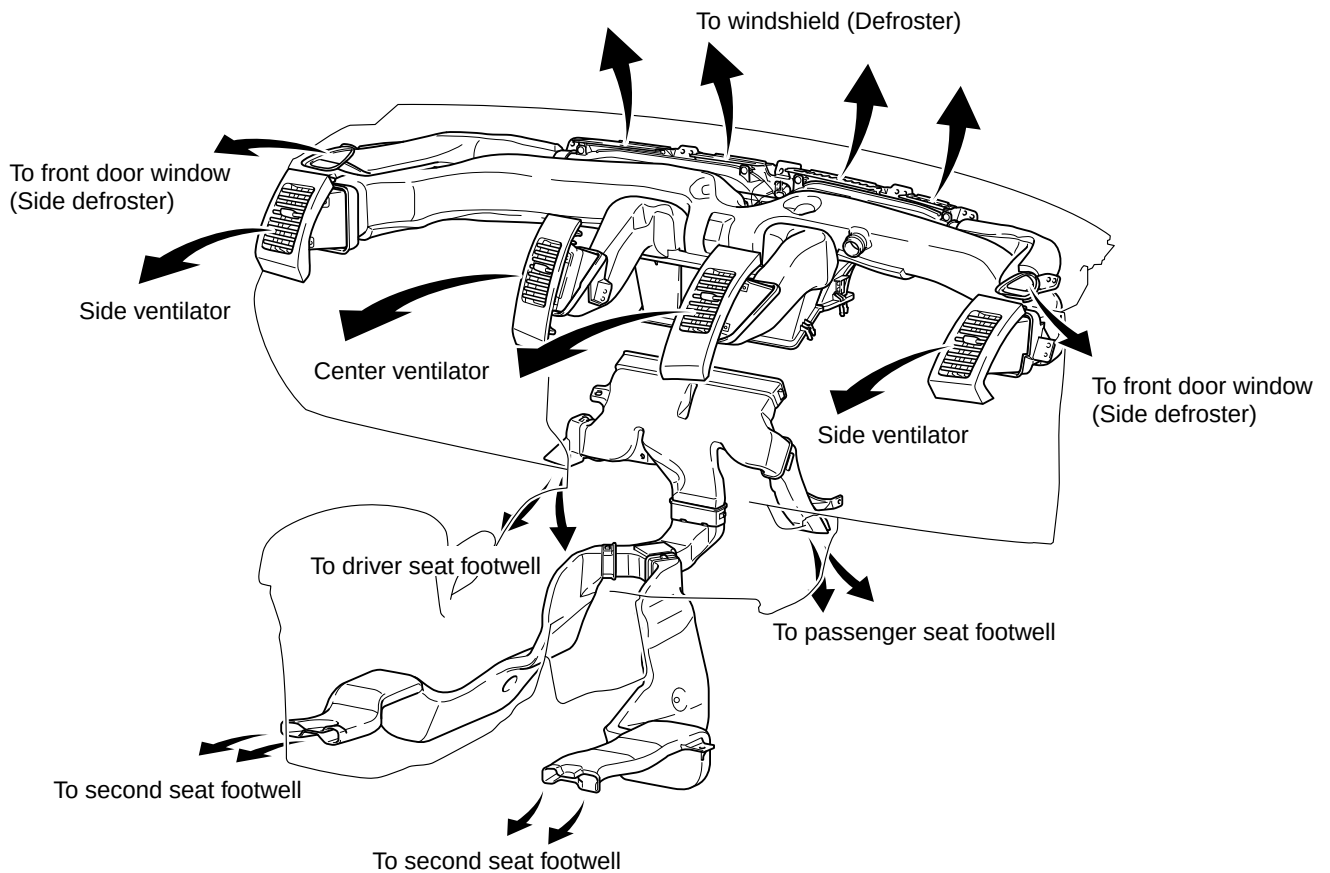
- *Diagnostic function

- *Service data output
- *Actuator test

NOTE: For each item, refer to the Service Manual.

DUCT

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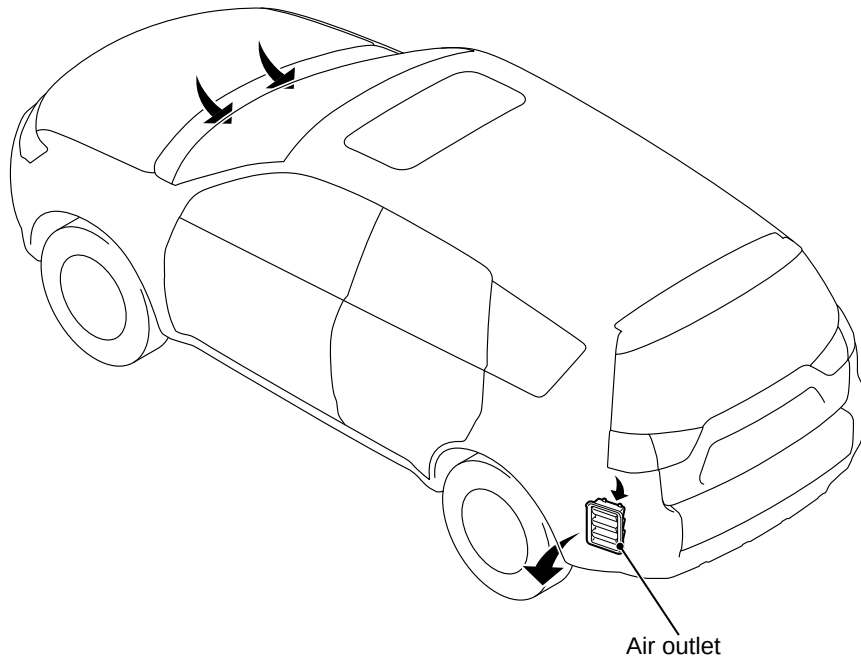
The rear heater duct for the 2nd row seats has been introduced as standard, and the air distribution ratio to front and 2nd row has been optimized in order to

enhance the air heating performance for the 2nd row, and to reduce the circulation of cooled air back to the front row.

VENTILATION SYSTEM

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REAR VENTILATION



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Fresh air is introduced from the front deck, and emitted from the air outlet behind the back of rear bumper. Areas of fresh air intake hole and air outlet ventilation have been optimized in order to improve air volume (ventilation performance) while securing cabin quietness.

MEMO