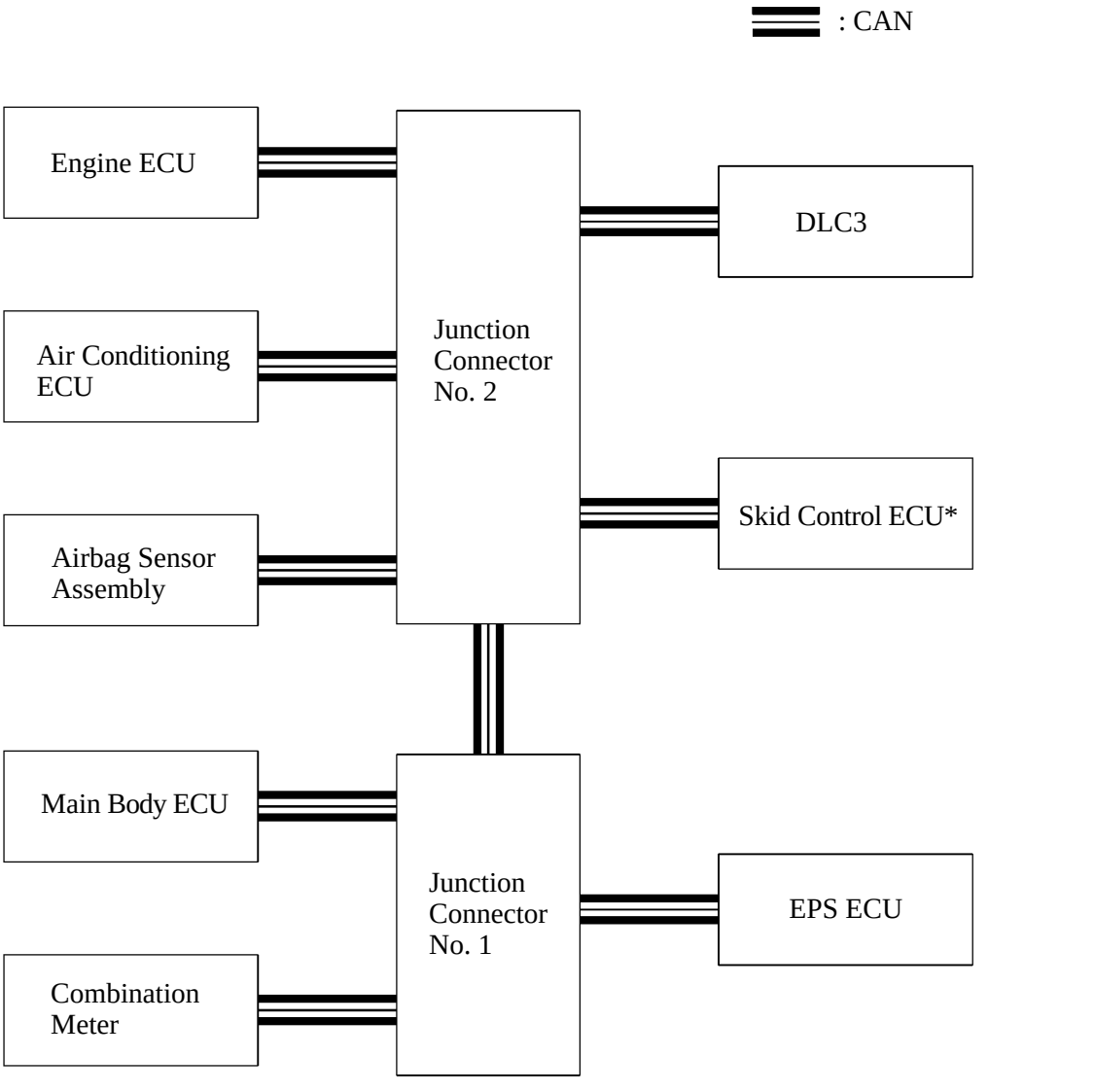
BODY ELECTRICAL

MULTIPLEX COMMUNICATION

■DESCRIPTION

- On the ’06 models, a multiplex communication in which many different ECUs are linked to a bus line and data are mutually transmitted among the ECUs through the line is used.
- On the ’06 models, the CAN (Controller Area Network) is used among the ECUs as shown below.

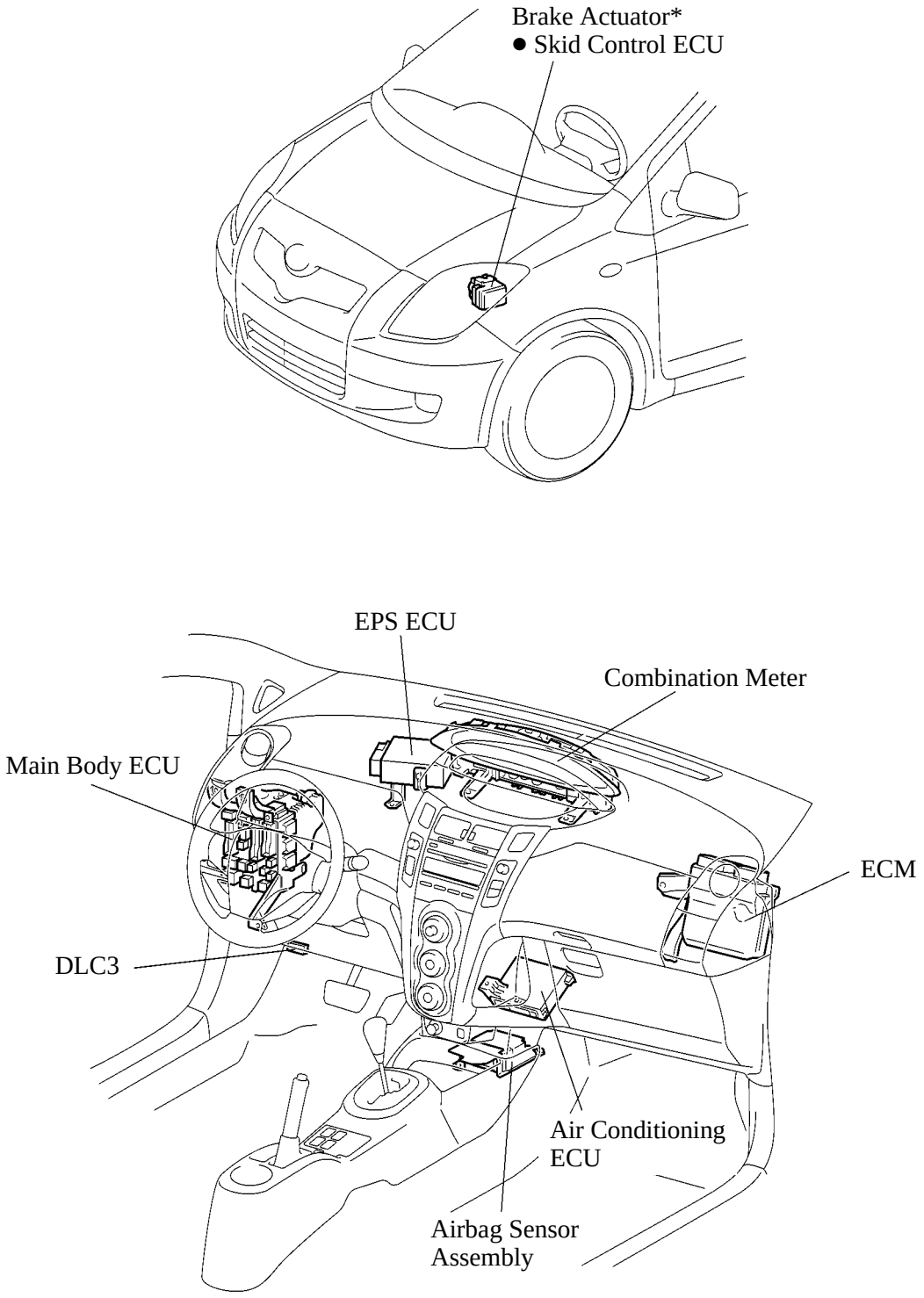
▶ CAN System Diagram ◀



00RBE30Y

*: Only for ABS Models

■LAYOUT OF CAN COMPONENTS



00RBE31Y

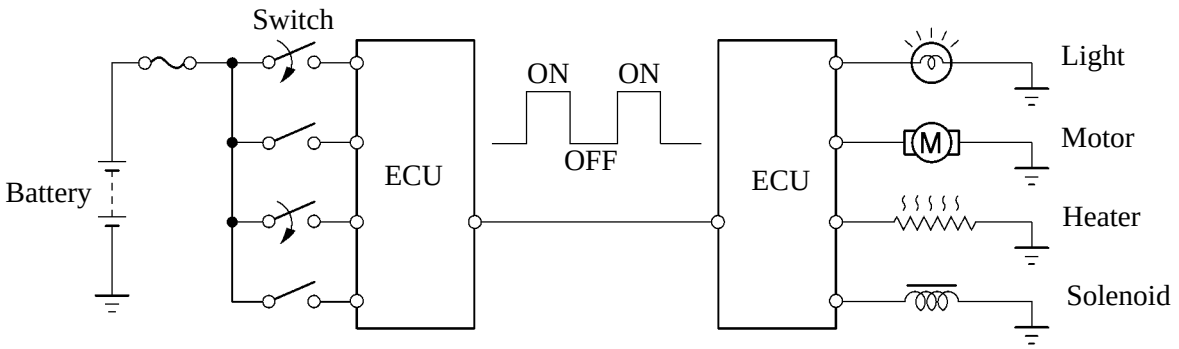
*: Only for ABS Models

■BASIC OF MPX

1. General

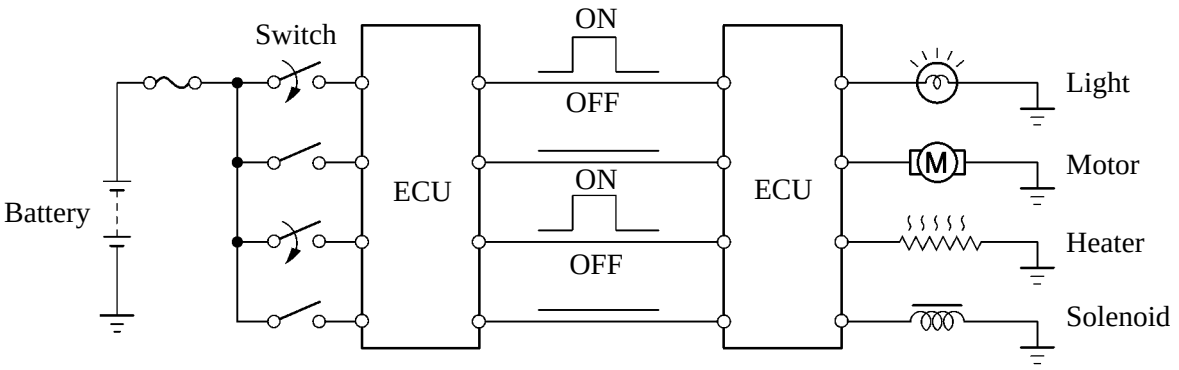
- In the conventional system, a parallel communication is used to exchange information between ECUs. To transmit four pieces of information, for example, the parallel communication requires four communication wires. In contrast, a multiplex communication is used on a serial communication, which converts multiple pieces of information into serial communication data. Thus, they can be transmitted through a single communication wire.

▶ Conceptual Drawing ◀



Serial Communication

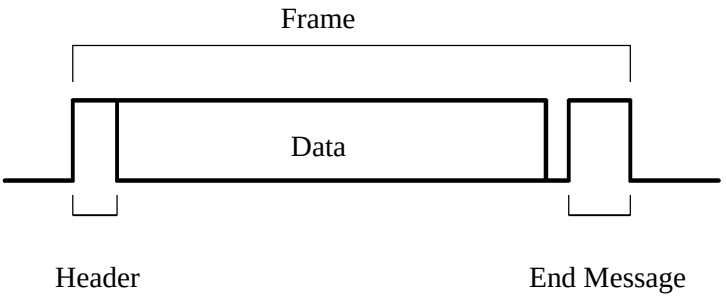
240BE03



Parallel Communication

240BE04

- Serial communication data consist of bits and frames. A bit is the basic unit that represents the amount of information. A bit is represented by binary values “0” or “1”. A frame is a body of data that is transmitted together. A frame contains a header that indicates the beginning, and an end message that indicates the end.



240BE05

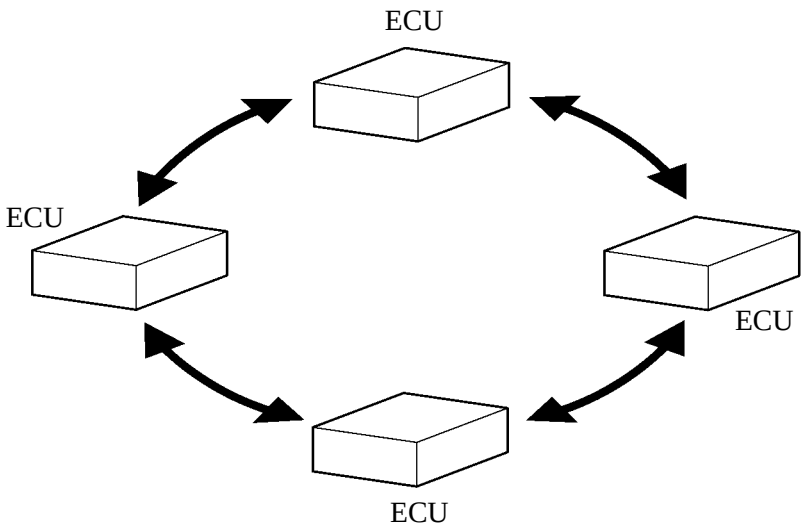
2. Network Style

General

Based on a serial communication, various ECUs are connected on a network to exchange various pieces of information. Such a system is called a “Multiplex Communication”. There are three styles of networks: ring, star, and bus.

Ring Style

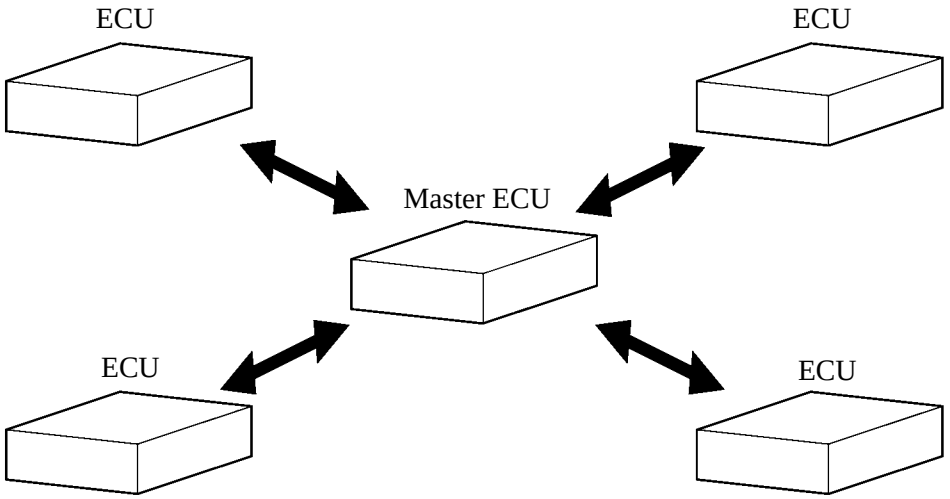
In this style of network, the ECUs are connected in a ring form. A feature of this style is that a signal that is output by a transmitting ECU circles the ring and returns to its original ECU.



240BE06

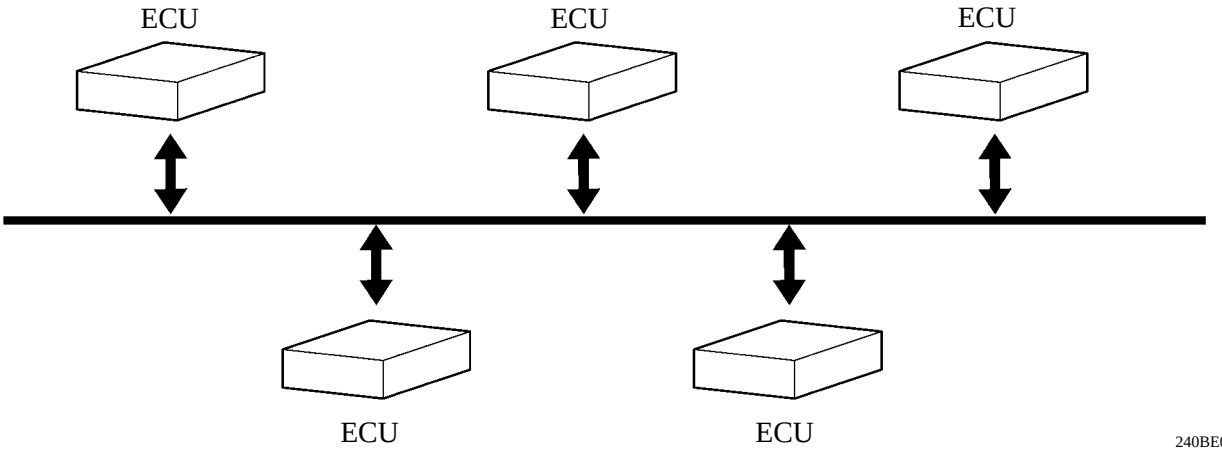
Star Style

This style is centered on a master ECU, which holds a central control function. The ECUs are connected in a star shape. The ECUs cannot establish a communication with other ECUs without passing through the master ECU.



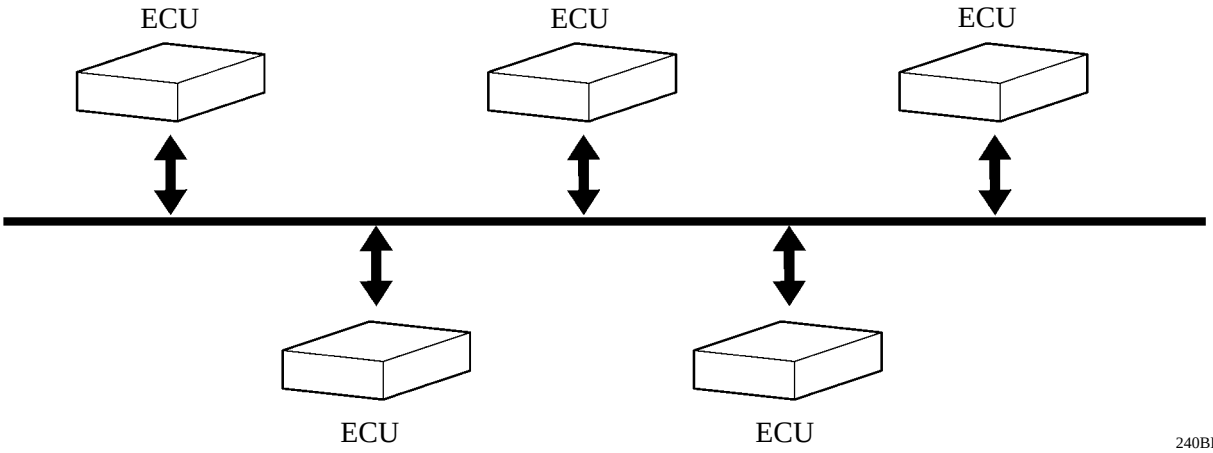
Bus Style

In this style of network, all ECUs are connected to a single common communication wire. The transmitting ECUs output signals through the common communication wire and the receiving ECUs input data through the common communication wire.



— REFERENCE —

The CAN uses the bus style bus connection. The sensors and ECUs are connected to a single common communication wire.



3. Differences of CAN and Other Communication Systems

- Currently, Toyota vehicles use three types of multiplex communication systems: the CAN (Controller Area Network), BEAN (Body Electronics Area Network), and AVC-LAN (Audio Visual Communication-Local Area Network).
- The protocols, which are the rules for establishing a data communication, differ between the CAN, BEAN and AVC-LAN. If the ECUs use different types of data such as a communication speed, communication wire, and signals, they will be unable to understand each other. Therefore, protocols (rules) must be established among them.

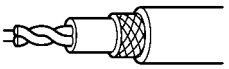
Protocol	CAN (ISO Standard)	BEAN (TOYOTA Original)	AVC-LAN (TOYOTA Original)
Communication Speed	500 k bps* (Max. 1 M bps)	Max. 10 k bps*	Max. 17.8 k bps*
Communication Wire	Twisted-pair Wire	AV Single Wire	Twisted-pair Wire
Drive Type	Differential Voltage Drive	Single Wire Voltage Drive	Differential Voltage Drive
Data Length	1-8 Byte (Variable)	1-11 Byte (Variable)	0-32 Byte (Variable)

*: bps: abbreviation for “Bits Per Second”, indicating the number of bits that can be transmitted per second.

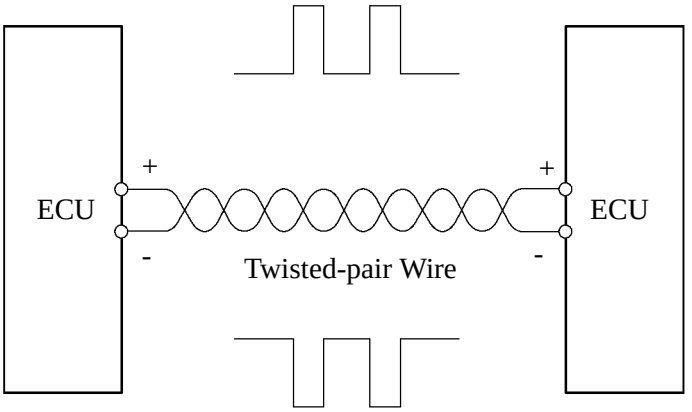
- Although the BEAN and AVC-LAN have almost the same communication speed, the communication speed of the CAN is much faster than the BEAN and AVC-LAN.
- When the chassis control system uses the BEAN with a slower communication speed than the CAN, the slower communication speed means that system control could possibly be delayed.
- For this reason, the power train and chassis control system uses the CAN which has a fast communication speed and can send and receive a large quantity of data at one time.

4. Communication Wire

A twisted-pair wire is used for the CAN and AVC-LAN communication. A single, AV (Automobile Vinyl) wire is used for the BEAN communication.

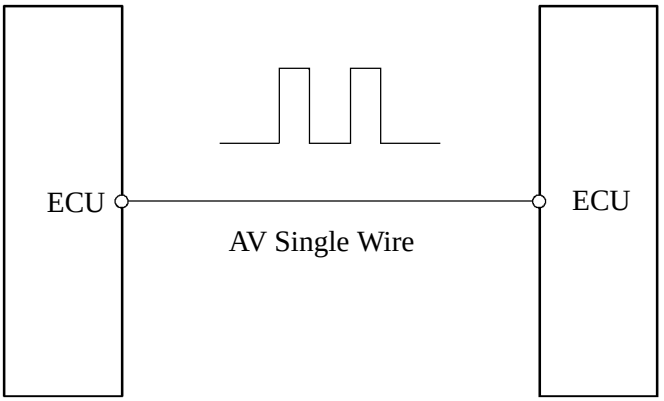
Communication Wire	Outline
Twisted-pair Wire for CAN  241BE168	In this communication wire, a pair of lines are twisted together and covered with insulation. The communication is driven by applying positive (+) and negative (-) voltage to the two lines in order to send a single signal. This system, which is called a “Differential Voltage Drive”, can reduce noise.
Twisted-pair Wire for AVC-LAN  240BE10	
AV Single Wire 240BE09	This is a lightweight single communication wire that consists of a single core line surrounded by insulation. Voltage is applied to this line in order to drive the communication, and this system is called a “Single Wire Voltage Drive”.

▶ Differential Voltage Drive ◀



240BE12

▶ Single Wire Voltage Drive ◀

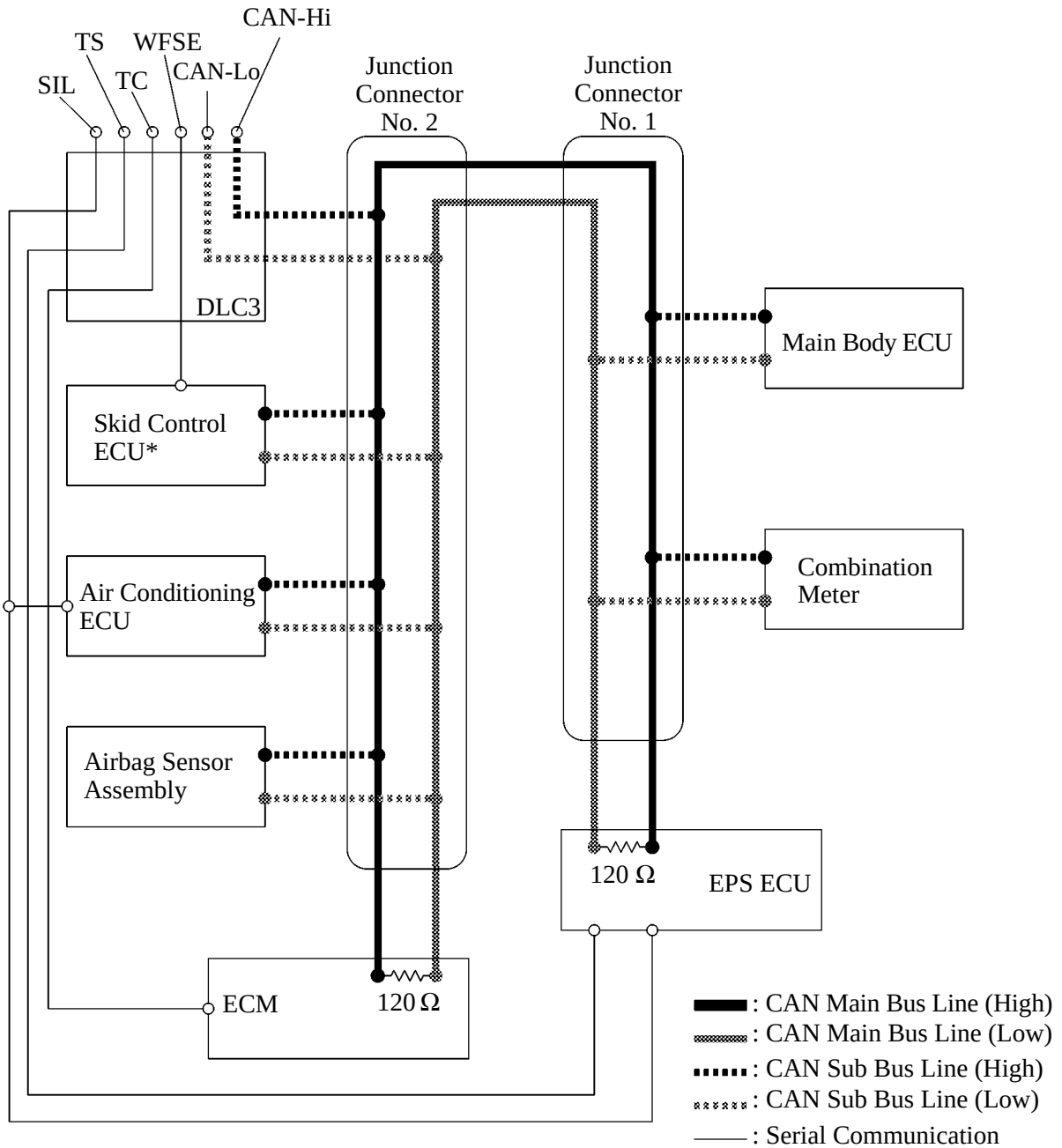


240BE11

■CAN (CONTROLLER AREA NETWORK)

- The CAN (Controller Area Network) is a serial data communication for a real time application. It is a multiplex communication to be equipped for a vehicle and has the communication speed (500 kbps) and function to detect malfunction.
- The communication wire uses a twisted-pair wire. The bus line has a high line (2.5 V to 3.5 V of voltage is applied) and a low line (1.5 V to 2.5 V of voltage is applied).
- The CAN system in the ’06 models is used to connect the following ECUs and parts via junction connector No. 1 and No. 2.

▶ System Diagram ◀



*: Only for ABS Models

00RBE32Y

■DIAGNOSIS

If a malfunction occurs on the CAN communication line, the ECU that is connected to the CAN communication line stores the DTCs (Diagnostic Trouble Codes) in its memory.

- There are 2-digit DTCs and 5-digit DTCs for the CAN communication.
  - The 5-digit DTCs can be read by connecting a hand-held tester to the DLC3.
  - The 2-digit DTCs can be read from the warning light on the combination meter by connecting the SST (09843-18040) to TC and CG terminals of the DLC3.

For details, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

■CUSTOMIZED BODY ELECTRONICS SYSTEM

A hand-held tester can be changed the specification of the systems or functions.

System	Hand-Held Tester Display Content	Contents	Default	Selection
Wireless Door Lock Remote Control System*1	WIRELESS OPER (Wireless door lock control function)	Function to turn on or off of the wireless door lock.	ON	ON/OFF
	HAZARD ANS BACK (Hazard answer back of the wireless)	Function to turn on or off of the hazard answer back of the wireless door lock.	ON	ON/OFF
	AUTO LOCK DELAY (Auto lock time)	Function to change the time until re-locking after unlocking with the wireless door lock.	30 sec.	30 sec./ 60 sec.
	UNLOCK/2 OPER (2 times operation wireless unlock)	Function to unlock the driver's door by pressing the unlock button of the transmitter once and to unlock all the doors by pressing it twice. In the OFF setting, pressing one time makes all the doors unlocked.	ON	ON/OFF
	ALARM FUNCTION (Panic function)	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 1.5 seconds. If there is the panic button, press the panic button instead of the lock button.	ON	ON/OFF
Door Lock Control System*2	UNLK/KEY TWICE (Unlock w/2 times D key operation)	Function to unlock only the driver's door by operating the key once and to unlock all the doors by operating the key twice. In the OFF setting, operating the key "UNLOCK" once makes all the doors unlocked.	ON	ON/OFF
Illuminated Entry System	LIGHTING TIME	To change the lighting time after closing the door. (It will quickly fade out in case of turning the ignition on.)	15 s	7.5 s/ 15 s/30s
	I/L ON/UNLOCK (Interior light on w/door key unlock)	Function to light the interior light, etc. when the door is unlocked with a transmitter, door key or door lock control switch.	ON	ON/OFF
	I/L ON/ACC OFF (Light the I/L when ACC OFF)	Function to light the interior light when the ignition switch is operated from "ACC" to "LOCK".	ON	ON/OFF
Warning	KEY REMND SOUND	To change the frequency of the key reminder buzzer.	NORMAL	NORMAL/ FAST/ SLOW/0 s
	SEAT BELT WARN	Function to change the seat-belt warning buzzer.	D/P ON	D/P ON/ D ON/ P ON/ D/P OFF

*1: Only for Models with Wireless Door Lock Remote Control System

*2: Only for Models with Door Lock Control System

LIGHTING

■DESCRIPTION

The ’06 models have a lighting system with the following equipments:

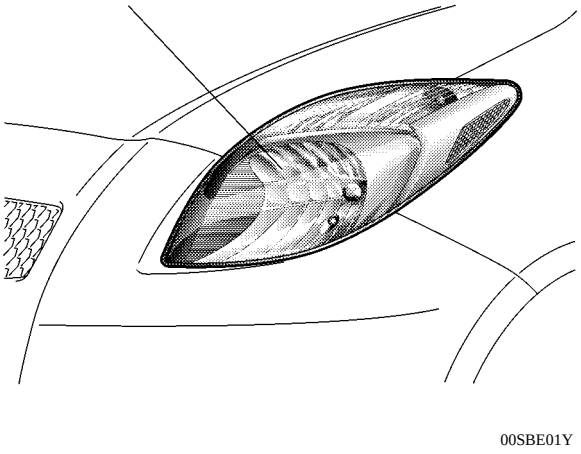
●: Standard OP: Option

Destination	U.S.A.	CANADA	
Grade / System	Standard	Standard	RS
Daytime Running Light System	OP*1	●	●
Light Reminder System (Buzzer)	●	●	●
Illuminated Entry System (Room Light)	OP	●*2 OP*3	●*2 OP*3
Front Fog Light	OP	OP	OP

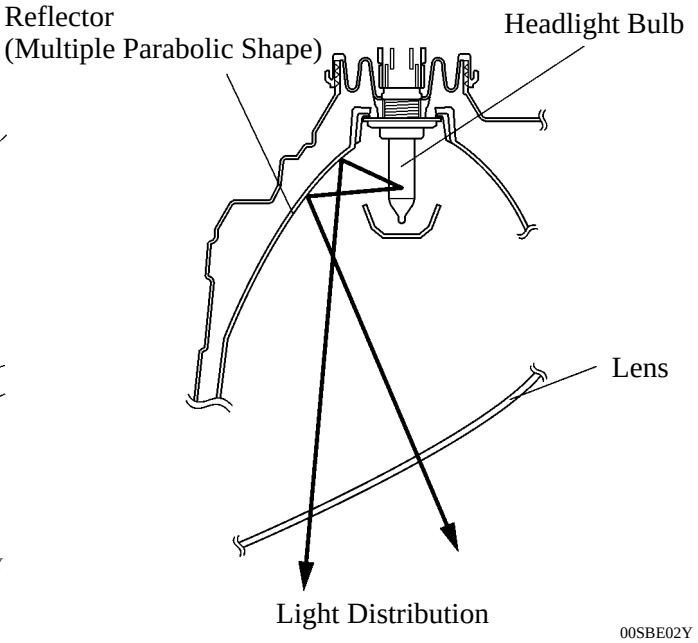
*1: Only for Cold Area Specification Models
*2: Only for 5-door Hatchback Models
*3: Only for 3-door Hatchback Models

■MULTI-REFLECTOR TYPE HEADLIGHT

As with the ’05 models, the ’06 models use 2 sculptured multi-reflector type headlights.
With the multi-reflector type headlights, the light from the bulbs is dispersed and distributed through multiple parabolic shaped reflectors. As a result, the lens cut pattern is no longer provided in the center of the lens, thus realizing a clear look.



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00SBE02Y

■DAYTIME RUNNING LIGHT SYSTEM

- The daytime running light system is provided as standard equipment for the cold area specification on the ’06 U. S. A. and Canada models.
- This system is designed to automatically activate the headlights at reduced brightness (low beam) during the daytime to keep the car highly visible to other vehicles.
- This system is controlled by the daytime running light relay.
- This system is enabled when the conditions given below are met:

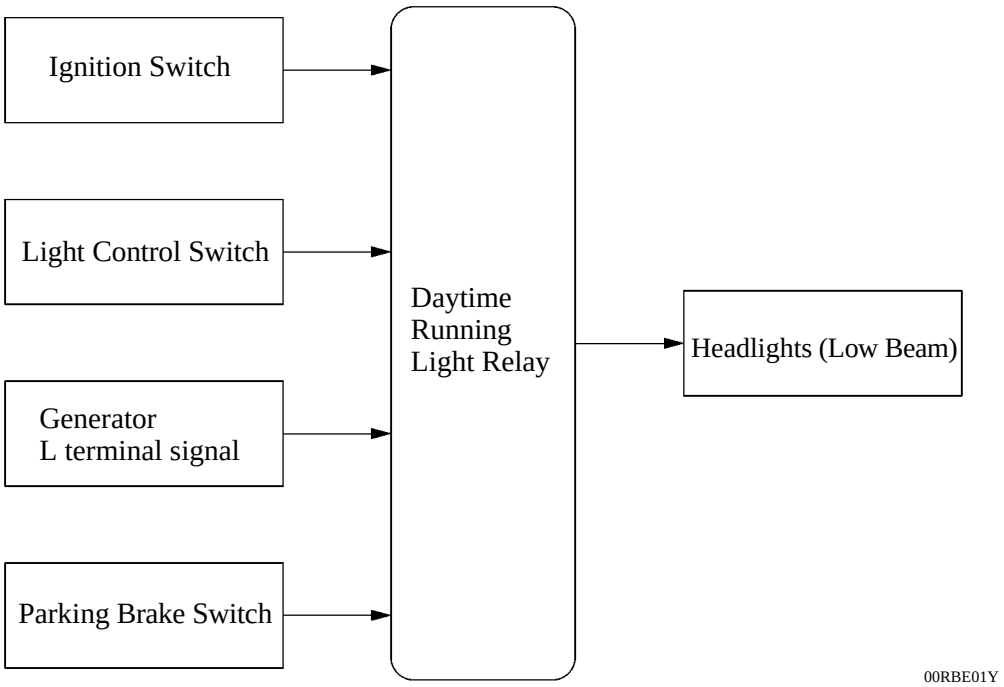
  1) The ignition switch on condition.

  2) Parking brake off condition.

  3) Generator L terminal signal input is on (Engine running condition).

  4) Light control switch is off.

▶ System Diagram ◀



■LIGHT REMINDER SYSTEM

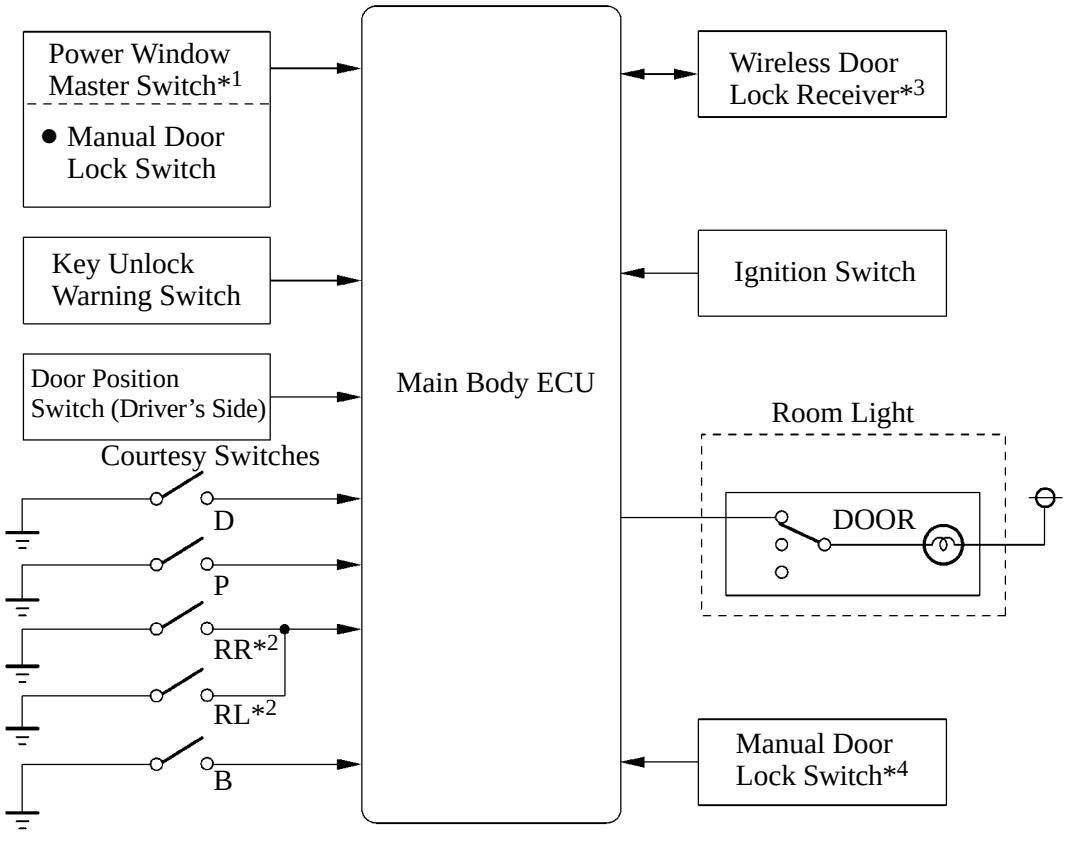
As with the ’05 model, the light reminder system is standard equipment on the ’06 model.
When the ignition switch is turned from the ON to ACC or OFF while the driver’s door is open with the taillights turned on, this system warns the driver that the lights remain on by sounding the multi buzzer. The multi buzzer is located inside the combination meter.

■ILLUMINATED ENTRY SYSTEM

- As with the ’05 model, the ’06 model uses the illuminated entry system.
- This system is controlled by the main body ECU.
- When any one of the following conditions is satisfied, the illuminated entry system turns on the room light.
  1) A door is unlocked through a driver door key operation or transmitter operation*.
  2) Any door is opened.
  3) All doors closed and the ignition switch is changed from ON to OFF.
- When any one of the following conditions is satisfied, these lights will fade out (in approximately 1 second).
  1) After continuing to be on for approximately 15 second after all doors have been properly closed.
  2) All doors are closed and driver, front passenger, and rear doors are locked.
  3) All doors are closed and the ignition switch is turned to ACC or ON.
- A battery saving function is used to automatically turn the room light off when the following condition occurs continuously for 20 minutes or more: the ignition key is not in the ignition key cylinder when any door is either ajar or open.

*: Models with Wireless Door Lock Remote Control System

▶ System Diagram ◀



*1: Models with Power Window System
*2: Only for 5-door Hatchback Models
*3: Models with Wireless Door Lock Remote Control System
*4: Models without Power Window System

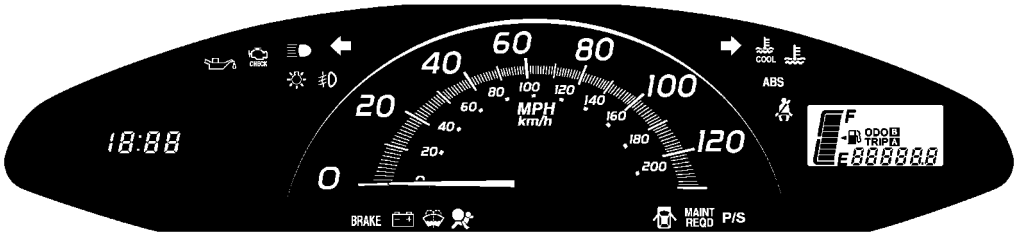
METER

■ COMBINATION METER

1. General

The combination meter in the ’06 models has the following features:

- An Optitron display type combination meter is used. It is located at the upper center of the instrument panel to ensure its visibility.
- The Optitron display type meter realizes excellent visibility through the use of smoke acrylic in the protective panel, and LEDs (Light Emitting Diodes) that are very bright and have high contrast for illuminating the indicator and dial.
- The movement for actuating the indicator of the speedometer and tachometer is used a step-motor type.
- LCDs (Liquid Crystal Displays) are used for the odometer, trip meter, and fuel gauge.
- A fuel gauge which displays the amount of fuel remaining in the fuel tank with an 8-segment bar is used.
- A meter ECU and multi buzzer are enclosed in the combination meter. This ECU maintains communication with other ECUs through the CAN (Controller Area Network).
- An oil replacement reminder light has been established in the combination meter, which will light or flash to remind the driver to change the engine oil. (Only for the U.S.A. models)



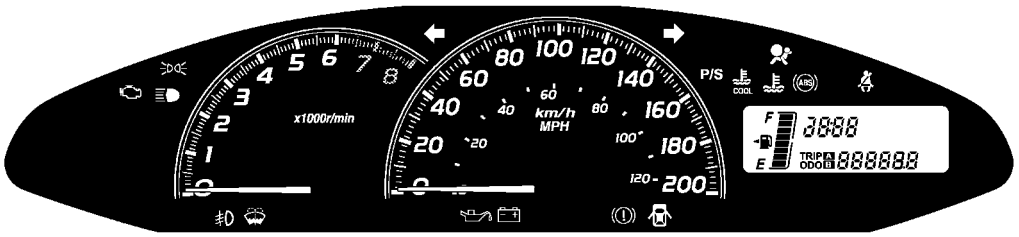
00RBE09Y

U.S.A. Models



00RBE10Y

CANADA Models



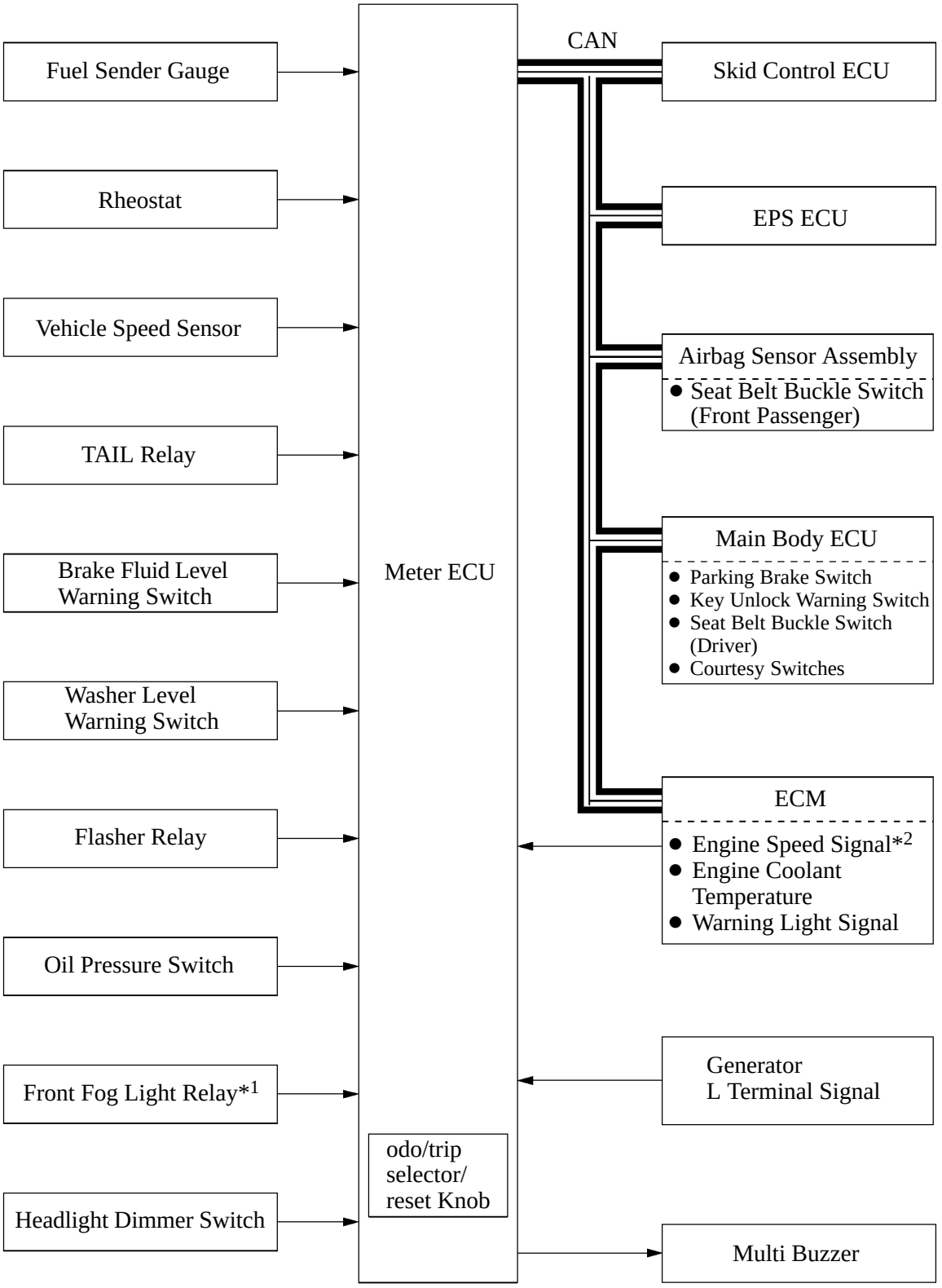
00RBE11Y

CANADA Models (RS Grade)

Service Tip

If the LEDs malfunction, it must be replaced as a combination meter assembly. Refer to the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

2. System Diagram

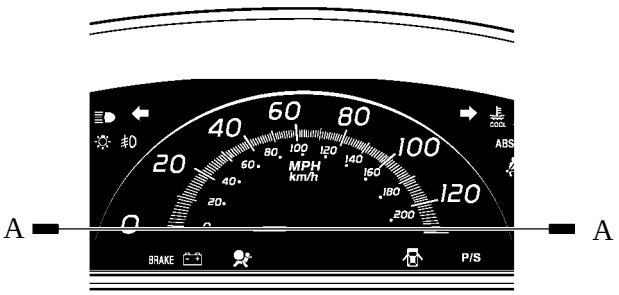


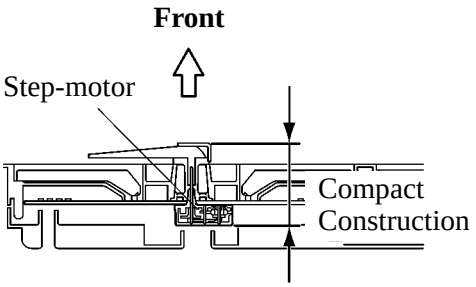
00RBE04Y

*1: With Front Fog Light
*2: With Tachometer

3. Construction

- The pointer movement for the speedometer and the tachometer is used the step-motor type. This has resulted in a thinner pointer movement, thus achieving a lightweight and compact construction.
- In the case of the step-motor type, when the power to the combination meter is turned on through the recollection of the battery terminal, the step-motor initializes once to recognize the zero point of the indicator in relation to the step-motor. However, if the ignition switch is changed to ON after 60 seconds or more have elapsed after the initialization, the step-motor initializes again.





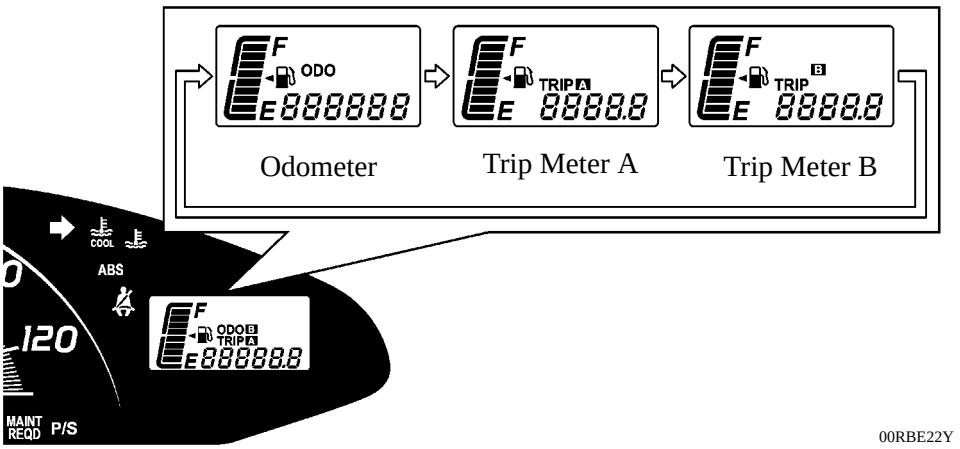
A - A Cross Section

00RBE05Y

4. LCD (Liquid Crystal Display)

Odo/Trip Meter

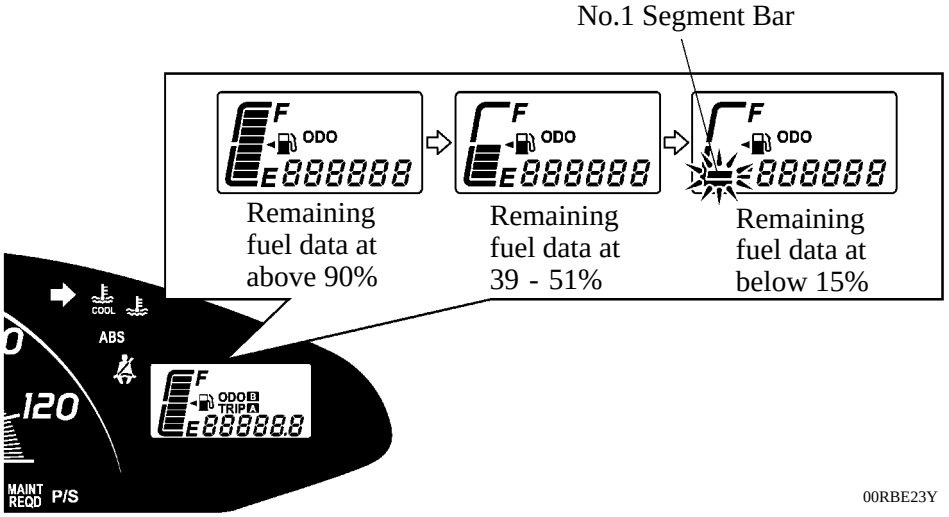
- Pressing the odo/trip selector/reset knob switches between each mode in the following order: odometer → trip meter A → trip meter B.
- While the trip meter A or B is displayed, pressing the odo/trip selector/reset knob 0.8 seconds or longer causes the driven distance displayed by the current trip mode to revert to 0.0 mile (or km/h). The trip meter will resume measuring the distance at the moment the odo/trip selector/reset knob is released.



00RBE22Y

Fuel Gauge

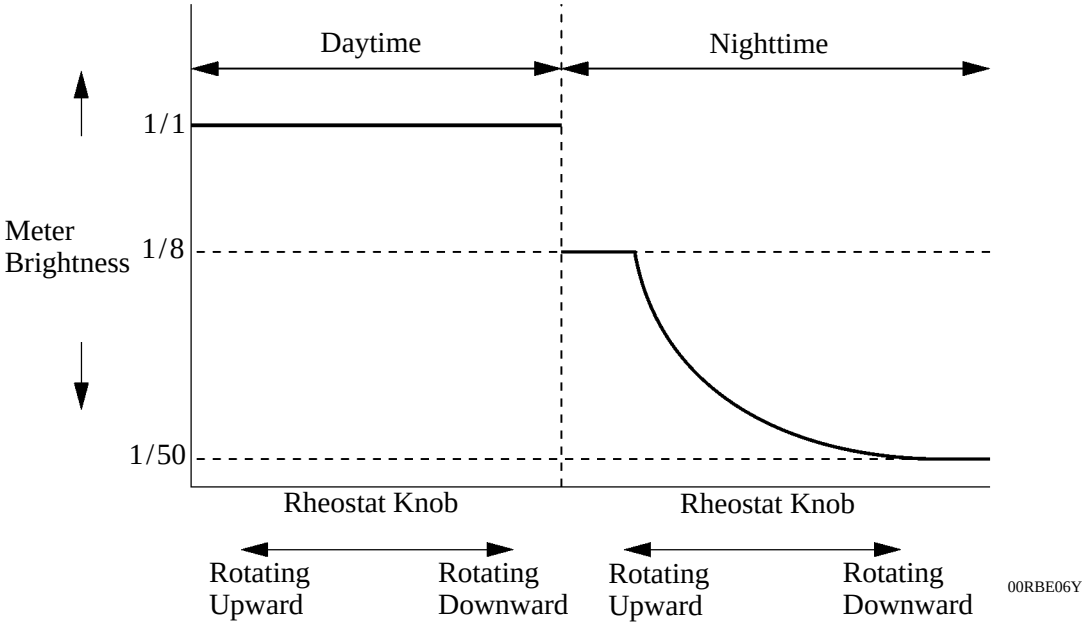
- A fuel gauge which displays the amount of fuel remaining in the fuel tank with an 8-segment bar is used.
- A remaining fuel amount indicator function is used to blink the No. 1 segment bar when the amount of remaining fuel is lower than the predetermined value. Furthermore, there are two patterns of blink cycles depending on the amount of remaining fuel to provide a more accurate remaining fuel warning.
- The amount of the remaining fuel is calculated and displayed by the meter ECU. The meter ECU calculates this based on the signal from the fuel sender gauge and the vehicle speed signal from the skid control ECU in accordance with the vehicle conditions such as driving or stopped.
- The remaining fuel amount indicator function is activated when the fuel amount data calculated by the meter ECU indicates the amount of remaining fuel has dropped to 15% or less, and causes the No. 1 segment bar to blink in approximately 1.2-second cycles. When the amount of remaining fuel drops to 10% or less, the No. 1 segment bar blinks in approximately 0.6-second cycles.

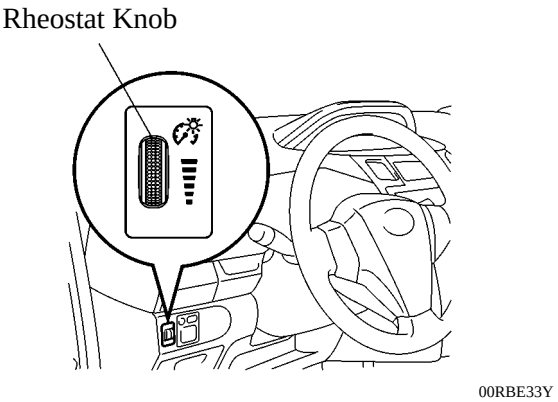


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5. Combination Meter Illumination Control

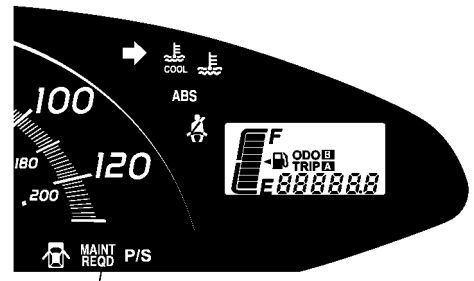
- As part of the combination meter illumination control, the meter brightness can be adjusted by operating the rheostat knob when the meter ECU has determined that it is nighttime.
- The brightness of the meters is fixed to the daytime characteristic when the taillights are off. The brightness is automatically adjusted between the daytime characteristic and nighttime characteristic according to the detection signal provided by the tail relay.
- Assuming the maximum brightness to be 1, the meter brightness for the daytime characteristic is fixed at 1/1, and the meter brightness for the nighttime characteristic can be adjusted from 1/8 to 1/50.
- The meter ECU controls the combination meter illumination.





6. Oil Replacement Reminder Light (U.S.A. Models)

- An oil replacement reminder light will light or flash to remind the driver to change the engine oil depending on the vehicle driving distance.
- Lighting and flashing of the oil replacement reminder light are operated based on the accumulated vehicle driving distance memorized in the combination meter (Meter ECU).
- The meter ECU calculates the vehicle driving distance based on the signals from the skid control ECU.
- This light has a bulb check function and an oil replacement reminder function.
- When turning the ignition switch ON, the meter ECU will turn on the oil replacement reminder light for 3 seconds for the bulb check.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 4500 miles (7200 km) after being reset, the meter ECU will flash the oil replacement reminder light for 15 seconds after the bulb check and remind the driver that the engine oil needs to be changed shortly.
- When the accumulated vehicle driving distance memorized in the meter ECU exceeds 5000 miles (8000 km) after being reset, the meter ECU will keep the oil replacement reminder light on immediately and remind the driver to change the engine oil.



Oil Replacement Reminder Light

00RBE29Y

Service Tip

The accumulated mileage memorized in the meter ECU can be reset by the following procedures.
1) Turn the ignition switch on and make sure that the odo/trip display screen is in the Trip A mode.
2) Turn the ignition switch off. Then, while pressing the odo/trip selector/reset knob, turn the ignition switch on again. (Note: hold down the knob throughout the entire reset procedure.)
3) The odometer indicates “000000” and then the oil replacement reminder light goes off.
4) When the light goes off, release the odo/trip selector/reset knob. The mode should change to Trip A.
5) Turn the ignition switch off. Turn the ignition switch on again and confirm that the oil replacement reminder light goes on for 3 seconds and then goes off.
6) This completes the reset procedure.

AIR CONDITIONING

■DESCRIPTION

The ’06 models have an air conditioning system with the following equipments.

—: Not Available ●: Standard OP: Option

Destination		U.S.A.	CANADA	
Grade		Standard	Standard	RS
Air Conditioning	Without	●	●	●
	Manual	OP	OP	OP
Heater	Standard	●	●	●
	Partial Recirculation System & PTC Heater	OP*	●	●
Clean Air Filter		—	●	●
Rear Footwell Register Duct		OP*	●	●

*: Only for Cold Area Specification Models

- The partial recirculation system & PTC heater achieves a faster heating effect in cold areas.
- The PTC heater system uses a PTC (Positive Temperature Coefficient) element to warm the air that passes through the heater core.

▶ Performance ◀

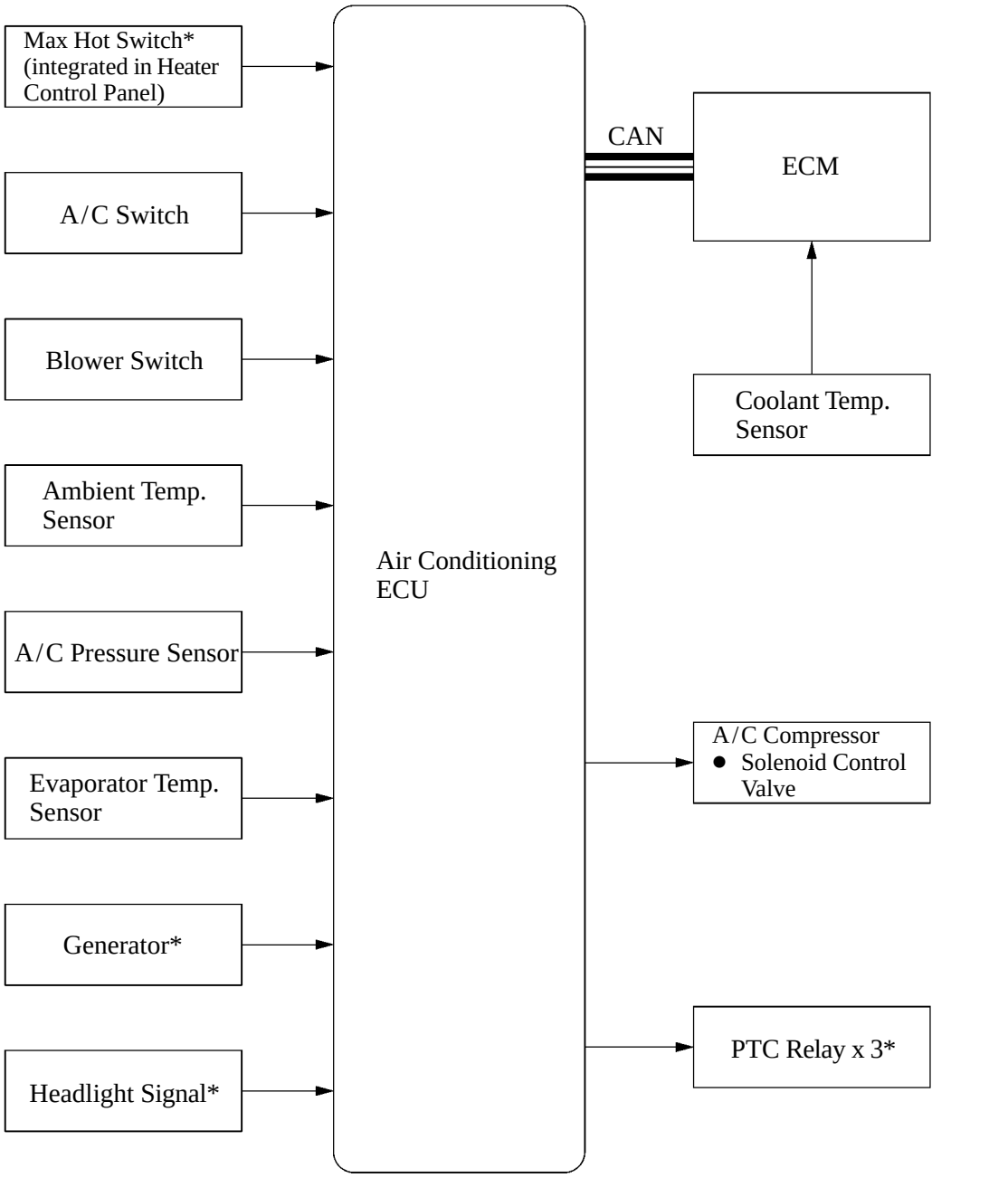
Heater	Heater Output	W (Kcal/h)	4600 (3955)
	Air Flow Volume	m^3/h	280
	Power Consumption	W	170 under
Air Conditioning	Cooling Capacity	W (Kcal/h)	4275 (3675)
	Air Flow Volume	m^3/h	420
	Power Consumption	W	210 under

▶ Specifications ◀

Ventilation and Heater Core	Heater Core	Type	SFA-II (Straight Flow Aluminum-II)
		Size W x H x L mm (in.)	201.5 x 140 x 27 (7.9 x 5.5 x 1.1)
		Fin Pitch mm (in.)	1.8 (0.07)
	Blower	Motor Type	K62-11.5T
		Fan Type	Stabilized Scroll Flow
		Fan Size Dia. x H mm (in.)	145 x 65 (5.7 x 2.6)
Air Conditioning	Condenser	Type	Multi-Flow IV (Sub Cool)
		Size W x H x L mm (in.)	520 x 325.4 x 16 (20.5 x 12.8 x 0.6)
		Fin Pitch mm (in.)	2.75 (0.11)
	Evaporator	Type	Revolutionary & Super Slim
		Size W x H x L mm (in.)	199.3 x 231 x 38 (7.8 x 9.1 x 1.5)
		Fin Pitch mm (in.)	2.6 (0.10)
	Compressor	Type	5SE11
		Pulley	Plastic DL (without Magnetic Clutch)
	Refrigerant	Type	R134a
		Charge Volume g	360 ± 30
Clean Air Filter Type			High Efficiency
Low Heat Source Countermeasure			Air Inlet Mode & PTC Heater

■SYSTEM DIAGRAM

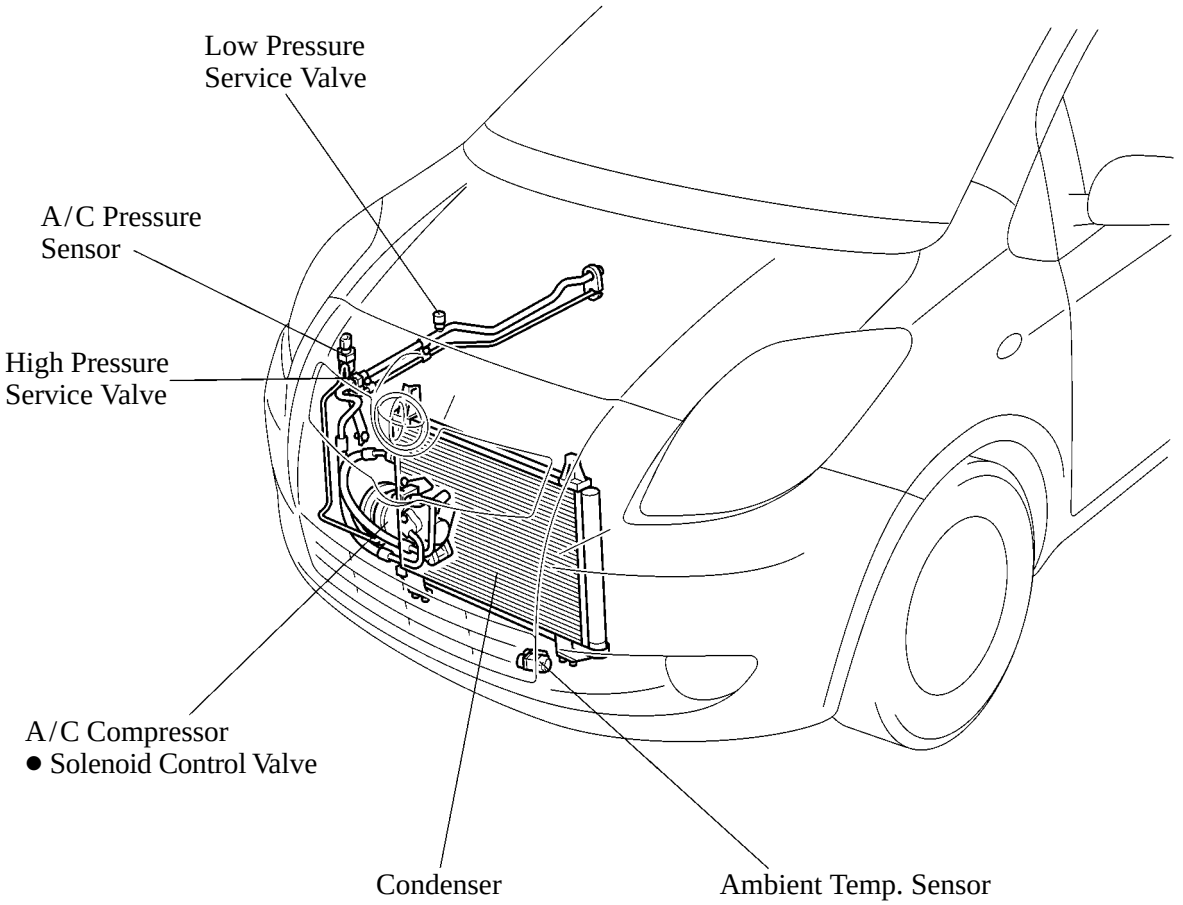
▶ Manual Air Conditioning ◀



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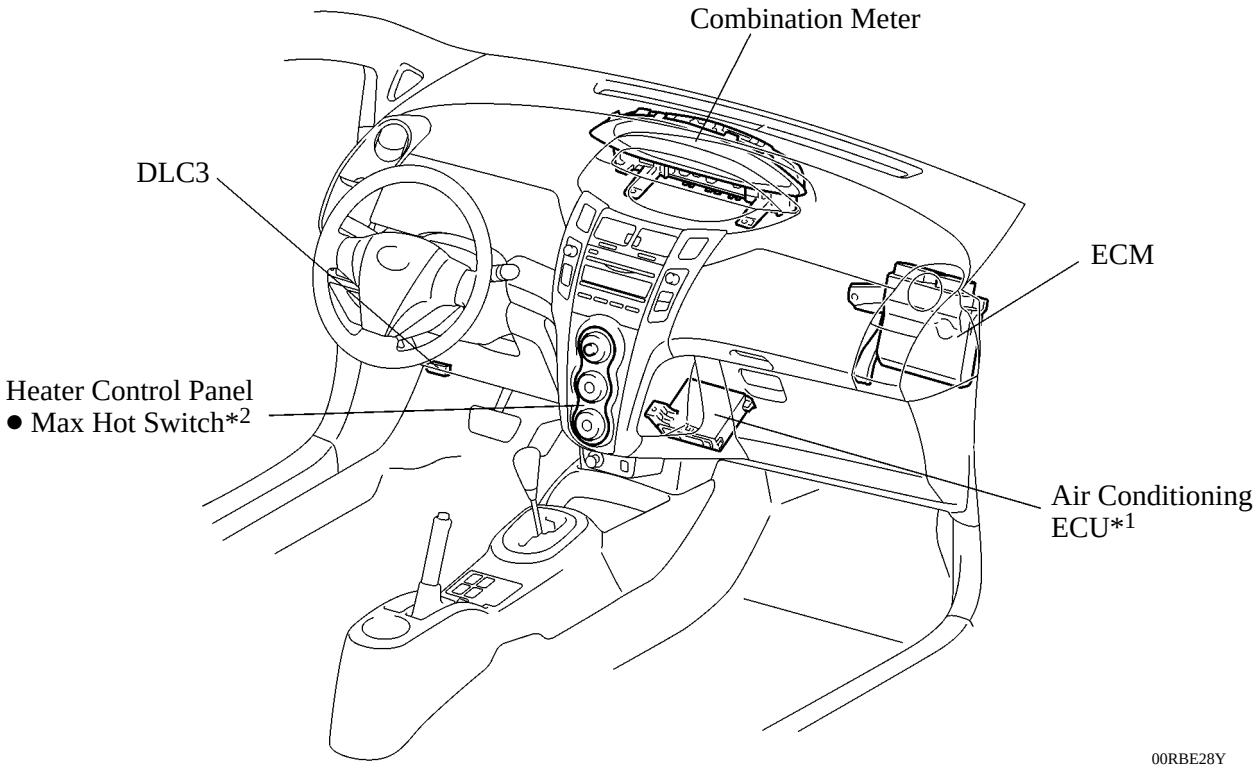
*: Only for Models with PTC Heater

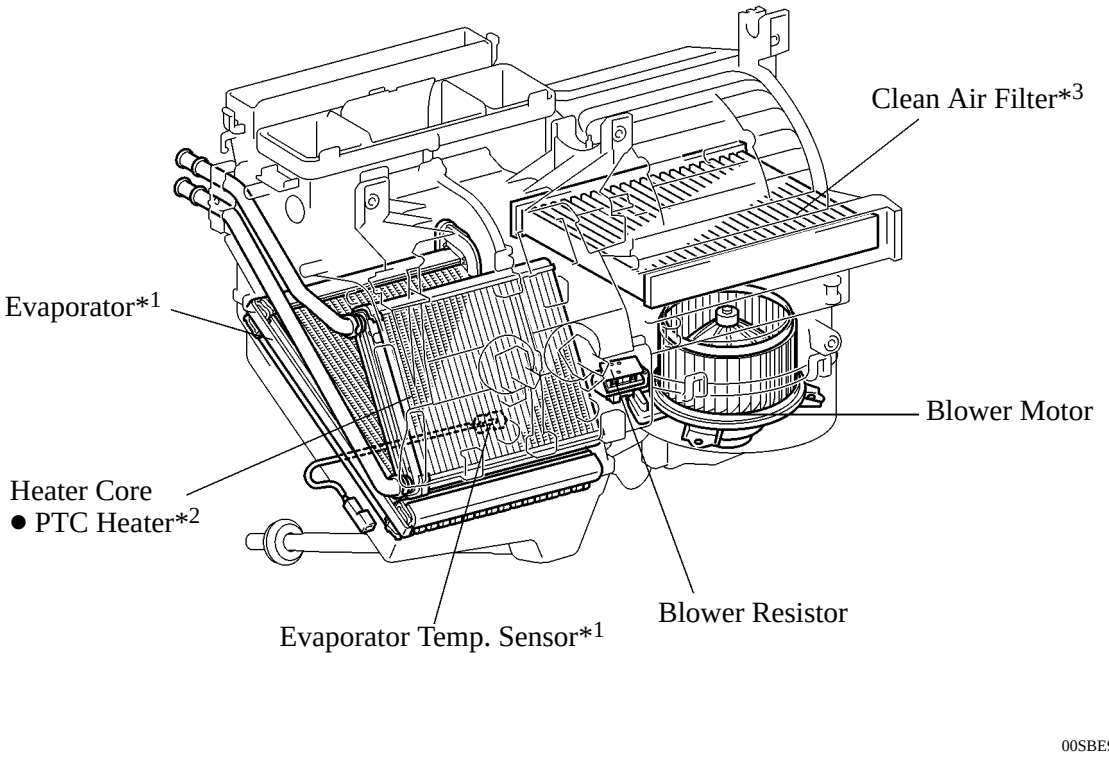
■LAYOUT OF MAIN COMPONENTS



00SBE89Y

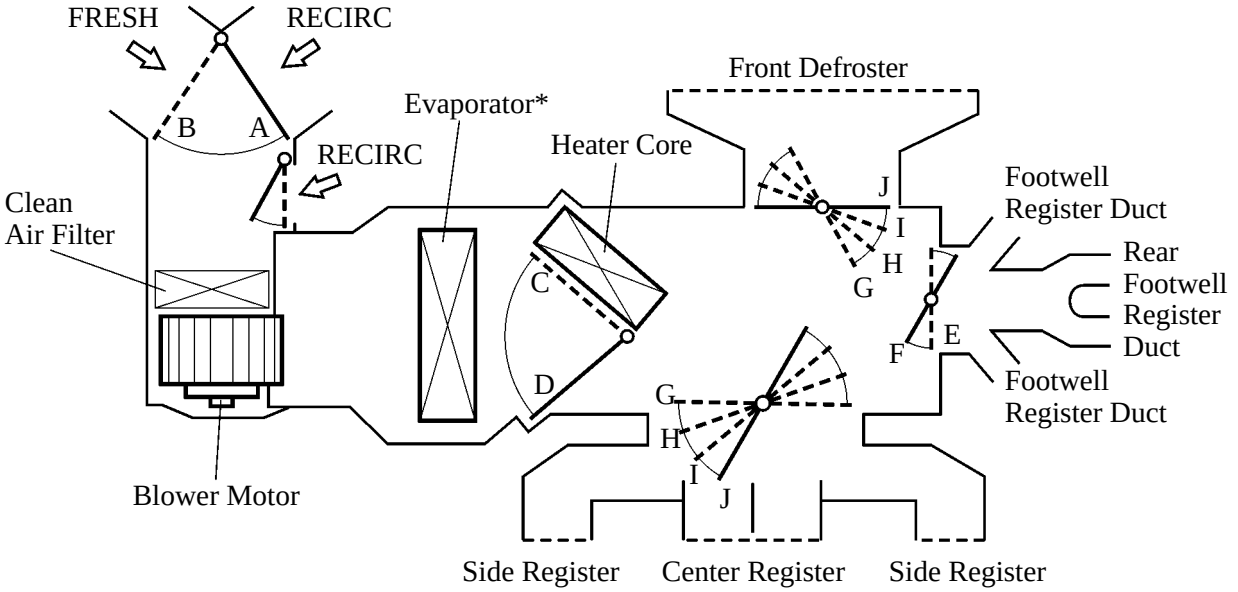
Models with Air Conditioning





*1: Only for Models with Air Conditioning
*2: Only for Models with PTC Heater
*3: Only for Models with Clean Air Filter

■MODE POSITION AND DAMPER OPERATION



*: Only for Models with Air Conditioning

HINT: This illustration is a model diagram showing the doors positions in each mode. The parts layout and the number of the doors in the illustration are different from those of the actual system.

▶ Function of Main Damper ◀

Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD - MAX HOT	C, D	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.
Mode Control Damper	 DEF 187BE28	E, G	Defrosts the windshield through the front defroster and side register.
	 FOOT/DEF 187BE27	F, H	Defrosts the windshield through the front defroster and side register, while air is also blown out from the footwell register duct and rear footwell register duct*.
	 FOOT 187BE26	F, I	Air blows out of the footwell register dust and rear footwell register duct*, and side register. In addition, air blows out slightly from the front defroster.
	 BI-LEVEL 187BE25	F, J	Air blows out of the center register, side register, footwell register duct and rear footwell register duct*.
	 FACE 187BE24	E, J	Air blows out of the center register and side register.

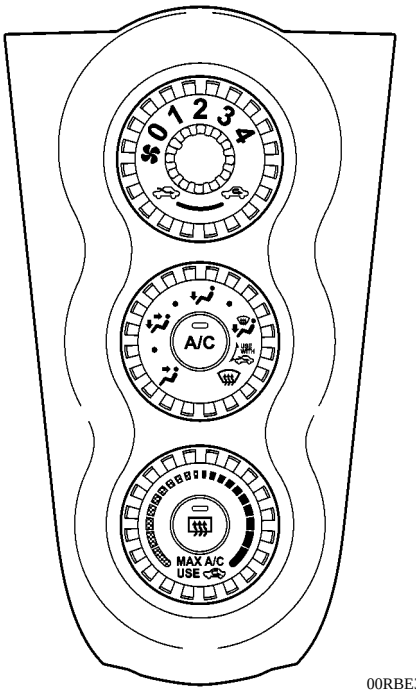
*: Only for Models with Rear Footwell Register Duct

■CONSTRUCTION AND OPERATION

1. Heater Control Panel

Heater and Manual Air Conditioning

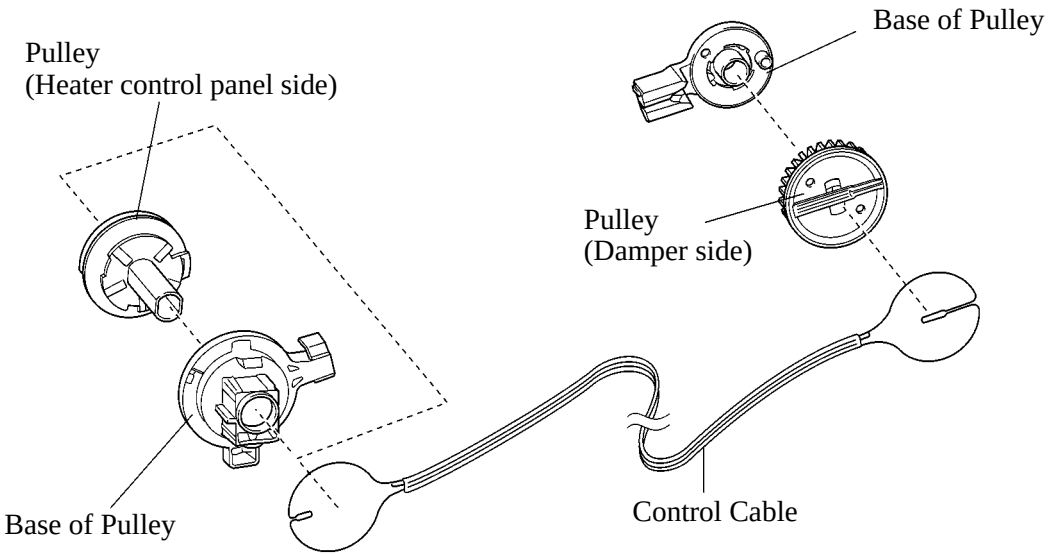
- The rotary switch type heater control panel is used.
- The ’06 models use two cables on pulleys to operate the heater control panel and damper.
- Five air outlet modes are provided on the control panel on the models with air conditioner. To realize finer mode settings, a positive feel is provided between the positions of these modes, thus realizing the high comfort level.



Models with Manual A/C

Heater Control Cable

- The ’06 models use two cables on pulleys that are always operated in the pulling direction to operate the heater control panel and damper.
- This cable is circular, and is placed around the cable pulleys that are provided at the heater control panel and the damper.
- The operation of the heater control panel is transmitted to the damper via the control cable, which always moves in the pulling direction. Due to the consistent action point of the pulleys, the fluctuation of the operating effort has been minimized through the use of the pulleys. These measures have ensured the ease of use and reduced the operating effort.

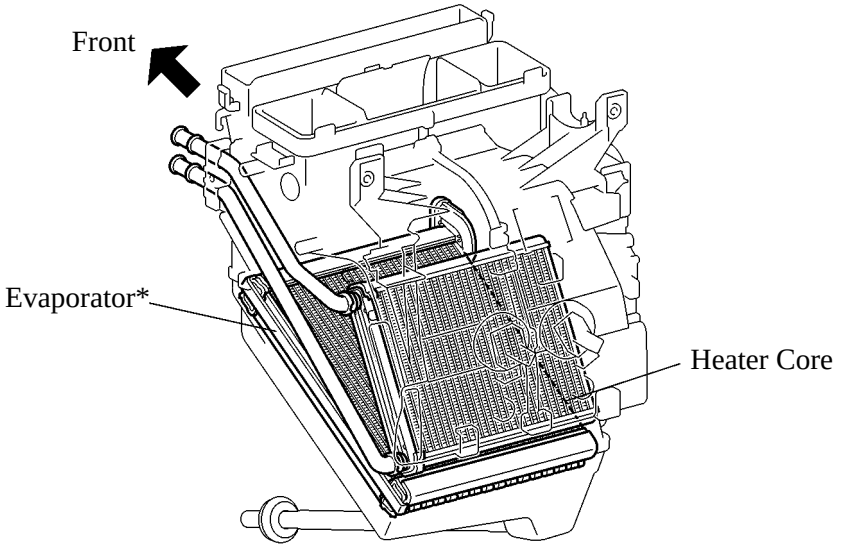


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2. Air Conditioning and Blower Units

General

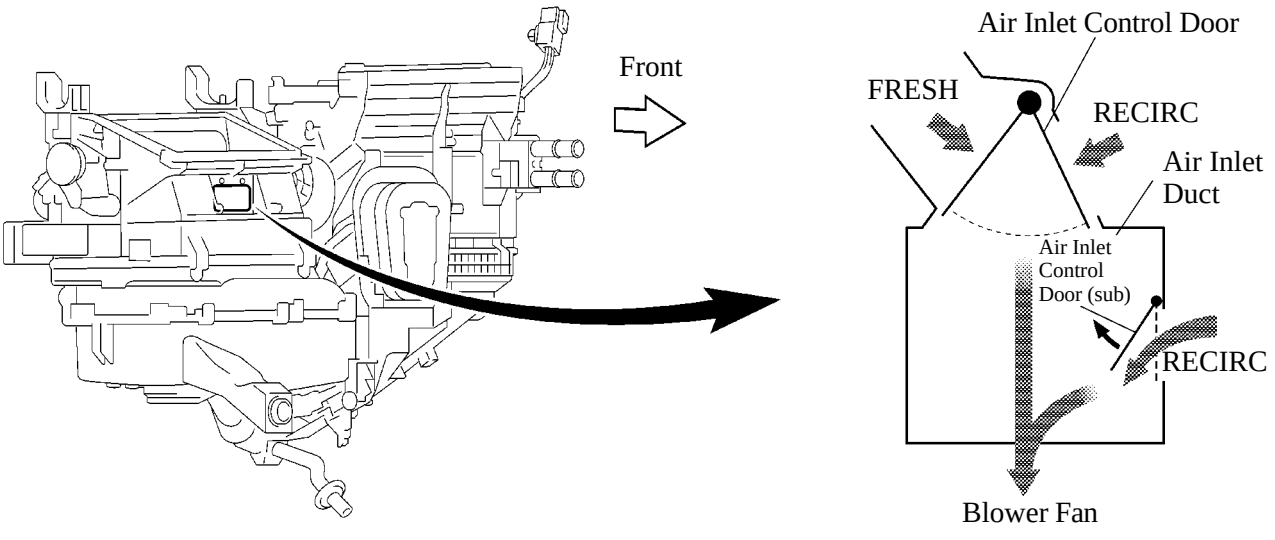
A semi-center location air conditioning unit in which the evaporator and heater core are placed in the vehicle's longitudinal direction is used.



*: Only for Models with A/C

Partial Recirculation System

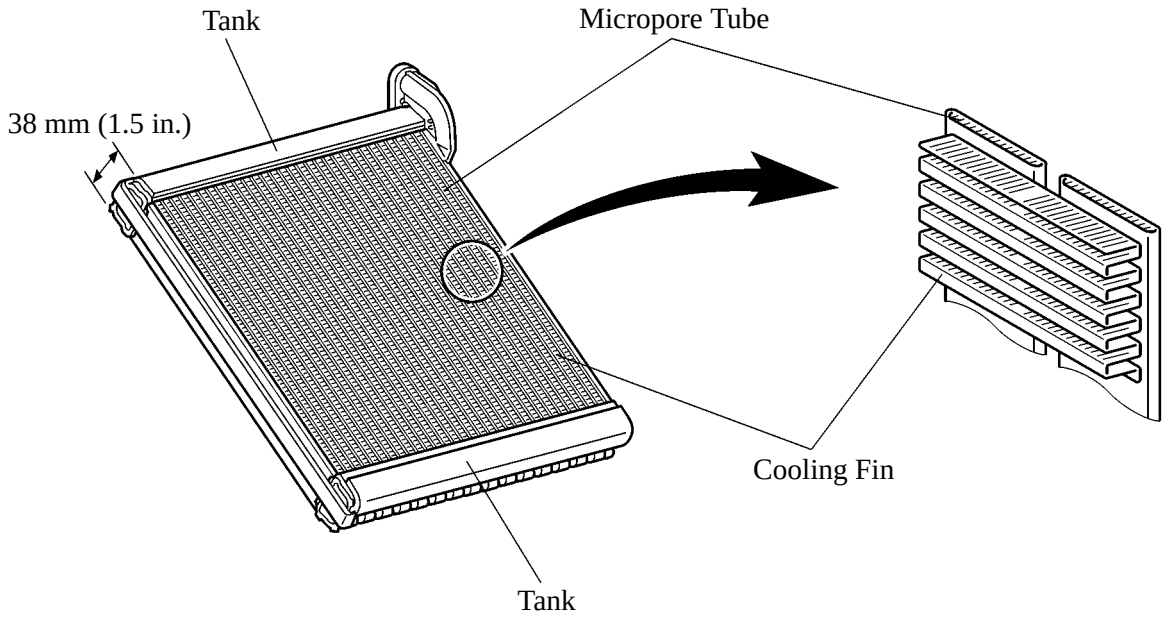
The partial recirculation system is used, and it is optional equipment for the U.S.A models and standard equipment for the Canada models.
This system has an air inlet control door (sub) in the cabin side of the air inlet duct. Thus, it is able to cycle a small volume of recirculated air even in the FRESH mode, thus ensuring heating and air conditioning performance. When the blower switch is on, the suction force of the blower fan opens this air inlet control door (sub).



Evaporator

A revolutionary super-slim structure 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:

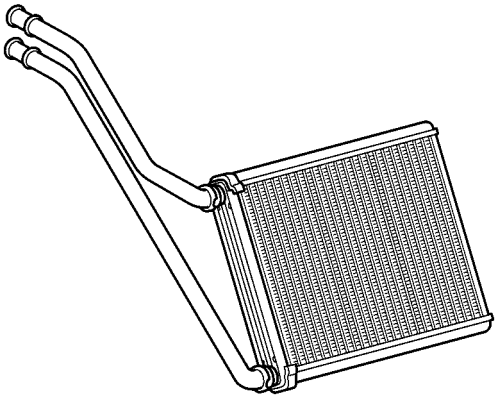
- The heat exchanging efficiency is ensured.
- The temperature distribution is made uniform.
- The evaporator is made thinner. 58 mm (2.3 in.) → 38 mm (1.5 in.)



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SFA-II Heater Core (SFA-II: Straight Flow Aluminum-II)

This heater core has been made more compact and higher performance by making the core section finer and improving the shapes of the tank section and flow section. Also, the environment is considered. By using aluminum as the material, the amount of the environmental burden disposal (lead) is reduced.

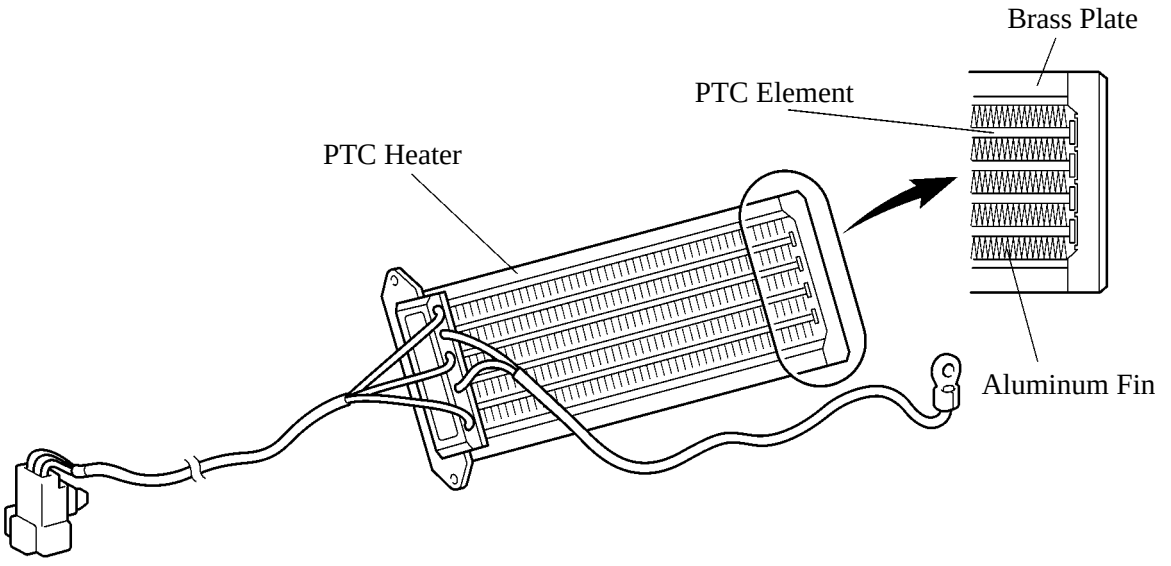


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PTC (Positive Temperature Coefficient) Heater

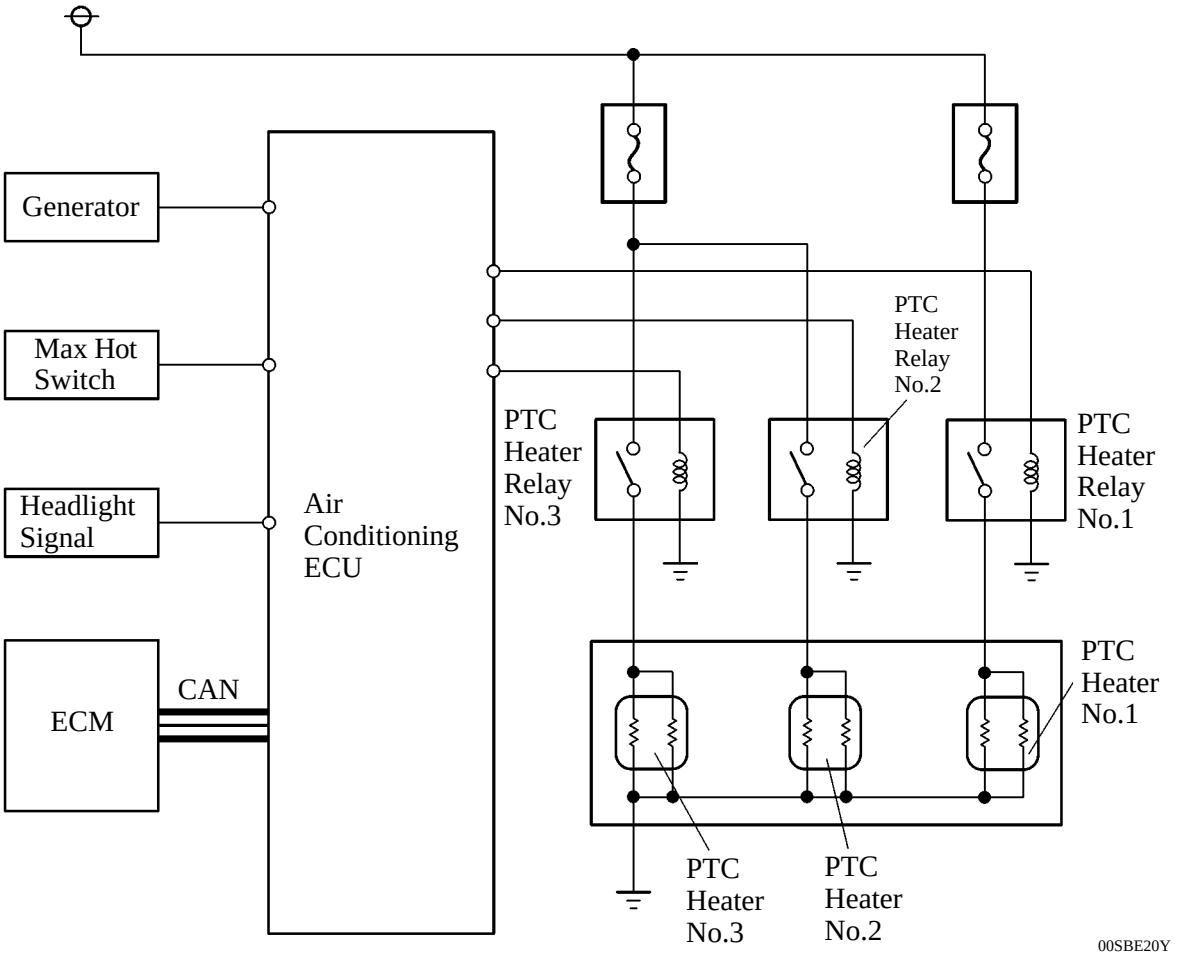
1) General

- 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 heat to warm the air that passes through the unit.



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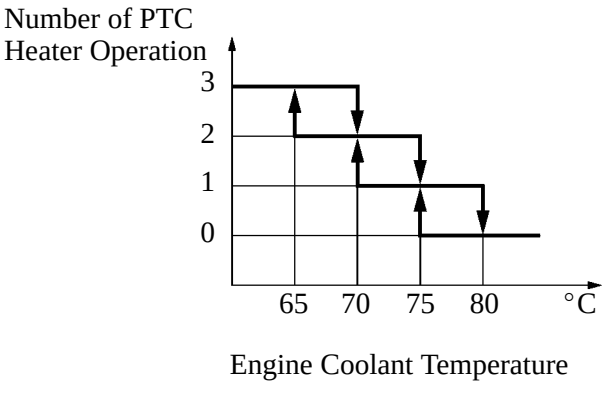
2) Wiring Diagram



3) PTC Heater Operating Conditions

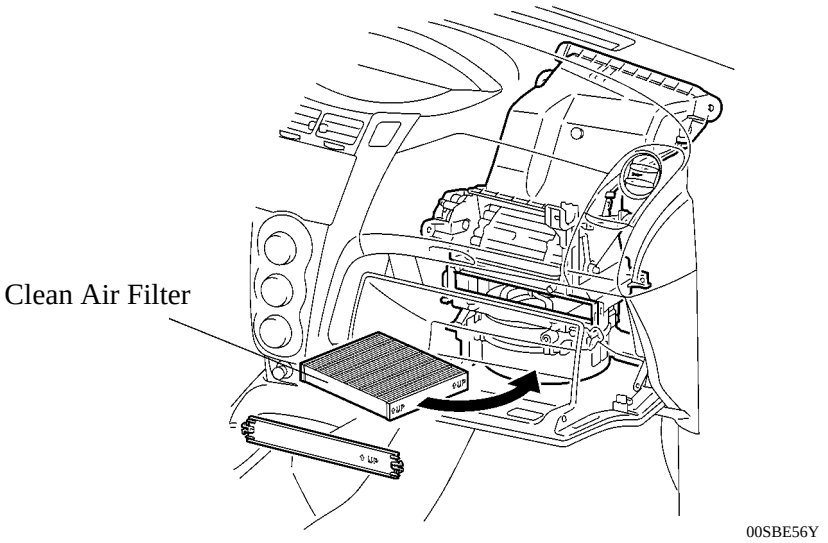
The on/off function of the PTC heater is controlled by the air conditioning ECU in accordance with the engine coolant temperature, engine speed, air mix setting, and electrical load (alternator power ratio). For example, the number of the operating PTC heaters varies with the water temperature as in the graph below.

▶ Heating Value Pattern ◀



Clean Air Filter

A clean air filter (high efficiency type) is used to remove dust, pollen, and other micron particles from air entering from outside the vehicle to provide a comfortable cabin of clean air. The clean air filter is installed in the upper section of the blower fan for easy replacement of the clean air filter without the need for tools by removing the one-touch clip in the glove box, making this easy to service.



Service Tip

The clean air filter on the U.S.A models should be changed at 30,000 miles. On the Canada models, it should be changed at 16,000 km. However, it varies with the conditions or environment.

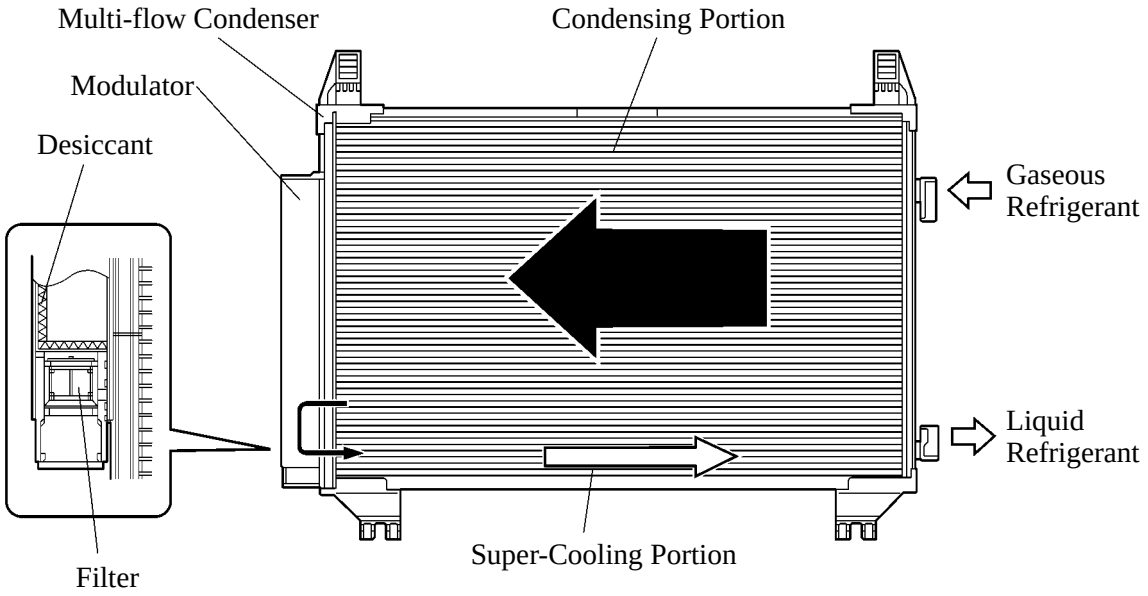
3. Condenser

General

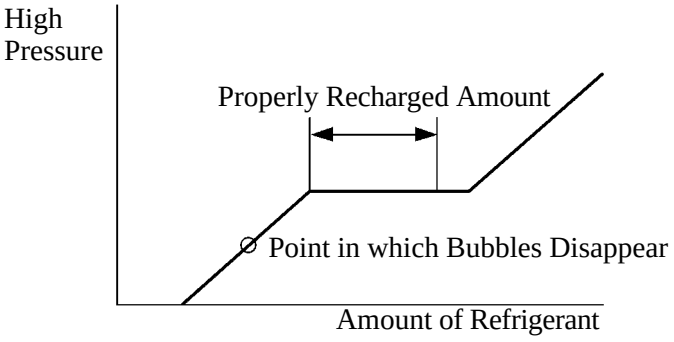
The ’06 models use a sub-cool condenser. This is a multi-flow condenser consisting of two cooling portions: a condensing portion and super-cooling portion, and a gas-liquid separator (modulator) all integrated together. This condenser uses a sub-cool cycle for its cooling cycle system to ensure heat-exchanging efficiency.

Sub-Cool Cycle

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.



NOTE:
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 to recharge the system with refrigerant, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

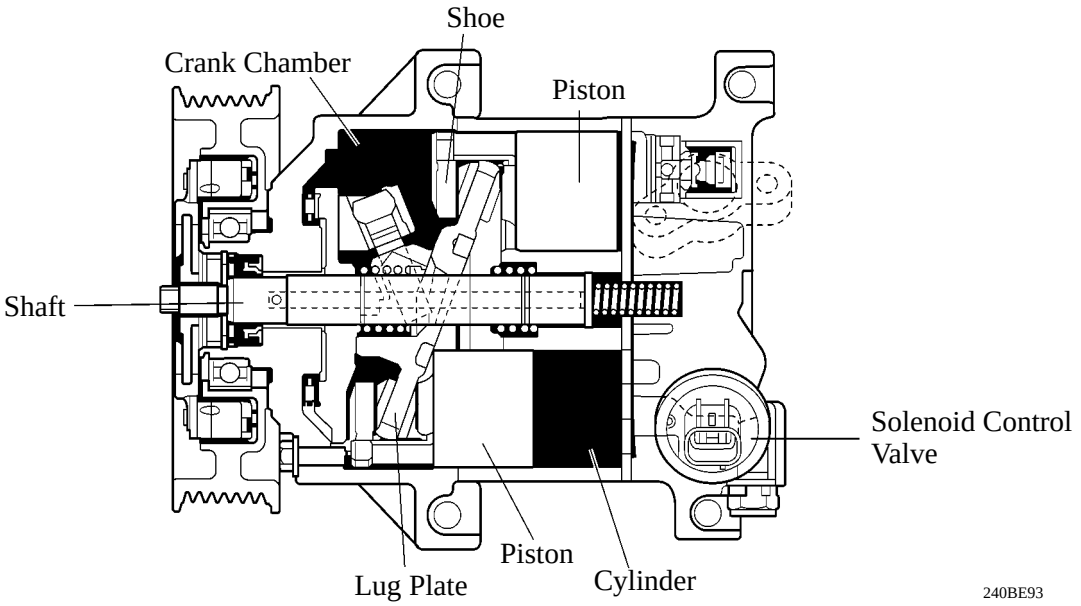


4. A/C Compressor

General

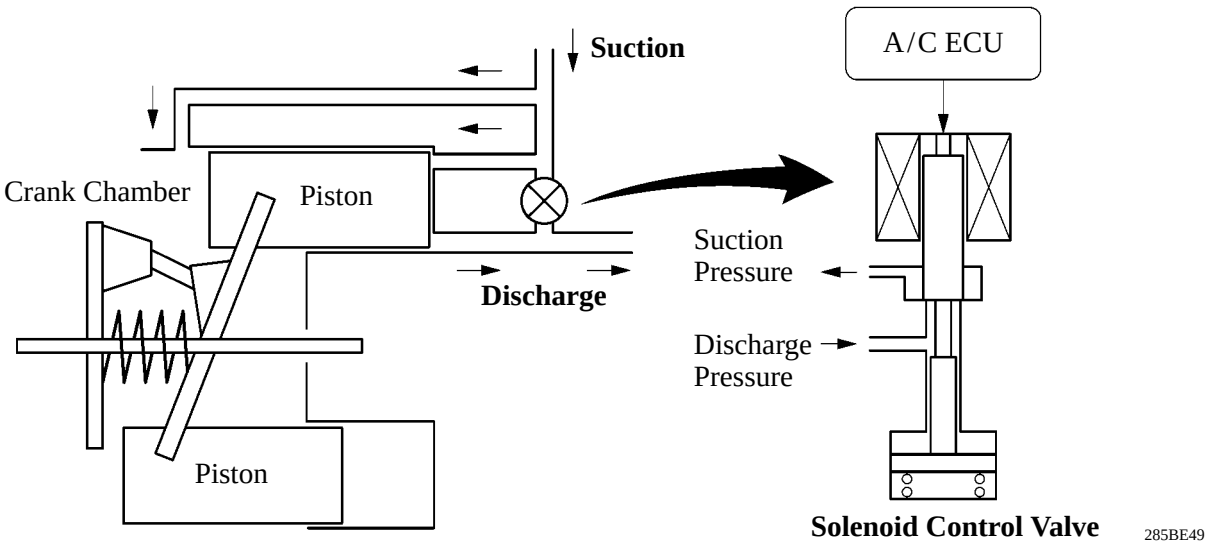
An A/C compressor is a continuously variable capacity type in which its capacity varies in accordance with the cooling load of the air conditioning.

- This compressor consists of the shaft, lug plate, piston, shoe, crank chamber, cylinder, and solenoid control valve.
- The solenoid control valve that adjusts the suction pressure so that the suction pressure can be controlled as desired is provided.
- An A/C pulley is used the plastic DL (Damper Limiter) type.
- A rotary valve type is used to suction refrigerant gas into the cylinder.

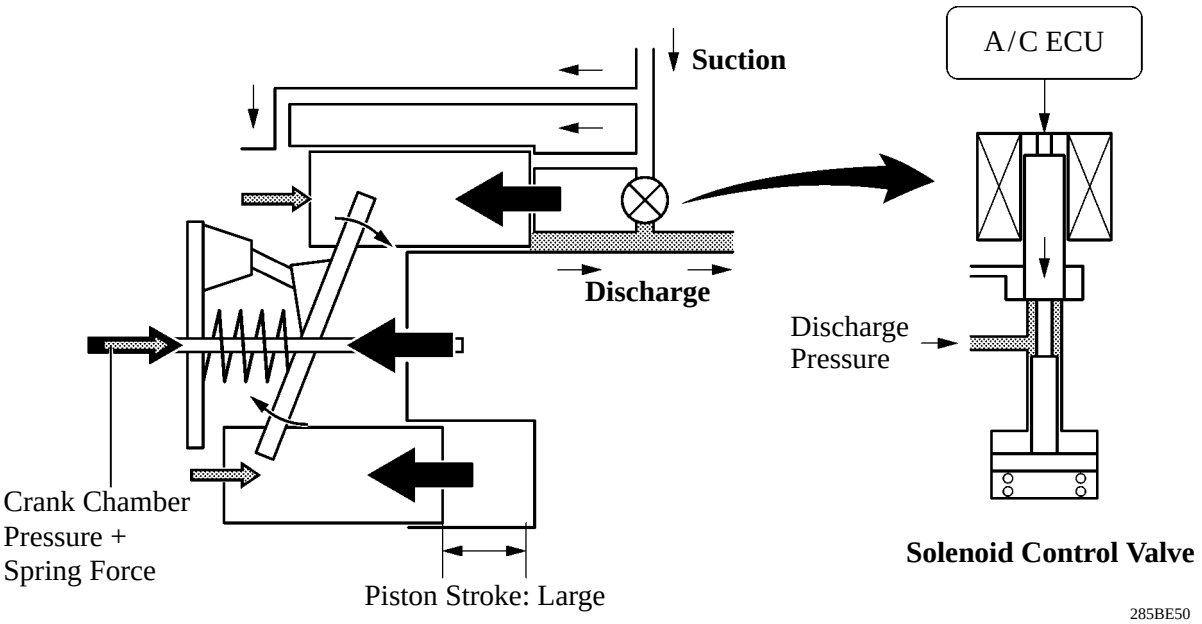


Operation

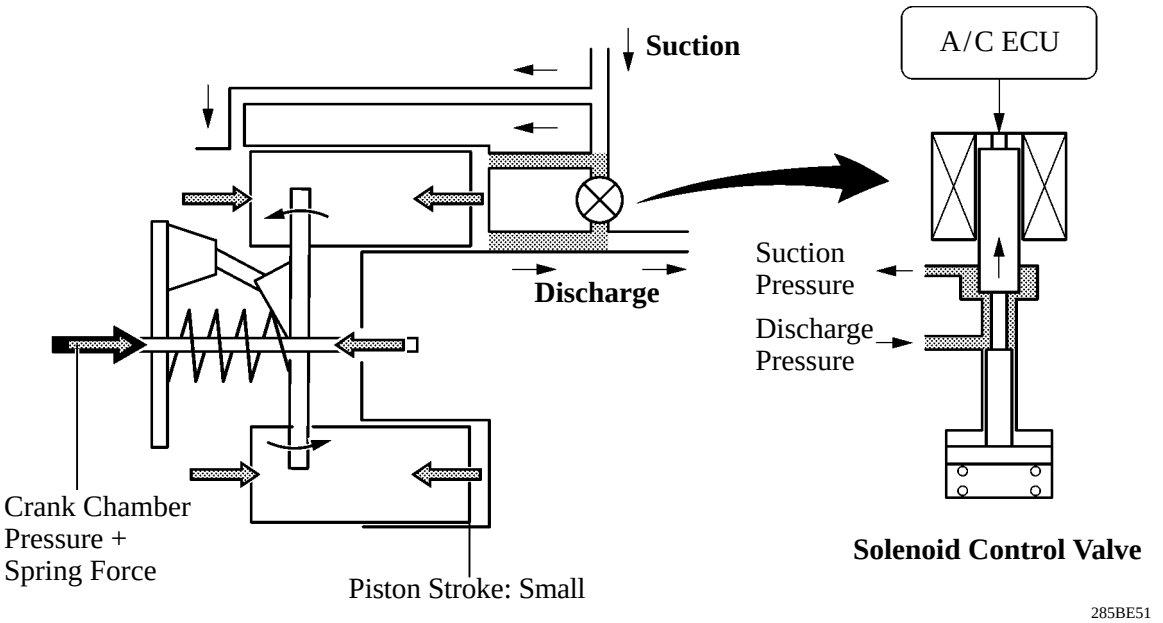
- The crank chamber is connected to the suction passage. A solenoid control valve is provided between the suction passage (low pressure) and the discharge passage (high pressure).
- The solenoid control valve operates under duty cycle control in accordance with the signals from the A/C ECU.



- When the solenoid control 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 lug plate. As a result, the piston stroke increases and the discharge capacity increases.

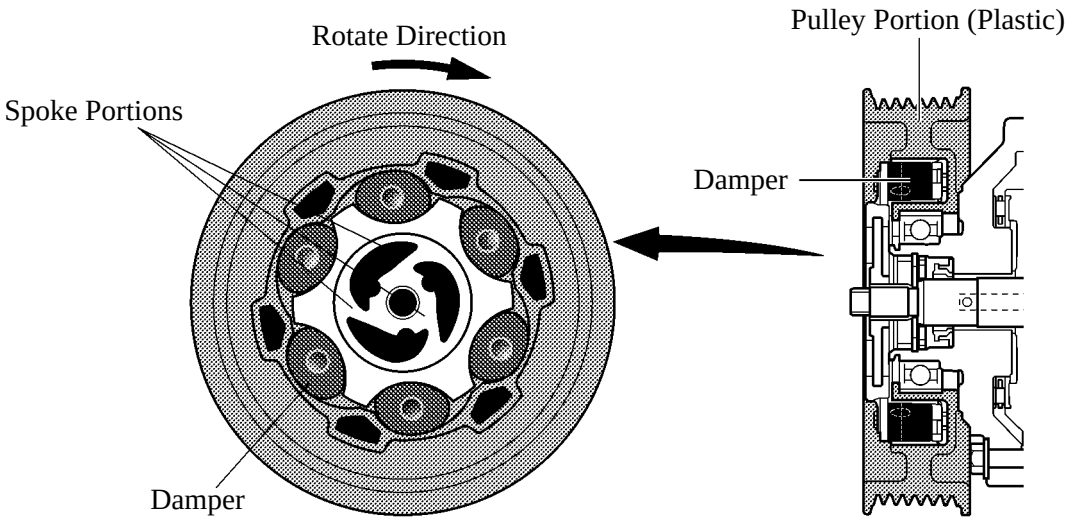


- When the solenoid control valve opens (solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates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



Plastic DL Type A/C Pulley

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. To reduce weight, the pulley portion is made of plastic.



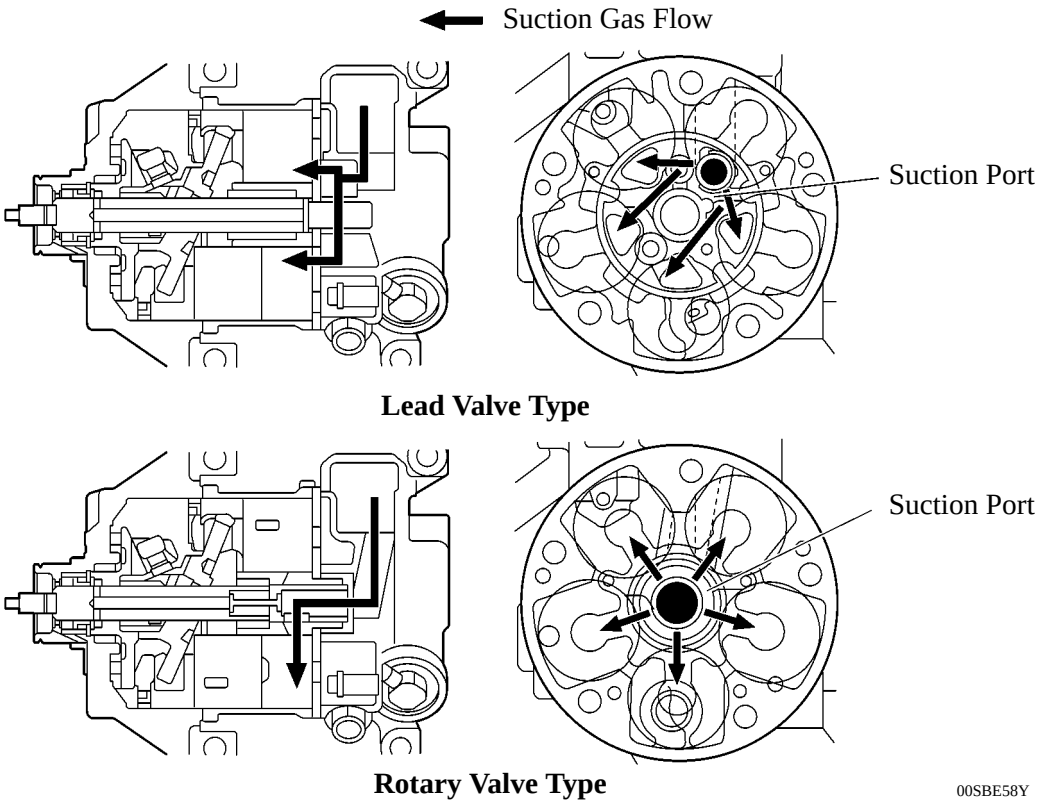
Limiter Mechanism

240BE92

Rotary Valve

The rotary valve type produces the following excellent results in comparison to the conventional lead valve type.

- Decreases suction loss of refrigerant gas
- Recovers reexpanded gas
- Decreases discharge loss



Lead Valve Type

Rotary Valve Type

00SBE58Y

■AIR CONDITIONING CONTROL

1. Air Conditioning ECU

The air conditioning ECU has following controls.

Control	Outline
Variable Capacity Compressor Control	Controls the compressor to turn on or off and the discharge capacity based on the signals from various sensors.
Self-diagnosis	Checks the sensors in accordance with operation of air conditioning switches, then clock displays a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioning switches (actuator check function).

2. Self-Diagnosis

Air conditioning ECU has a self-diagnosis function. It stores any operation failures in the air conditioning system memory in the form of DTC (Diagnostic Trouble Code).
For details, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

POWER WINDOW SYSTEM

■DESCRIPTION

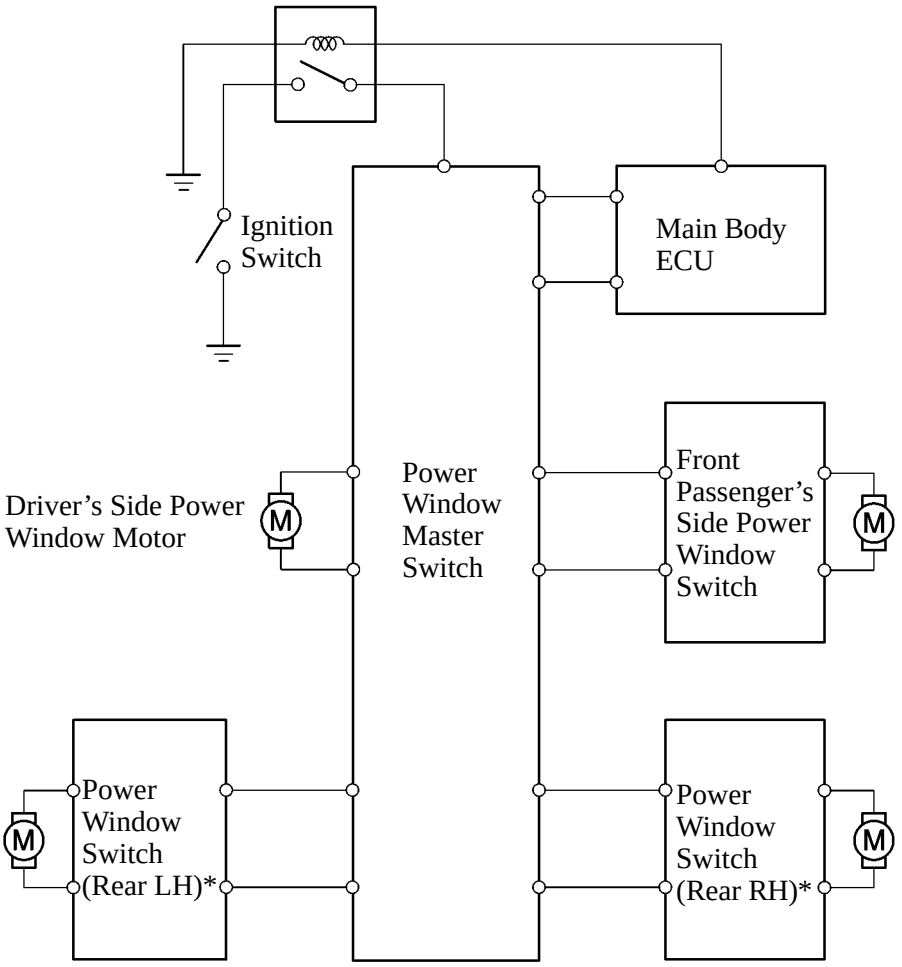
The power window system is provided as optional equipment on the ’06 models.

The power window system has the following functions:

Function	Outline
Manual-up-and-down Function	The manual-up-and-down function causes the window to open or close while the power window switch is being pulled halfway up or pushed halfway down. The window stops as soon as the switch is released.
Driver’s Door One-touch Auto Down Function	The driver’s door one-touch auto down function is used in the driver’s window. The driver’s door one-touch auto down function enables the window of driver’s door to be fully opened at a touch of the power window switch.
Remote Control Function	The up-and-down operations of the front passenger door window and the rear door windows*can be controlled by operating the power window master switch.

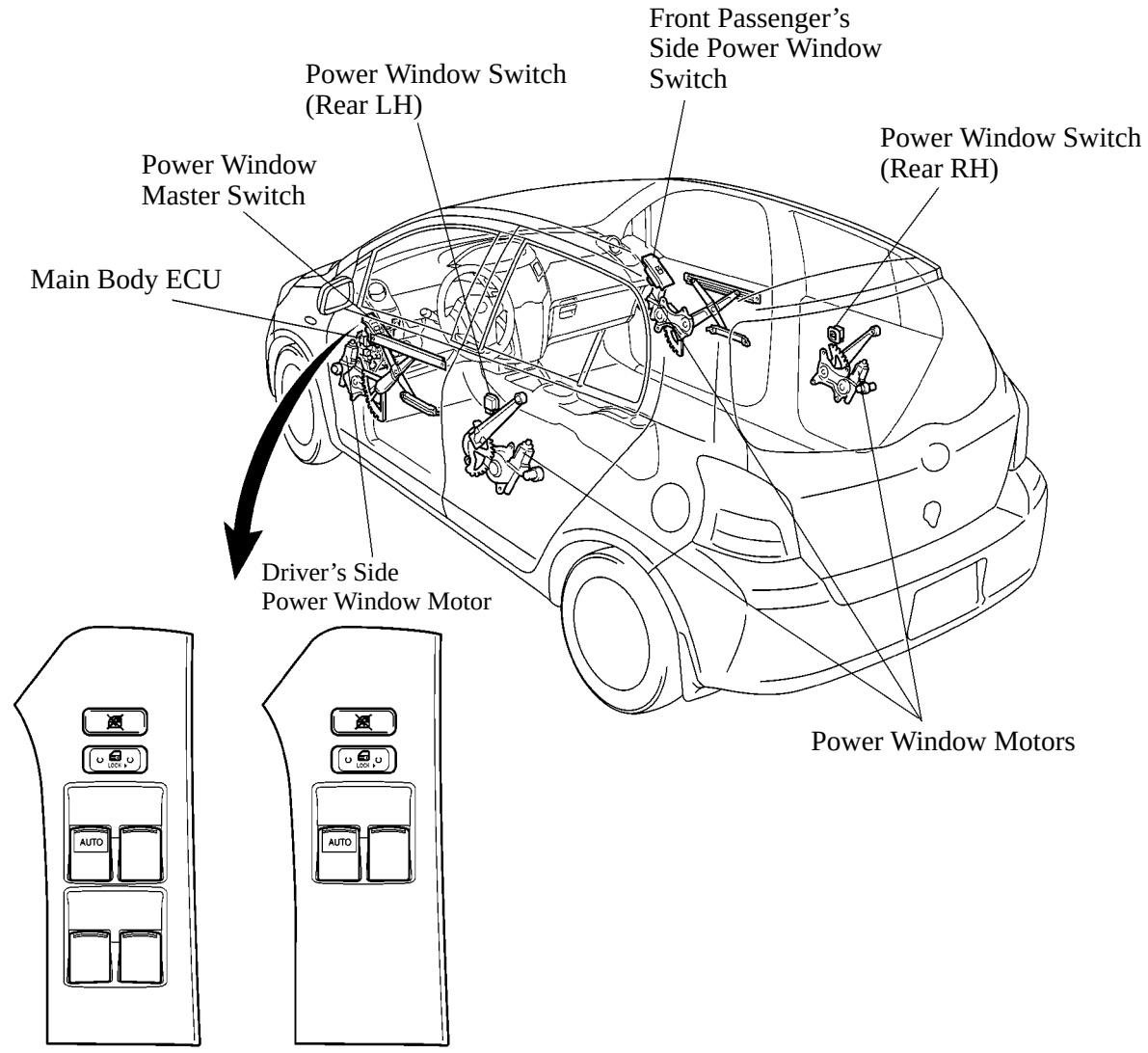
*: Only for 5-door Hatchback Models

▶ System Diagram ◀



*: Only for 5-door Hatchback Models

■LAYOUT OF MAIN COMPONENTS



5-door Hatchback Models **3-door Hatchback Models**

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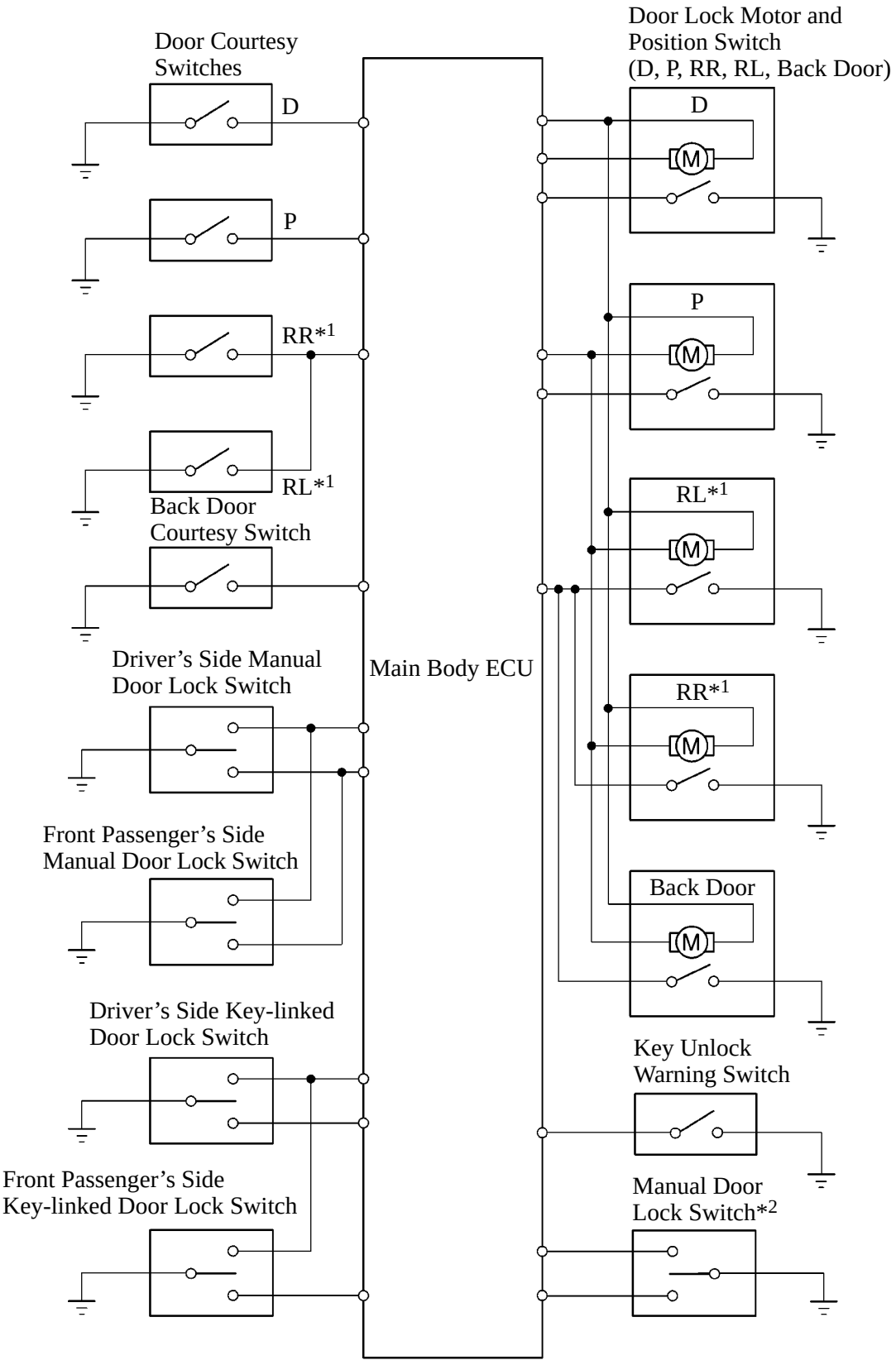
DOOR LOCK CONTROL SYSTEM

■DESCRIPTION

- The door lock control system is provided as optional equipment on the U.S.A. models and the 3-door hatchback models for Canada, and is provided as standard equipment on the 5-door hatchback models for Canada.
- This system is controlled by the main body ECU. The main body ECU outputs signals to the respective door lock motors.
- The door lock system in the ’06 models has the following functions:

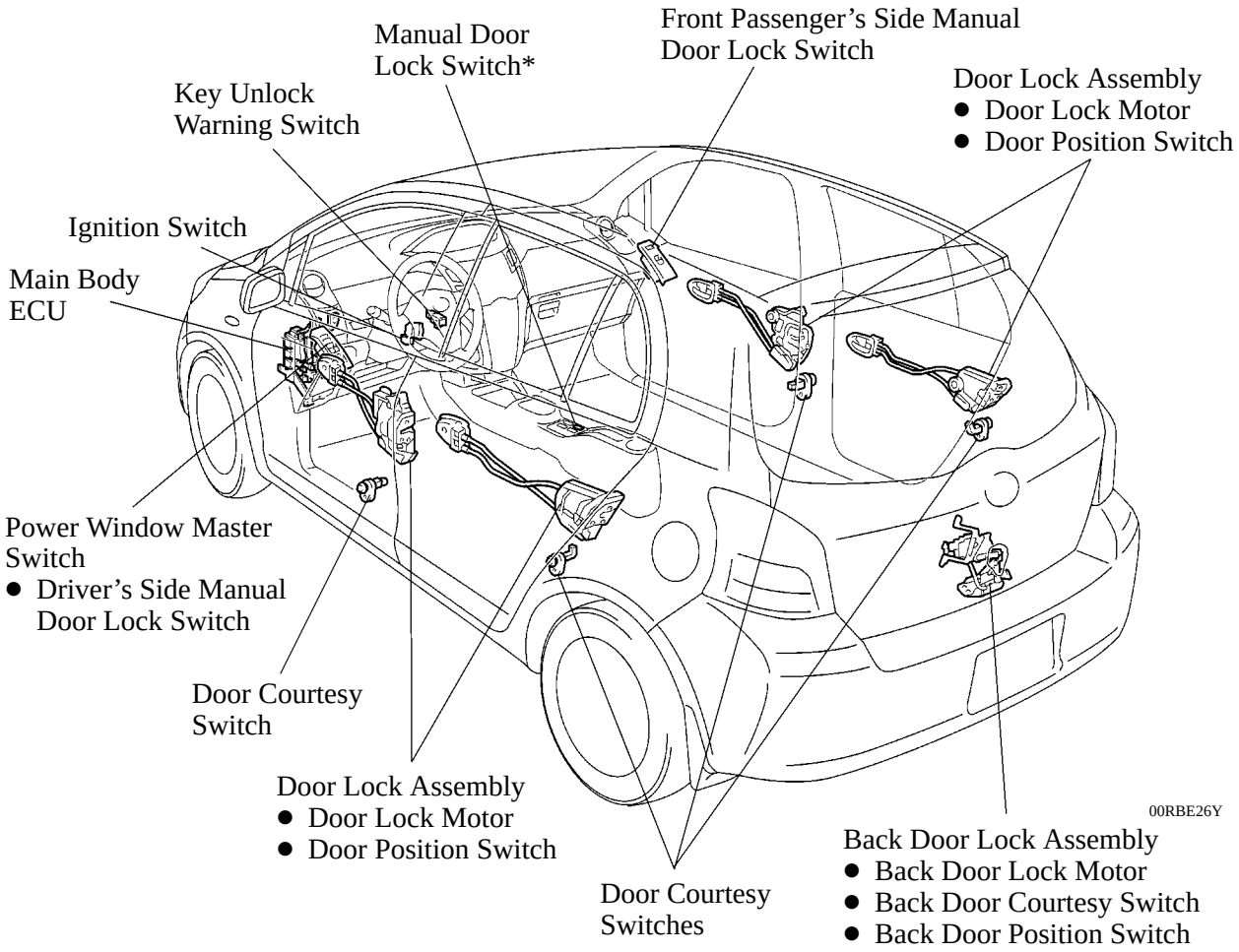
Function	Outline
Manual Lock and Unlock	This function can lock or unlock all doors by the door lock control switch operation.
Key-linked Lock and Unlock Function	This function which is linked with the key cylinder can lock or unlock all the doors when a lock or unlock operation is effected.
Key Confine Prevention Function	When the key is inserted in the ignition key cylinder with the driver’s door open and if you perform the door lock operation, all the doors will be unlocked.
Manual Unlock Prohibition Function	Performing the door lock operation with a transmitter or an ignition key will prohibit the unlock operation by the door lock control switch.
2-step Unlock Function	This function is provided to unlock the driver’s door by turning the key cylinder first and to unlock remaining doors by the door turning it the second time.
Door Lock with Transmitter Function (see page BE-47)	Pressing the door lock button of the transmitter locks all doors.
Door Unlock with Transmitter Function (see page BE-47)	Pressing the door unlock button of the transmitter unlocks all doors.
Customized Body Electronics	For details, see BE-11

▶ System Diagram ◀



*1: Only for 5-door Hatchback Models
*2: Models without Power Window System

■LAYOUT OF MAIN COMPONENTS



*: Models without Power Window System

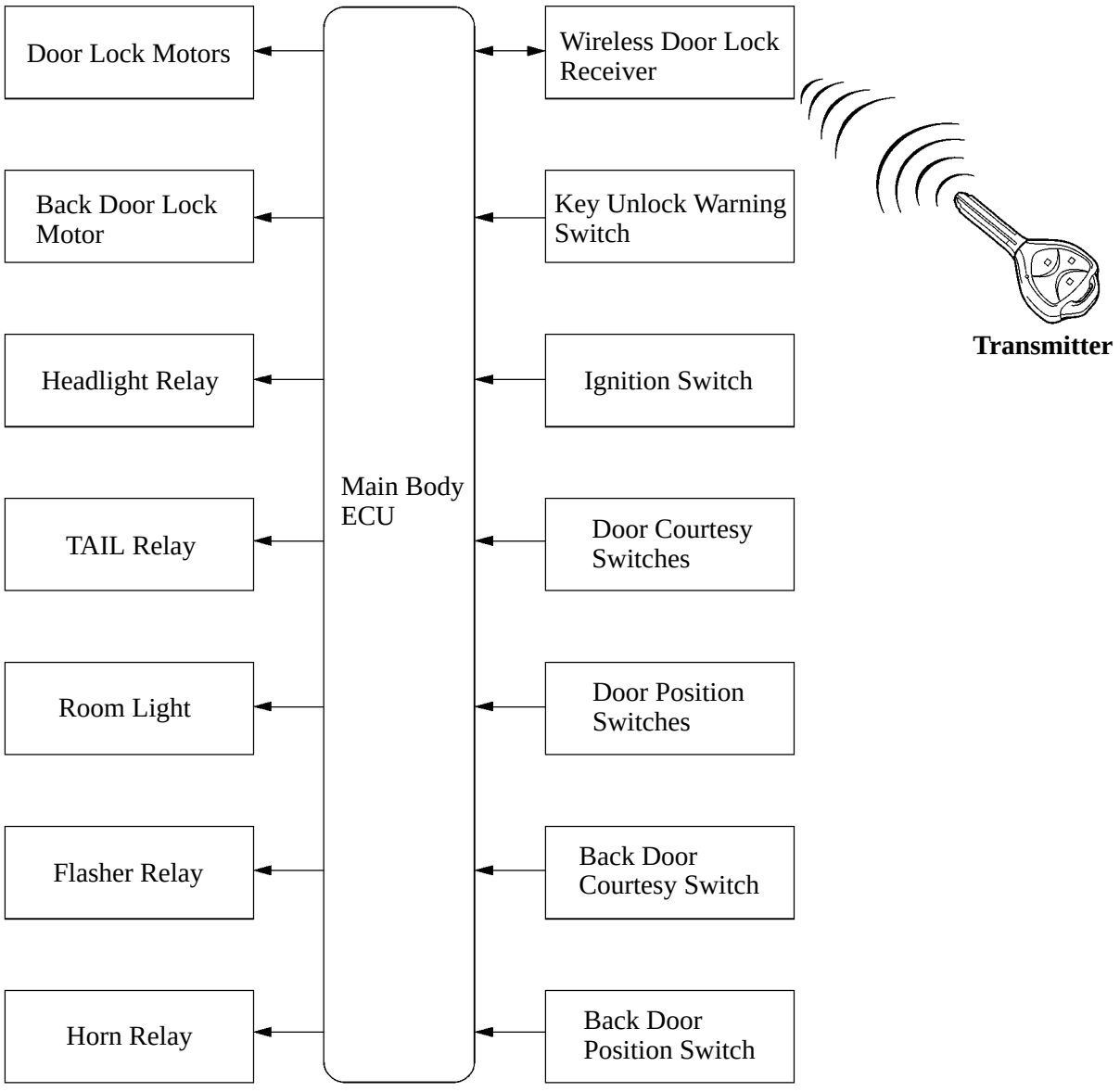
WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

■DESCRIPTION

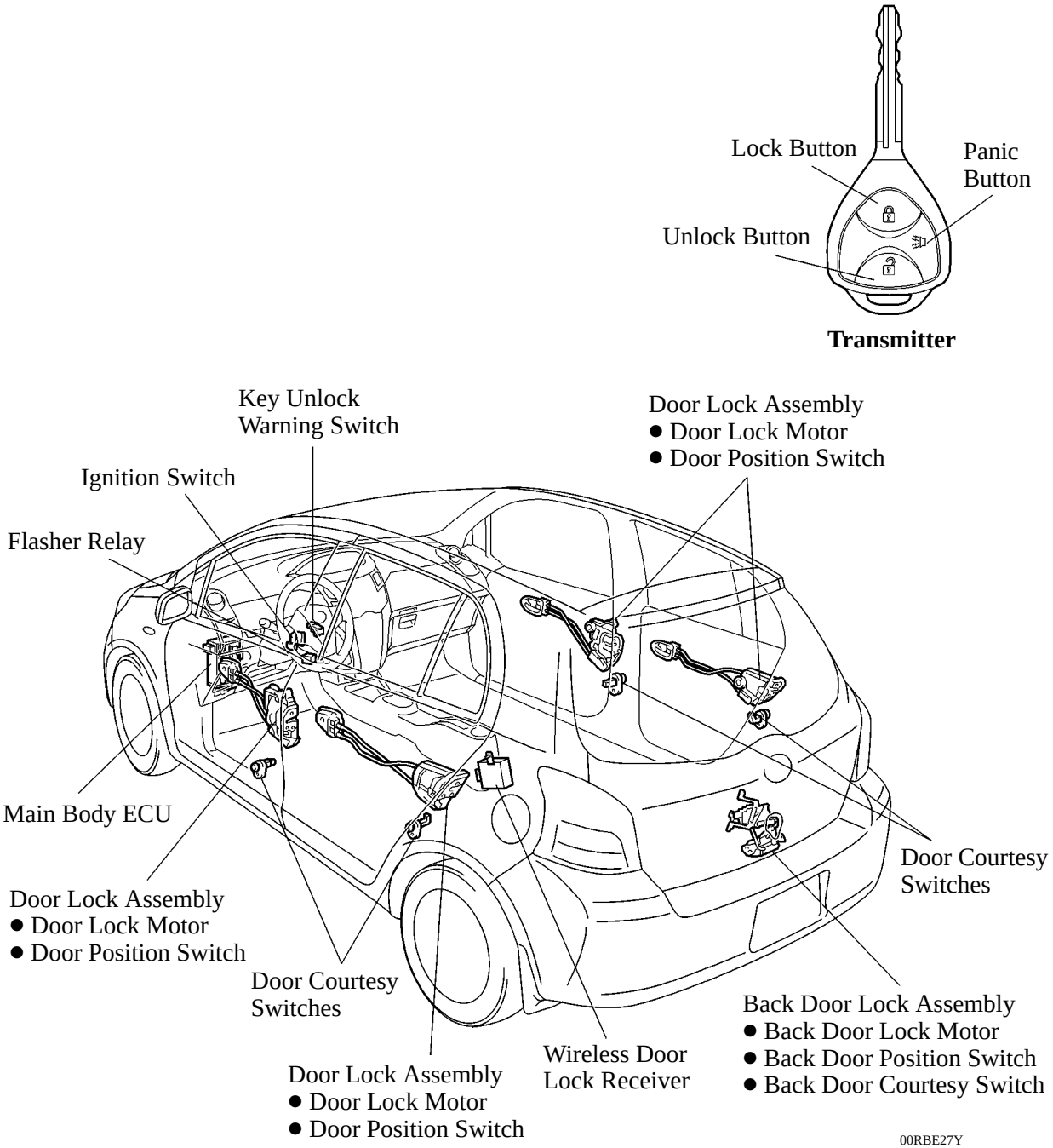
The wireless door lock remote control system has been provided as optional equipment.
This system is a convenient system for locking and unlocking all doors at a distance. This system in the '06 models has the following features:

- In this system, the wireless door lock receiver performs the code identification process and sends the lock or unlock signal to the main body ECU, then the main body ECU effects the door lock control.
- A key-integrated, three-button (lock, unlock, panic) type transmitter is used.
- The hazard warning light is flashed once when locking, and the hazard warning light is flashed twice when unlocking, to inform that the operation has been completed.
- A panic alarm operation is provided that activates alarms when the panic button on the transmitter is pressed and held for approximately 0.8 seconds.

▶ System Diagram ◀



■LAYOUT OF MAIN COMPONENTS



■FUNCTION

1. General

The wireless door lock remote control system has the following functions:

Function	Outline
All Doors Lock	Pressing the lock button of the transmitter locks all doors.
All Doors Unlock (2-step Unlock)	Pressing the unlock button on the transmitter once unlocks the driver's door. If the unlock button is pushed again within 3 seconds, all doors unlock.
Automatic Lock Function	If no door is opened within 30 seconds and the ignition key is not in the ignition key cylinder after unlocking the doors by pushing the unlock button on the transmitter, all doors are locked again antomatically.
Answer Back Operation	The hazard light is flashed once when locking, and the hazard light is flashed twice when unlocking, to inform that the operation has been completed.
Panic Alarm Operation	Pressing and holding the panic button on the transmitter for approximately 0.8 seconds activates alarms. Pushing any button on the transmitter during the alarms cancels the alarms.
Transmitter Recognition Code Registration Function	● A maximum of 4 types of transmitter recognition codes can be registered in the wireless door control receiver. ● When 4 codes are already registered and a new code is registered, it is written over the oldest of the already registered codes.
Customized Body Electronics	For details, see BE-11

2. Transmitter Recognition Code Registration Function

The table below shows the 4 special coded ID registration function modes through which up to 4 different codes can be registered. The codes are electronically registered (written and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the 2006 Yaris Repair Manual (Pub. No. RM00R0E).

Mode	Function
Rewrite Mode	Erases all previously registered codes and registers only the newly received codes.
Add Mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first.
Confirm Mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit Mode	Deletes all the registered codes and prohibits the wireless door lock function. This mode is used when the transmitter is lost.

ENGINE IMMOBILIZER SYSTEM

■DESCRIPTION

The engine immobilizer system compares the ID code that is registered in the transponder key ECU with the ID code of the transponder chip that is embedded in the ignition key. The system unsets if these ID codes match. Thus, the transponder key ECU and ECM communicate with each other to authorize fuel injection and ignition, enabling the engine to start.
The system is optional equipment on all models.

Service Tip

When replacing the transponder key ECU or adding a new ignition key, the key's recognition code must be registered.

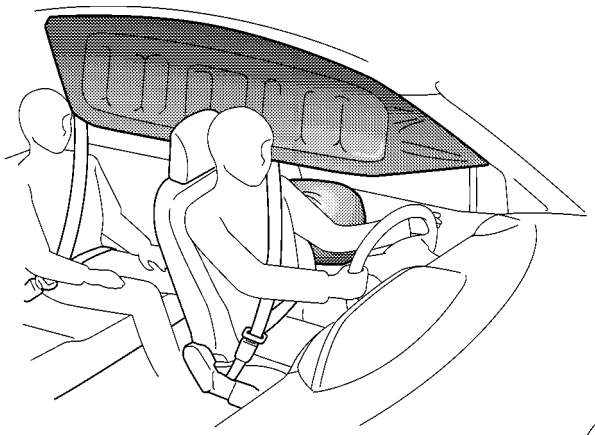
- When the transponder key ECU has been replaced, the handheld tester is necessary for the key registration. At this time, the total number of keys that can be registered is three (master key: two, sub key: one).
- The recognition code of additional keys must be registered. At this time, the total number of keys that can be registered is eight (master key: five, sub key: three).
  For details, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

SRS AIRBAG SYSTEM

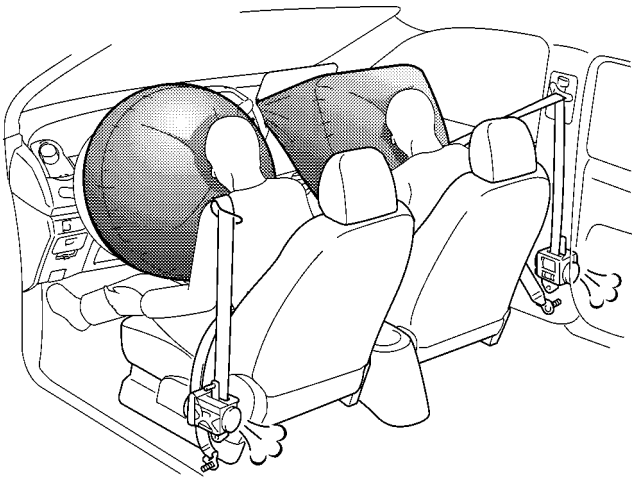
■DESCRIPTION

- The dual-stage SRS (Supplemental Restraint System) driver and front passenger airbags are used to help reduce the shocks to the heads and chests of the driver and front passenger in the event of frontal impact collision as supplements to the seat belts. The dual-stage SRS airbag system controls the airbag inflating output by judging the extent of impact, seat position and whether or not the seat belt is fastened.
- The SRS side and curtain shield airbags are used to help reduce the shocks to the heads and the chests of the driver, front passenger, and outer rear passengers in the event of a side collision.
- As a countermeasure against an interruption in the power supply in the event of a collision involving the vehicle, a backup power supply which consists of a power supply capacitor and a voltage boost circuit (DC-DC Converter) is provided in the airbag sensor assembly.
- The airbag sensor assembly uses a fuel cut control that stops the fuel pump if any airbag is deployed.
- The ’06 models have the SRS airbag system with the following equipments:

Area		U.S.A. & Canada
Airbag Type	Driver and Front Passenger Airbag	Standard
	Driver, Front Passenger, Side and Curtain Shield Airbag	Option

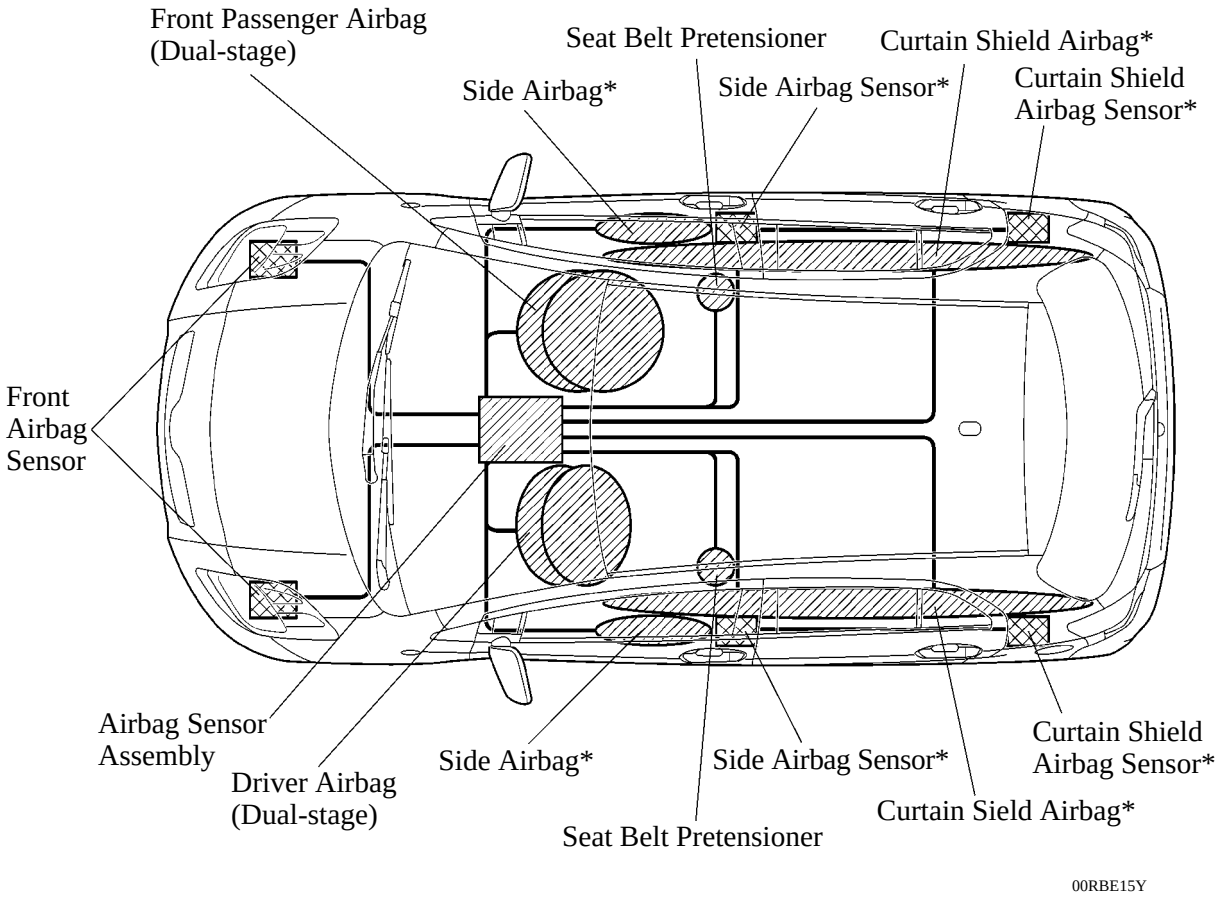


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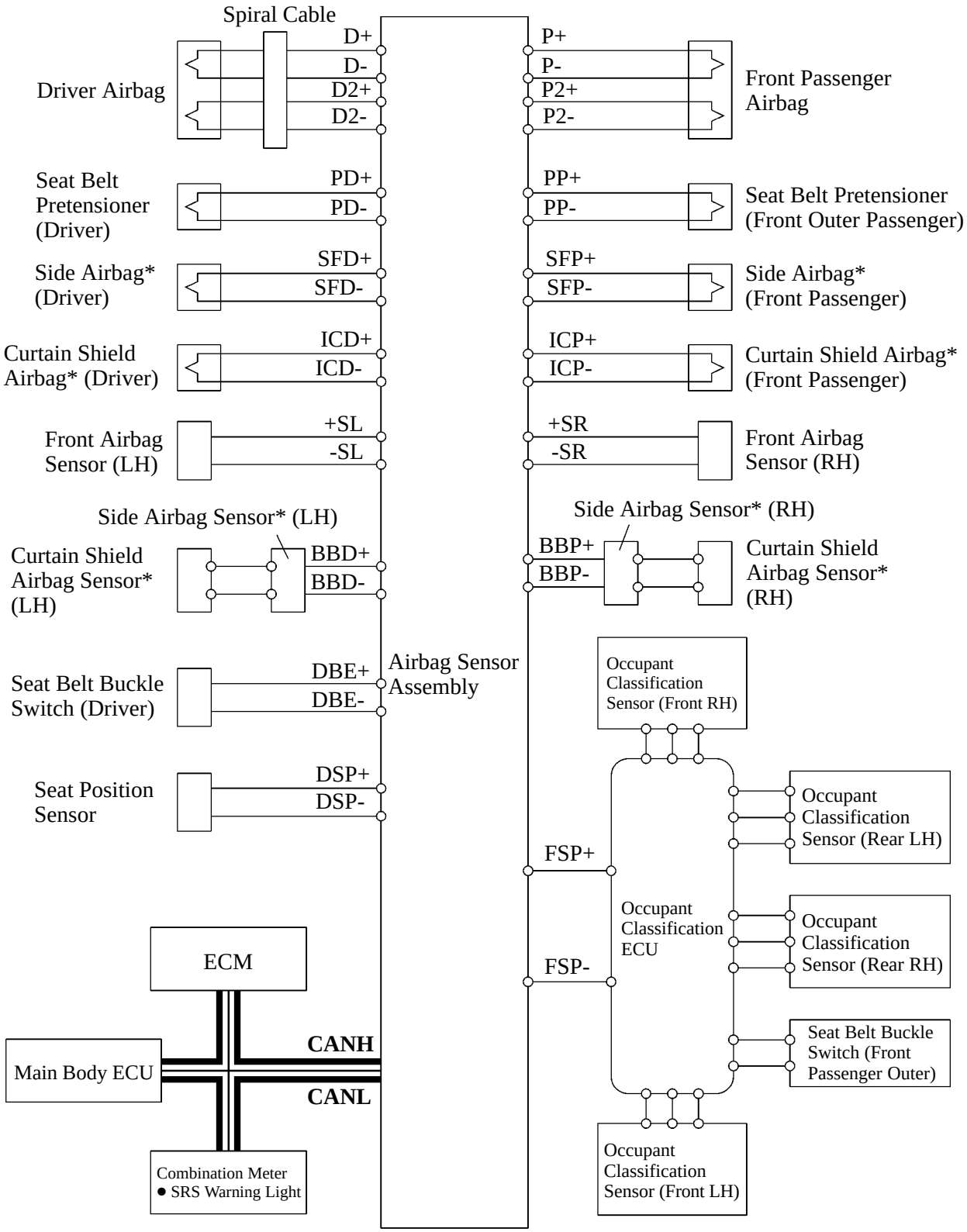
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▶ System Diagram ◀



*: Only for Models with Driver, Front Passenger, Side and Curtain Shield Airbags

■WIRING DIAGRAM



*: Only for Models with Driver, Front Passenger, Side and Curtain Shield Airbags

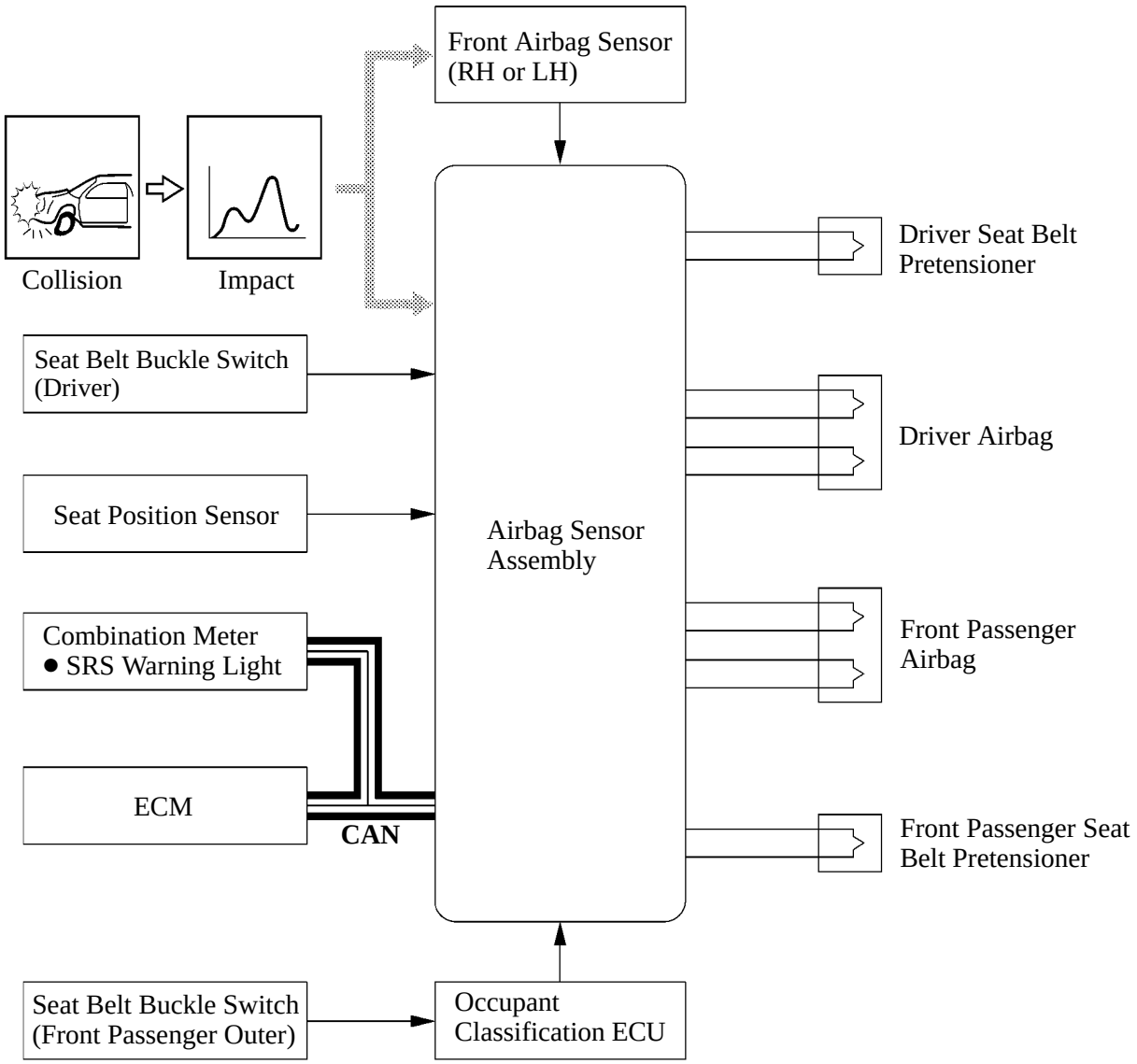
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■AIRBAG FOR FRONTAL COLLISION

1. General

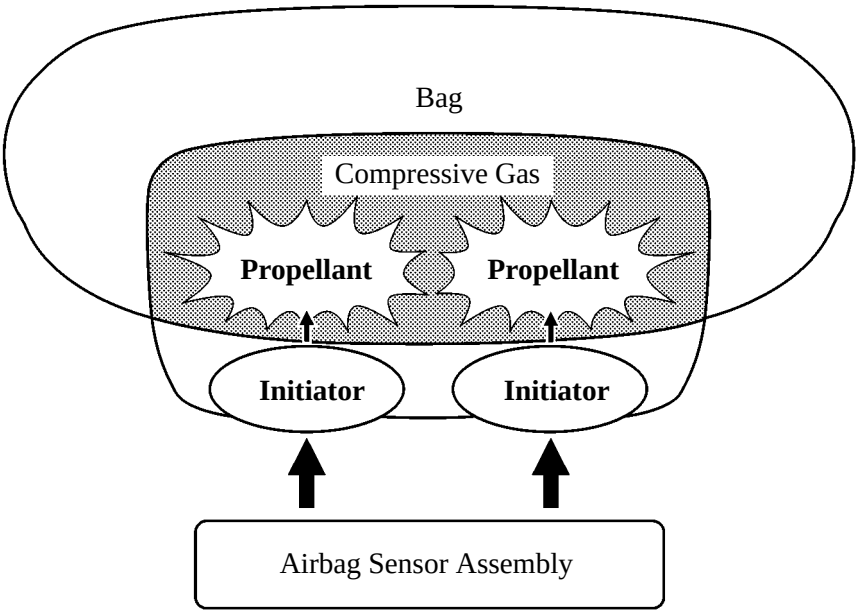
There are two airbags for frontal collisions: driver and front passenger. These airbags deploy simultaneously. The airbags for the driver and the front passenger use dual-stage control.
This controls the airbag inflating output optimum by judging the extent of the impact from front airbag sensors, and the extent of the impact from airbag sensor assembly, seat position and whether or not the seat belt is fastened.

▶ System Operation ◀



2. Dual-stage SRS Airbags

To support the dual-stage control, these airbag assemblies contain 2 sets of initiators and propellants. The airbag sensor assembly helps optimize the airbag inflation output by delaying the inflation timing of these initiators.

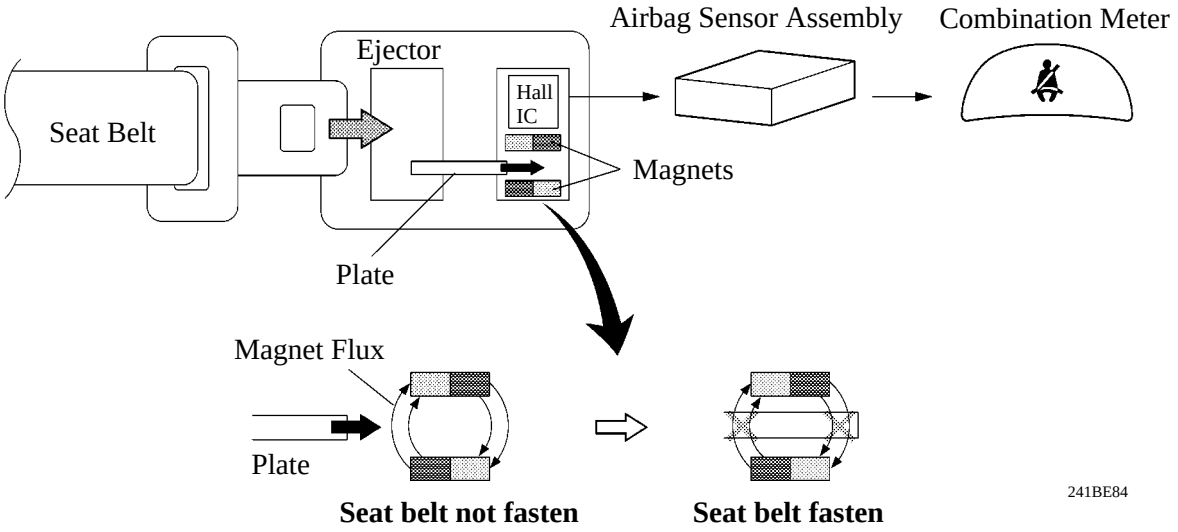


3. Front Airbag Sensor

- The electrical (acceleration sensor) type airbag sensor is used for front airbag sensor.
- The acceleration sensor is enclosed in the front airbag sensor. Based on the deceleration of the vehicle during a front collision, a distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be detected in detail.

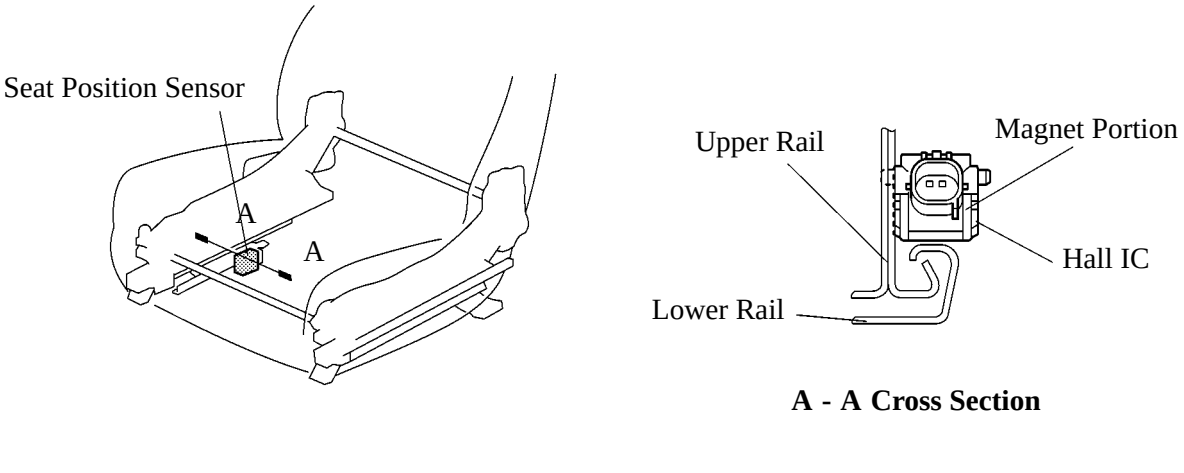
4. Seat Belt Buckle Switch (for Driver)

- The seat belt buckle switch which consists of an ejector with a plate, a Hall IC, and two magnets is integrated in the front seat inner belt assembly.
- The ejector with plate blocks the magnetic flux density between the two magnets. The Hall IC outputs this change to the airbag sensor assembly.



5. Seat Position Sensor (for Driver)

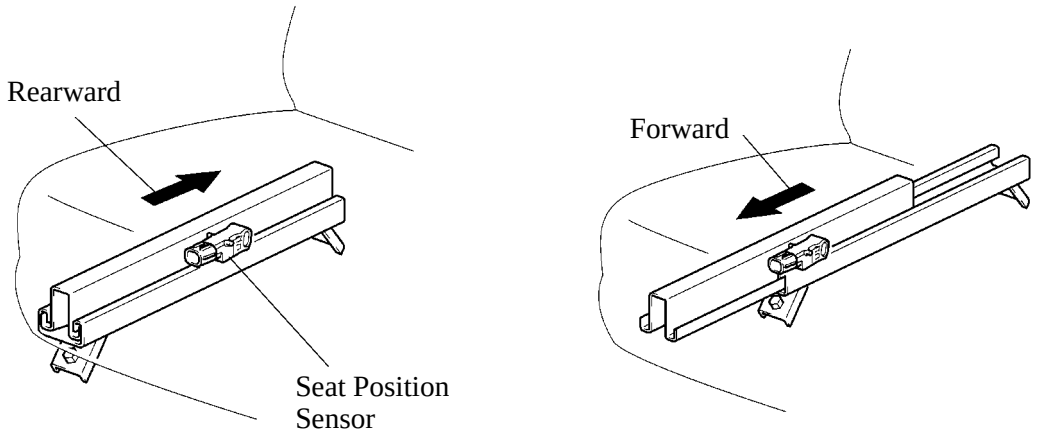
- The seat position sensor which is attached to the seat rail of the driver seat detects the sliding position of the seat. In addition, the shielding plate to make the seat position sensor judge the seat position is installed on this seat rail.
- The seat position sensor uses a Hall IC for its sensor and has a magnet portion on its opposite side.



A - A Cross Section

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- The seat position detection by the seat position sensor judges that the seat position is rearward if the shielding plate is between the sensor, and the seat position is forward if the shielding plate is not between the sensor.



Seat position is rearward **Seat position is forward**

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■AIRBAG FOR SIDE/REAR SIDE COLLISION

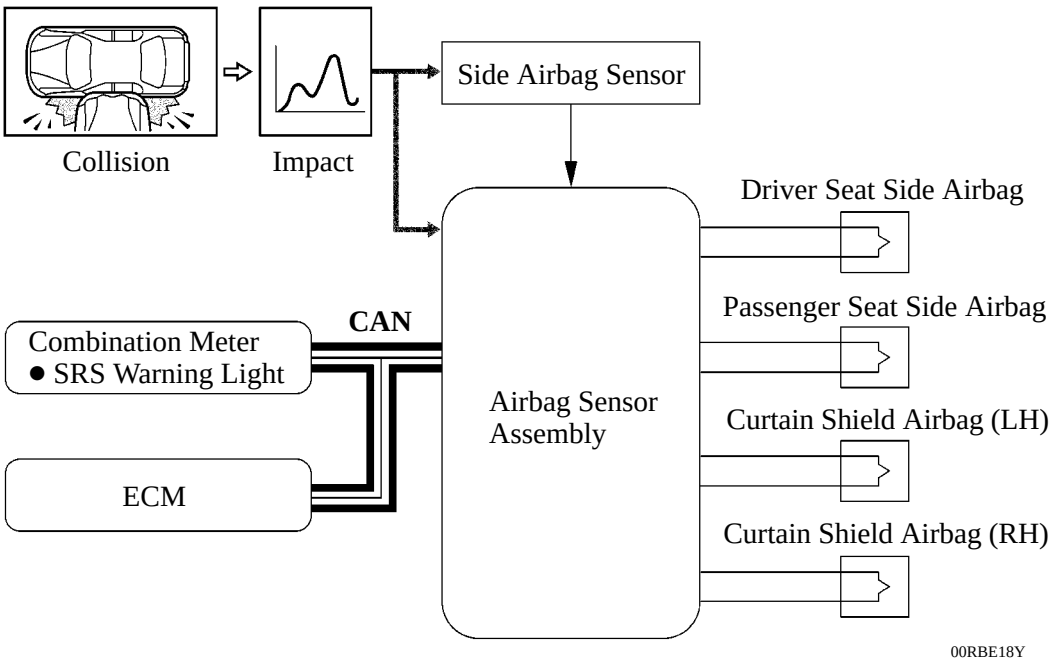
1. General

The airbag for side collisions contains two airbags: side and curtain shield. These airbags deploy simultaneously. The airbag for rear side collisions contains only the curtain shield airbag.

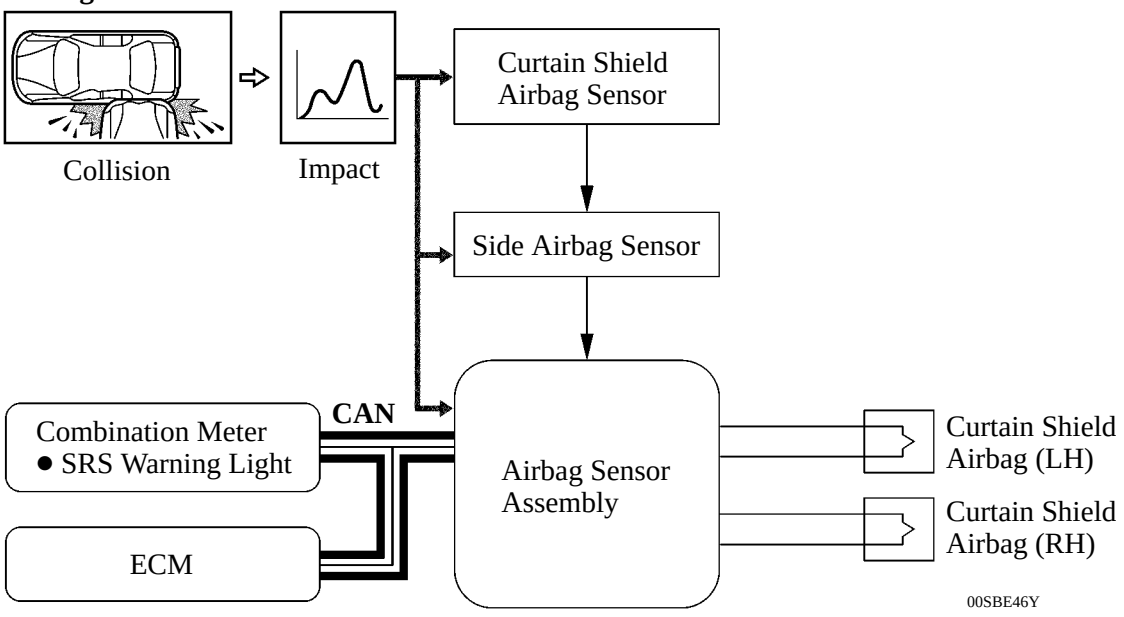
- With the airbag for side collisions, if the side airbag sensor detects an impact, it informs the airbag sensor assembly, and the airbag sensor assembly causes the side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear side collisions, if the curtain shield airbag sensor detects an impact, it informs the airbag sensor assembly via the side airbag sensor, and the airbag sensor assembly causes the curtain shield airbag to be deployed.

▶ System Operation ◀

Airbag for Side Collision

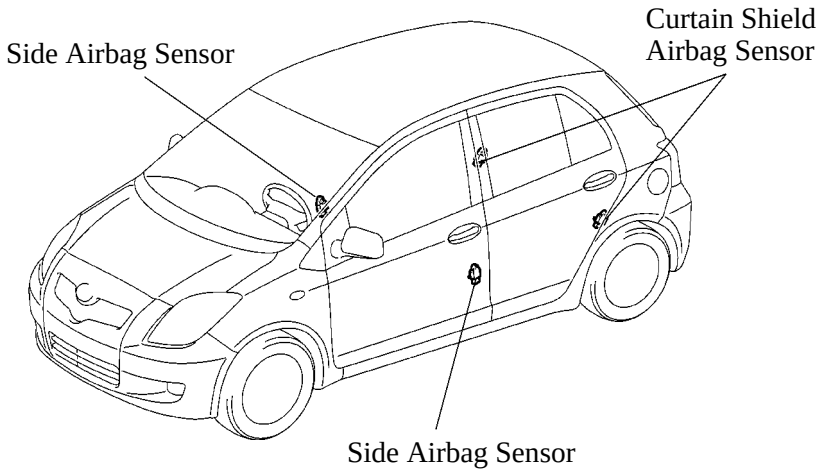


Airbag for Rear Side Collision



2. Side Airbag Sensor and Curtain Shield Airbag Sensor

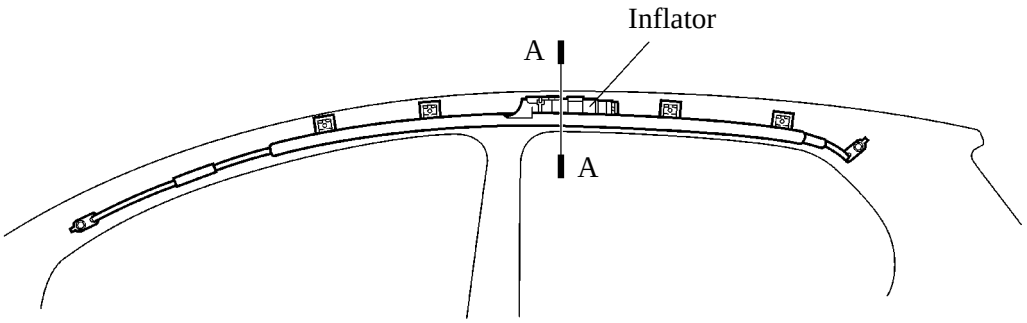
The deceleration sensor is enclosed in each side and curtain shield airbag sensor. Based on the deceleration of the vehicle during a side or side rear collision, a distortion is created in the sensor and converted into an electrical signal.

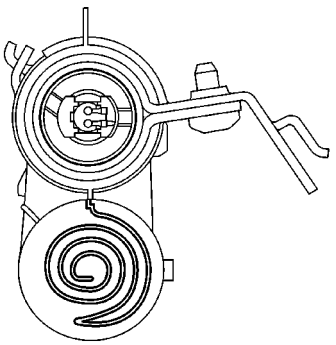


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3. Curtain Shield Airbag

A rear side collision is detected by the curtain shield airbag sensor in order to deploy the curtain shield airbag.





A - A Cross Section

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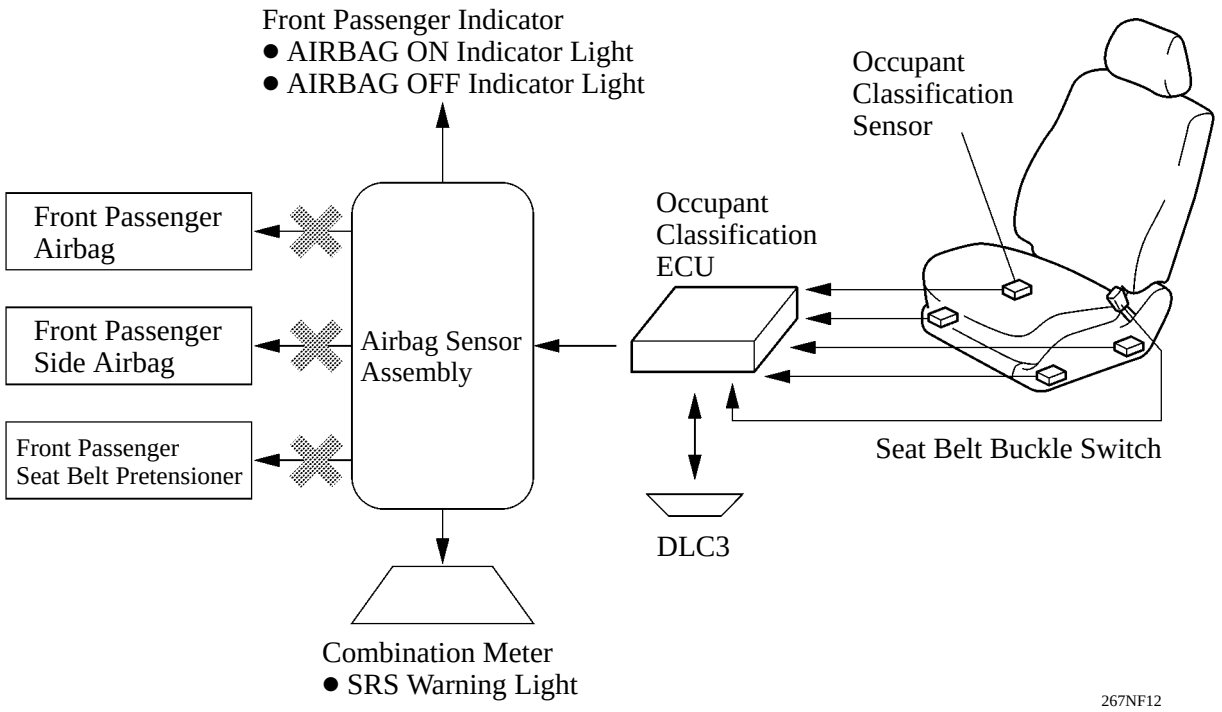
■FRONT PASSENGER OCCUPANT CLASSIFICATION SYSTEM

1. General

The front passenger occupant classification system judges whether the front passenger seat is occupied by an adult or child (with child seat) or is unoccupied, in accordance with the load that is applied to the front passenger seat and whether the seat belt is buckled. Thus, it restricts the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner. In addition, the system informs the driver of the result of the judgment through the use of the AIRBAG ON/OFF indicator lights.

- This system consists of the occupant classification ECU, four occupant classification sensors, “AIRBAG ON/OFF indicator lights”, seat belt buckle switch, and airbag sensor assembly.

▶ System Diagram ◀

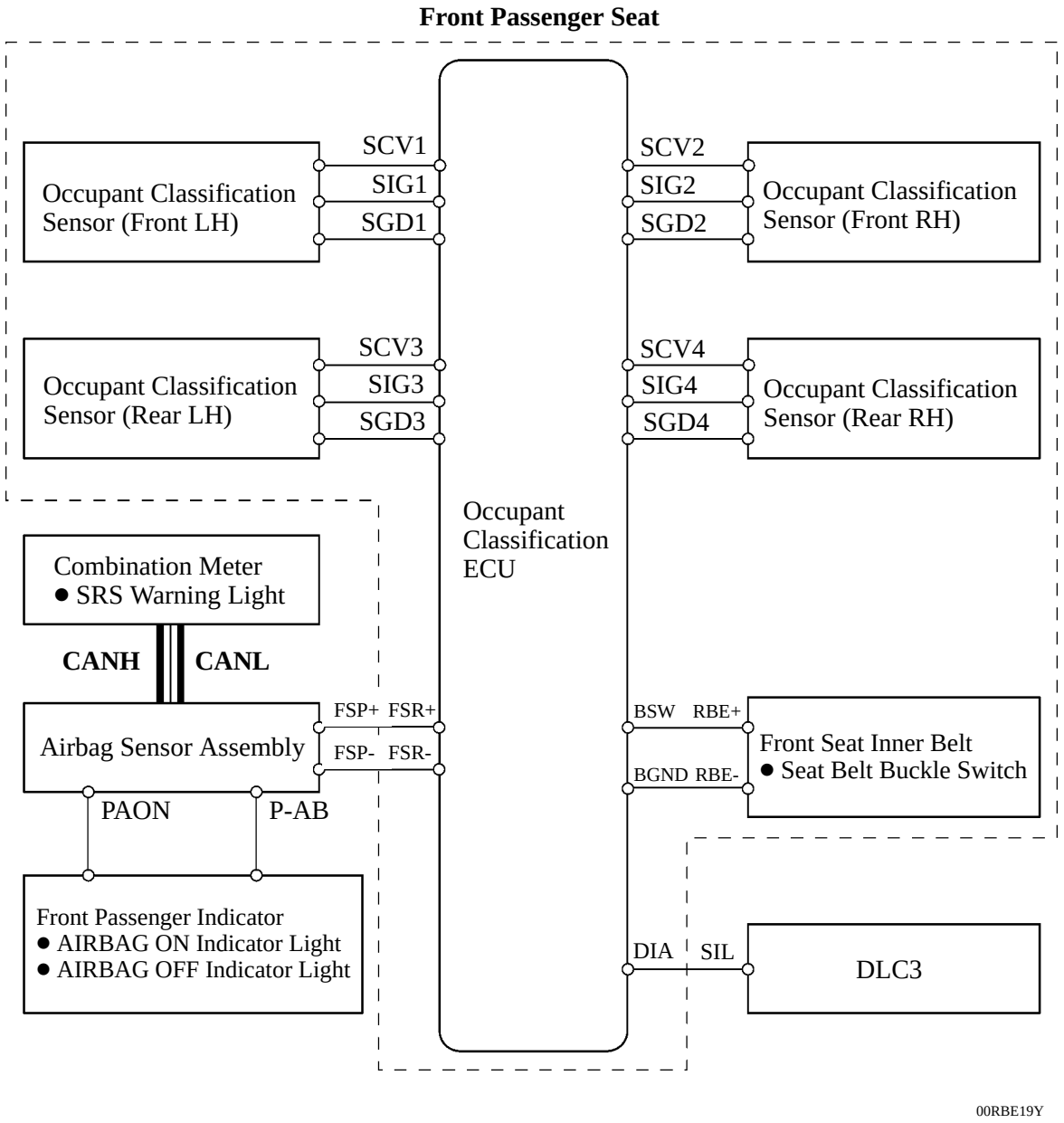


Service Tip

- When installing items to the front passenger seat or removing/installing the front passenger seat, connect the hand-held tester and be sure to perform a system check and perform a zero-point calibration of the sensor load value.
- If performing maintenance due to the SRS warning light being on constantly or due to a collision, in addition to the above item, check that the hand-held tester display value indicates within the range of 30 kg (66 lb) +/- 3 kg (6.6 lb) when a 30 kg (66 lb) weight is placed on the front passenger seat.

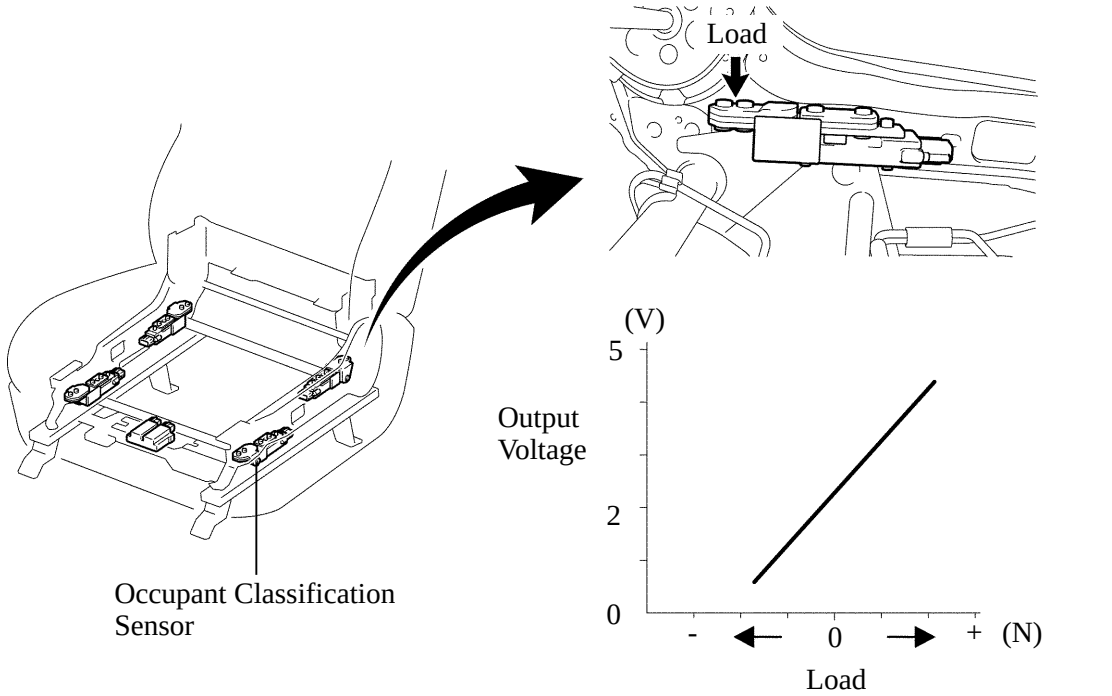
For details, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

2. Wiring Diagram



3. Occupant Classification Sensor

The occupant classification sensors are installed on four brackets connecting the seat rail and the seat frame. The resistance values of these sensors which vary in accordance with the distortion that acts on the brackets are output to the occupant classification ECU.



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4. System Operation

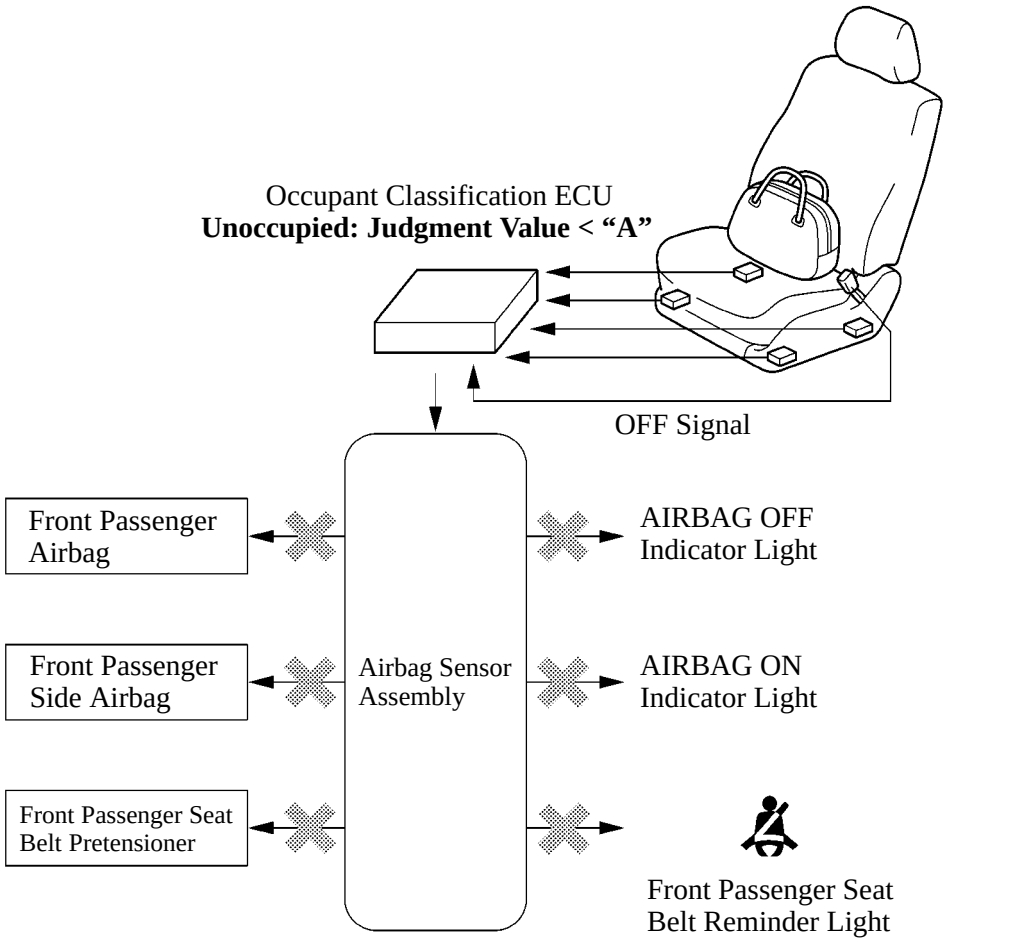
General

This system makes the following judgments: unoccupied judgment, child seat judgment, child judgment, and adult judgment. In addition, it performs an initial check to check the circuit of the AIRBAG ON/OFF indicator lights when the ignition switch is on.

- The occupant classification ECU constantly monitors the weight of the front passenger seat, and makes a judgment in accordance with the signals from the occupant classification sensor and the state of the seat belt buckle switch, regardless of the position of the ignition switch.
- The occupant classification ECU contains criteria value “A” to judge whether the seat is being occupied by a child or a child seat in accordance with the signals from the four occupant classification sensors and seat belt buckle switch, and criteria value “B” to judge whether the occupant is an adult or child (with child seat).
- The occupant classification ECU makes an occupied or unoccupied judgment in accordance with the signals from the seat belt buckle switch.

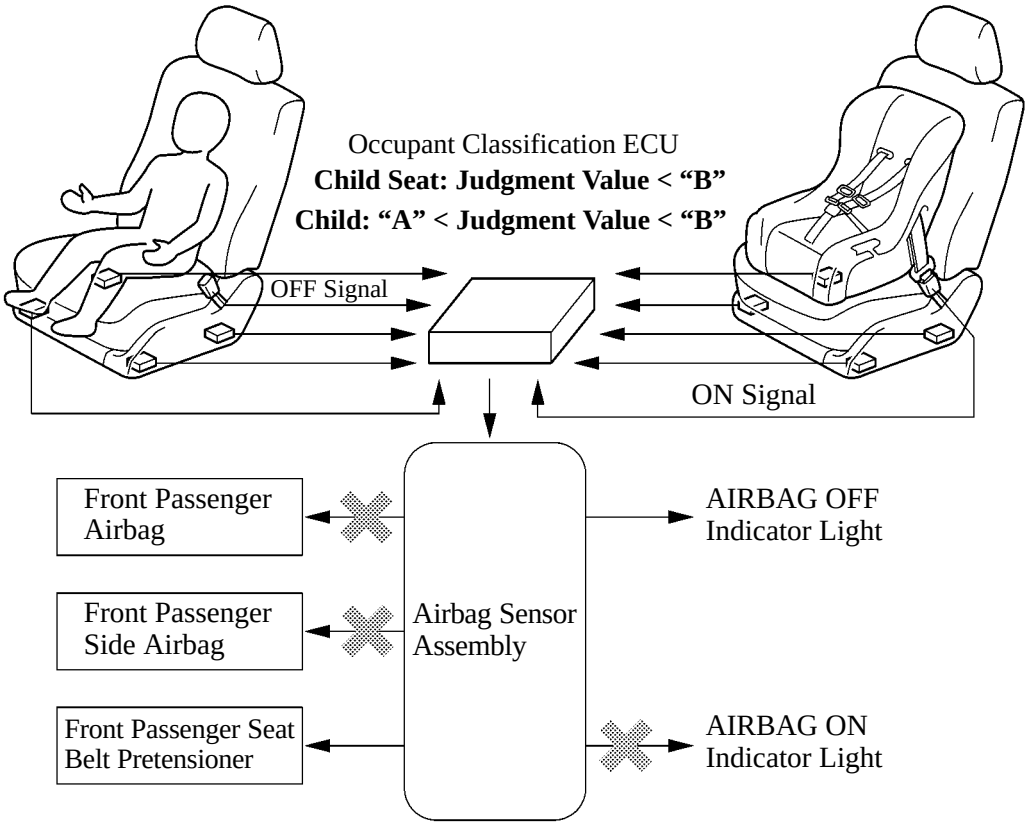
Unoccupied Judgment

- The occupant classification ECU makes an unoccupied judgment when the judgment value is lower than criteria value “A” and the seat belt buckle switch is off.
- If the ignition switch is turned on in this state, the system performs an initial check, and does not illuminate the AIRBAG ON/OFF indicator lights. Then, the system prohibits the deployment of the front passenger airbag, front passenger side airbag, and the front passenger seat belt pretensioner, and does not blink the seat belt reminder light.



Child Seat or Child Judgment

- If the judgment value is lower than criteria value “B” and the seat belt buckle switch is on, the occupant classification ECU judges that a child seat is installed.
- If the judgment value is higher than criteria value “A”, but lower than criteria value “B”, and the seat belt buckle switch is off, the occupant classification ECU judges that the seat is being occupied by a child.
- When the ignition switch is turned on under these conditions, the system performs an initial check and illuminates the AIRBAG OFF indicator light to indicate that the front passenger airbag and front passenger side airbag have been deactivated.

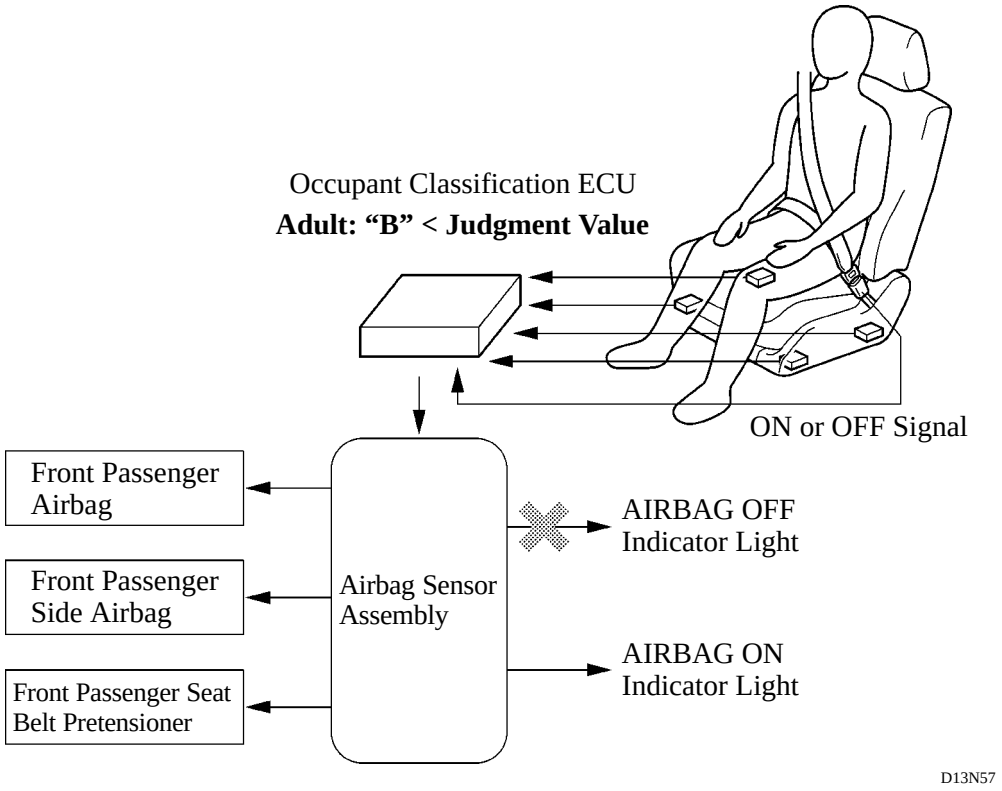


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- After the occupant classification ECU judges that child seat is installed, the AIRBAG OFF indicator light does not go off unless the seat belt buckle switch is turned off.

Adult Judgment

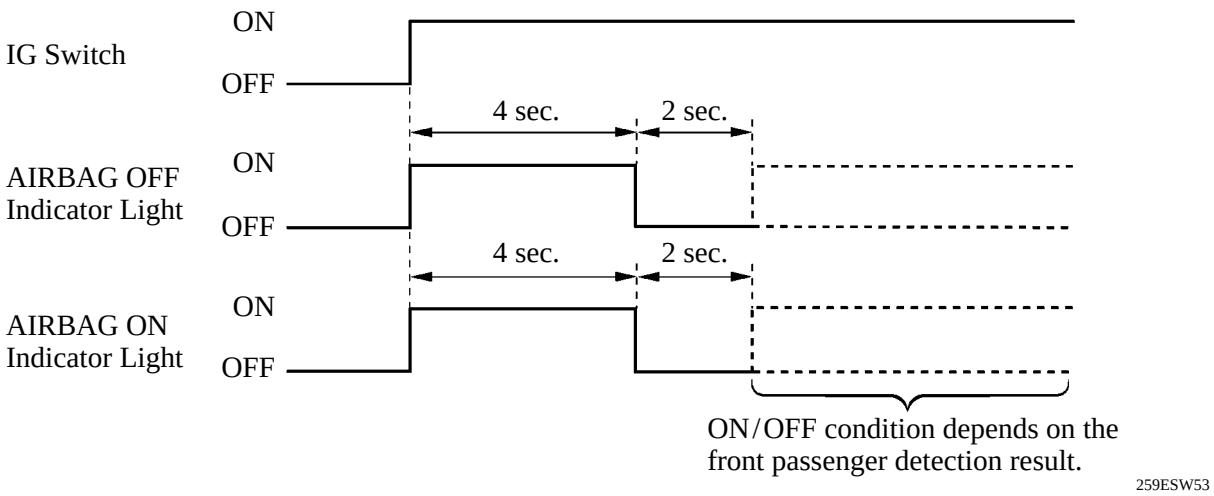
- When the judgment value is higher than criteria value “B”, the occupant classification ECU judges that the seat is being occupied by an adult.
- If the ignition switch is turned on in this state, the system performs an initial check and illuminates the AIRBAG ON indicator light, indicating that the front passenger airbag and front passenger side airbag are active.



- After the occupant classification ECU judges that the occupant is as adult, and if the judgment value is determined as criteria value “B” or less according to occupant load movement, the ECU continues adult judgment for approximately ten seconds before switching the child judgment.

Initial Check

After the ignition switch is tuned on, the occupant classification ECU lights up the AIRBAG ON/OFF indicator lights via the airbag sensor assembly based on the timing chart below in order to check the indicator light circuits.



5. Precaution for Occupant Classification System Operation

To avoid potential death or serious injury when the front passenger occupant classification system does not detect the conditions correctly, observe the following.

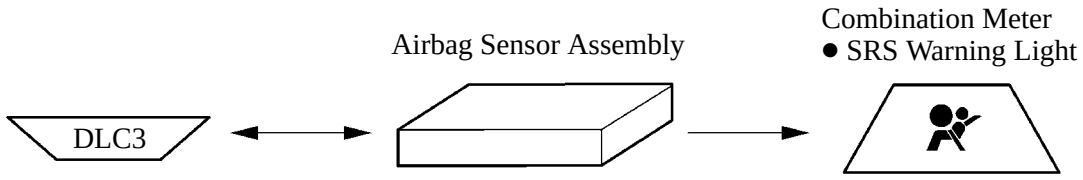
- Wear the seat belt properly.
- Make sure the front passenger seat belt tab has not been left inserted into the buckle before someone sits in the front passenger seat.
- Make sure the AIRBAG ON indicator light is illuminated when using the seat belt extender for the front passenger seat. If the AIRBAG OFF indicator light is illuminated, disconnect the extender tongue from the seat belt buckle, then reconnect the seat belt. Reconnect the seat belt extender after making sure the AIRBAG ON indicator light is illuminated. If you use the seat belt extender while the AIRBAG OFF indicator light is illuminated, the front passenger airbag and front passenger side airbag may not activate correctly, which could cause death or serious injury in the event of collision.
- Do not put a heavy load in the front passenger seatback pocket or attach a seatback table to the front passenger seat seatback.
- Do not put weight on the front passenger seat by putting your hands or feet on the front passenger seat seatback from the rear passenger seat.
- Do not let a rear passenger lift the front passenger seat with their feet or press on the seatback with their legs.
- Do not put objects under the front passenger seat.
- Do not recline the front passenger seat seatback so far that it touches a rear seat. This may cause the AIRBAG OFF indicator light to be illuminated, which indicates that the front passenger airbags will not deploy in the event of a severe accident. If the seatback touches the rear seat, return the seatback to a position where it does not touch the rear seat.
  Keep the front passenger seatback as upright as possible when the vehicle is moving. Reclining the seatback excessively may lessen the effectiveness of the seat belt system.
- Make sure the AIRBAG ON indicator light may be illuminated when an adult sits in the front passenger seat. If the AIRBAG OFF indicator light is illuminated, ask the passenger to sit properly with back upright and against the seat, with legs comfortably extended and wear the seat belt correctly. Nonetheless, if the AIRBAG OFF indicator light remains illuminated, let the passenger sit in the rear seat. When it is unavoidable to sit in the front passenger seat, ask the passenger to move the seat as far back as possible, remain properly seated.
- When it is unavoidable to install the forward-facing child restraint system on the front passenger seat, install the child restraint system on the front passenger seat in the proper order.
- Do not kick the front passenger seat or subject it to severe impact. Otherwise, the SRS warning light may come on to indicate a malfunction of the detection system.
- Child restraint systems installed on the rear seat should not contact the front seatbacks.

■DIAGNOSIS

1. General

If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light.

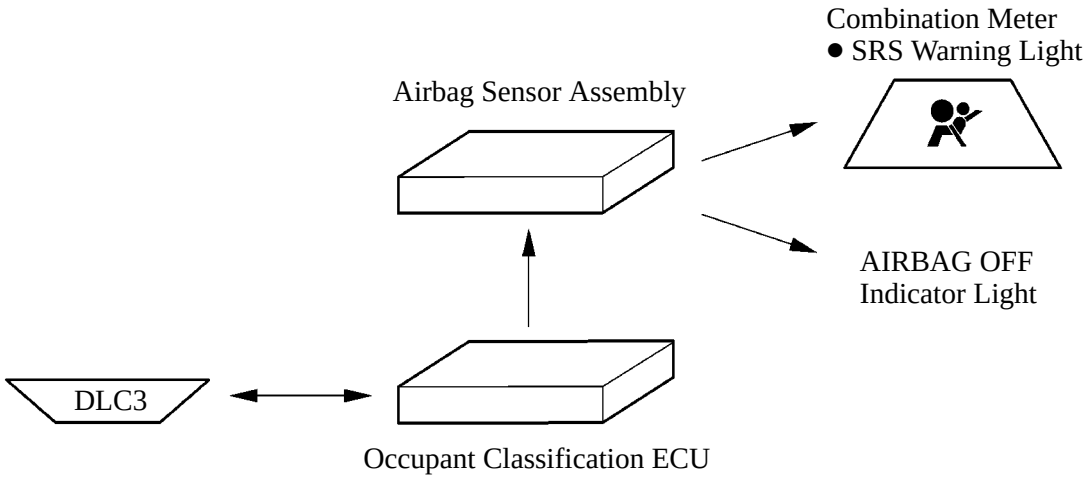
- The airbag sensor assembly outputs malfunction data, 5-digit DTCs (Diagnostic Trouble Codes) or 2-digit DTCs, to the hand-held tester or the SRS warning light.



259ESW31

If the occupant classification ECU detects a malfunction in the occupant classification system, it stores the malfunction data in memory via the airbag sensor assembly, illuminating the SRS warning light and AIRBAG OFF indicator light.

- The occupant classification ECU outputs 5-digit DTCs to the hand-held tester.



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2. DTC of SRS Airbag System

There are 2 types of DTCs of the SRS airbag system: 5-digit and 2-digit.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.
- The 2-digit DTC can be read through the blinking of the SRS warning light with the SST(09843-18040) connected between the TC and CG terminals of the DLC3.
- If the SRS airbag deploys, the airbag sensor assembly will turn on the SRS warning light. However, different from the ordinary diagnosis function that a DTC will not be memorized. The SRS warning light can be turned off only by changing the airbag sensor assembly to a new one.

3. DTC of Occupant Classification System

There is only a 5-digit DTC for the occupant classification system.

- The 5-digit DTC can be read by connecting a hand-held tester to the DLC3 terminal.

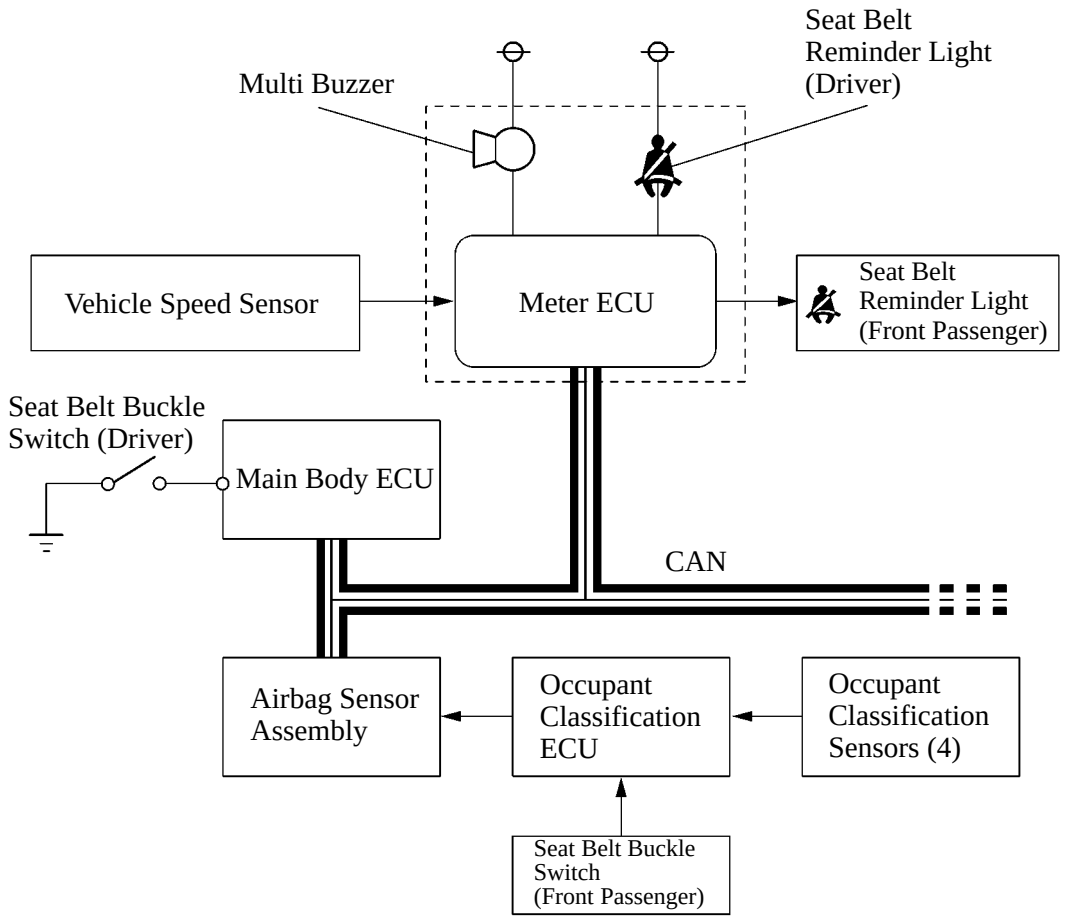
For details, see the 2006 Yaris Repair Manual (Pub. No. RM00R0U).

SEAT BELT REMINDER SYSTEM

■DESCRIPTION

- A seat belt reminder system is used. If the seat belt is not buckled, the reminder light flashes and the multi buzzer sounds. [The multi buzzer will sound for approximately 30 seconds when the vehicle speed reaches 12 mph (20 km/h) or more.]
- When the ignition switch is turned on, this system determines whether or not the seat belt is buckled depending on whether the signal from the switch in the seat belt buckle is on or off.
- The '06 models use the front passenger occupant classification system to detect the presence of an occupant in the front passenger seat. The airbag sensor assembly transmits the resultant detection signal to the meter ECU via the CAN. For details on the front passenger occupant classification system, see page BE-57.

▶ System Diagram ◀



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