BODY ELECTRICAL

MULTIPLEX COMMUNICATION

■ DESCRIPTION

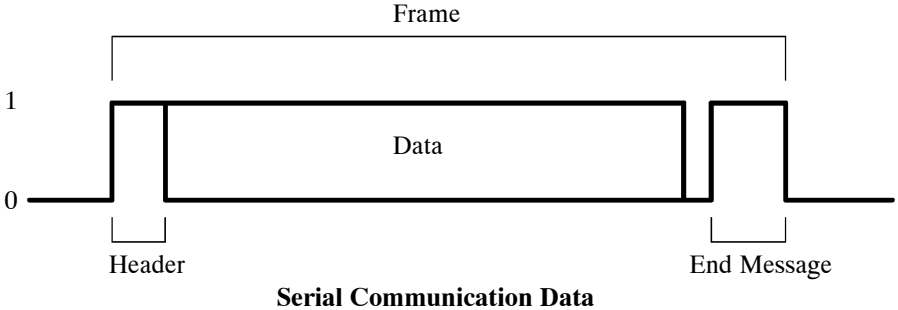
- The multiplex communication system of the new Land Cruiser (Station Wagon) uses the 3 communication protocols described below in order to achieve a streamlined wiring harness configuration.
  - CAN (Controller Area Network): A protocol is used for real-time control applications at high-speed communication rates. The CAN consists of 3 buses and is used for communication among 20 ECUs for power train, chassis and body electrical systems. ECUs with gateway functions (the network gateway ECU and main body ECU) are used to transmit data between the buses.
  - LIN (Local Interconnect Network): A protocol is used for local area networking, of which the system has a respective bus for each body electrical system.
  - AVC-LAN (Audio Visual Communication - Local Area Network): Used for communication only between the audio-visual systems.
  - Due to the introduction of the CAN system for the power train, chassis and body electrical systems, the BEAN (Body Electronics Area Network) that is used for the body electrical system of the previous Land Cruiser (Station Wagon) and some other TOYOTA models, but is not used on the new Land Cruiser (Station Wagon).
- A customized body electronics system is used, enabling the control functions of the ECUs to be set using an intelligent tester II. For details, see page BE-17.

— REFERENCE —

MPX communication uses serial communication data that consists of bits and frames in order to exchange information among the various ECUs. This allows a reduction of the amount of wiring on the vehicle.

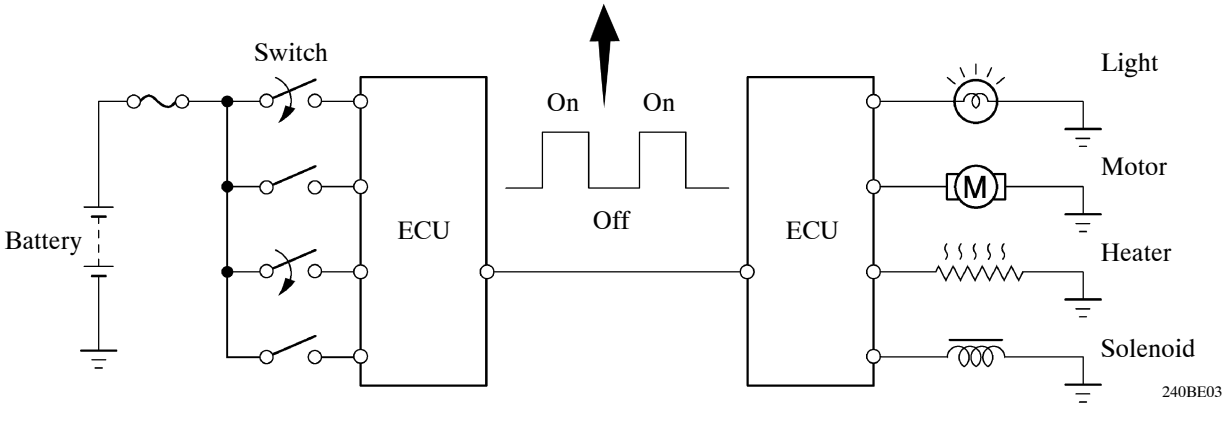
- *A bit is the basic unit of communication that is used to represent the information. A bit is represented by binary values of "0" or "1".*
- *A frame is a body of data that is transmitted together. A frame contains a header that indicates the beginning, and an end message that indicates the end.*

▶ Conceptual Drawing ◀



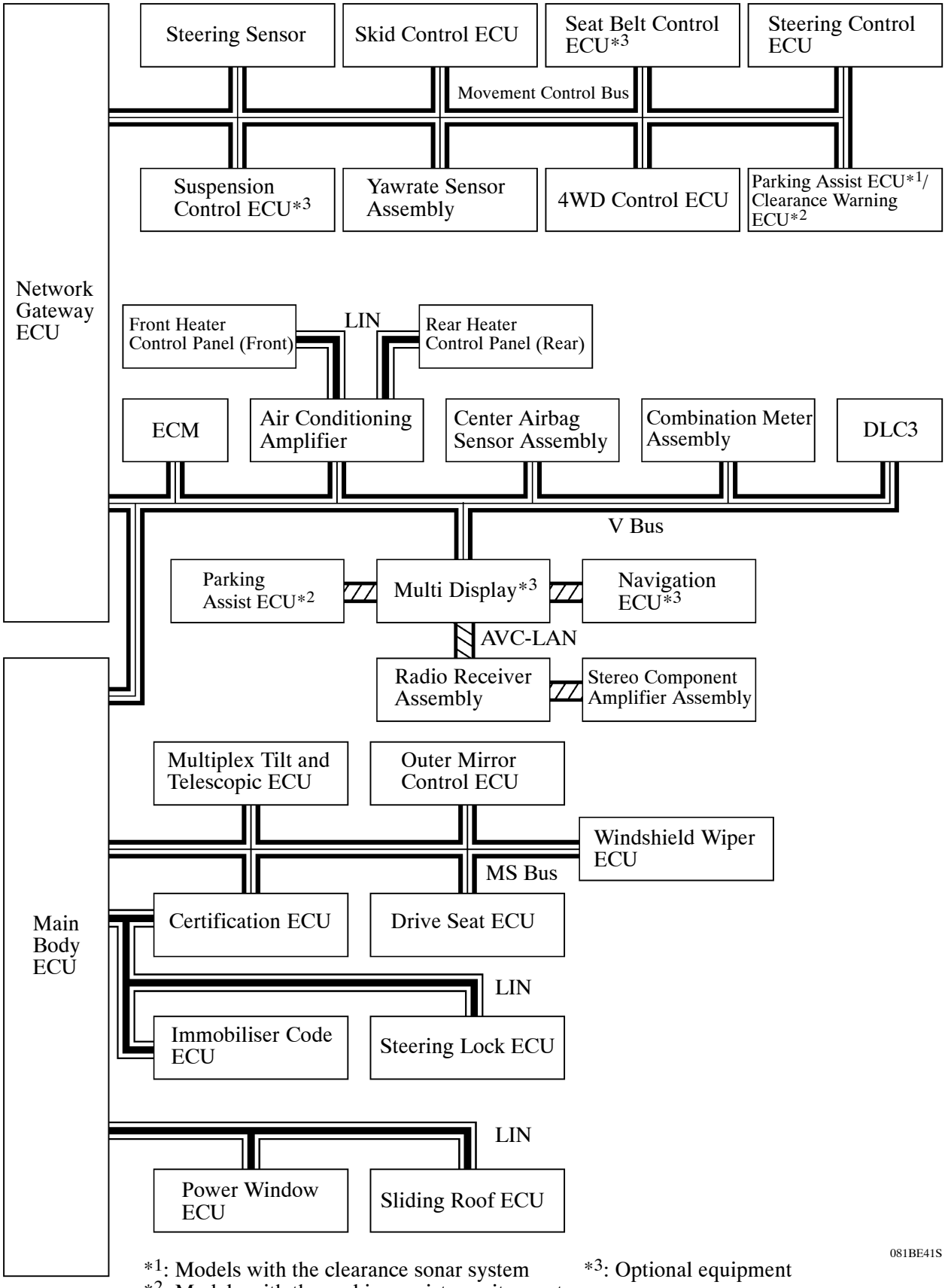
240BE05

Serial Communication Data



240BE03

▶ System Diagram ◀



081BE41S

*1: Models with the clearance sonar system
*2: Models with the parking assist monitor system
*3: Optional equipment

BE

■DIFFERENCES BETWEEN CAN, LIN, AVC-LAN AND BEAN

1. General

- The protocols, which are the rules for establishing data communication, differ between the CAN, LIN, AVC-LAN and BEAN. If the ECUs in the networks use different frameworks for their data, such as communication speed, communication wire, and signals, they will be unable to understand each other. Therefore, protocols (rules) must be established among them.
- Compared to the LIN, AVC-LAN and BEAN*, the CAN features high-speed data transmission. Therefore, the CAN is able to transmit larger amounts of data faster than other protocols. This feature makes it possible to transmit data accurately in the power train and chassis control system, which requires large amounts of data to be transmitted in short periods of time.

*: The BEAN is used in the body electrical system of the previous Land Cruiser (Station Wagon) and some other TOYOTA models, but is not used on the new Land Cruiser (Station Wagon).

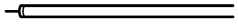
Protocol	CAN (ISO Standard)	LIN (LIN Consortium)	AVC-LAN (TOYOTA Original)	BEAN (TOYOTA Original)
Communication Speed	500 kbps*/ HS-CAN 250 kbps*/ MS-CAN (Max. 1 M bps)	Max. 20 kbps*	Max. 17.8 kbps	Max. 10 kbps*
Communication Wire	Twisted-pair Wire	AV Single Wire	Twisted-pair Wire	AV Single Wire
Drive Type	Differential Voltage Drive	Single Wire Voltage Drive	Differential Voltage Drive	Single Wire Voltage Drive
Data Length	1-8 Byte (Variable)	2, 4, 8 Byte (Variable)	0-32 Byte (Variable)	1-11 Byte (Variable)

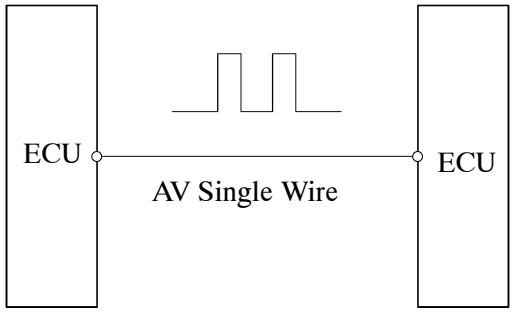
*: bps: abbreviation for “Bits Per Second”, indicating the number of bits that can be transmitted per second.

2. Communication Wire

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

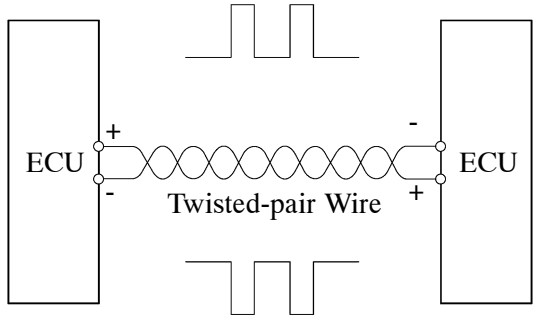
*: The BEAN is used in the body electrical system of the previous Land Cruiser (Station Wagon) and some other TOYOTA models, but is not used on the new Land Cruiser (Station Wagon).

Communication Wire	Outline
Twisted-pair Wire  241BE168	This communication wire is a pair of twisted lines. Communication is driven by applying different voltages to the two lines in order to send a single signal. This system, which is called a “Differential Voltage Drive”, reduces noise.
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 communication, and this system is called a “Single Wire Voltage Drive”.



240BE11

Single Wire Voltage Drive



240BE12

Differential Voltage Drive

BE

■ CAN

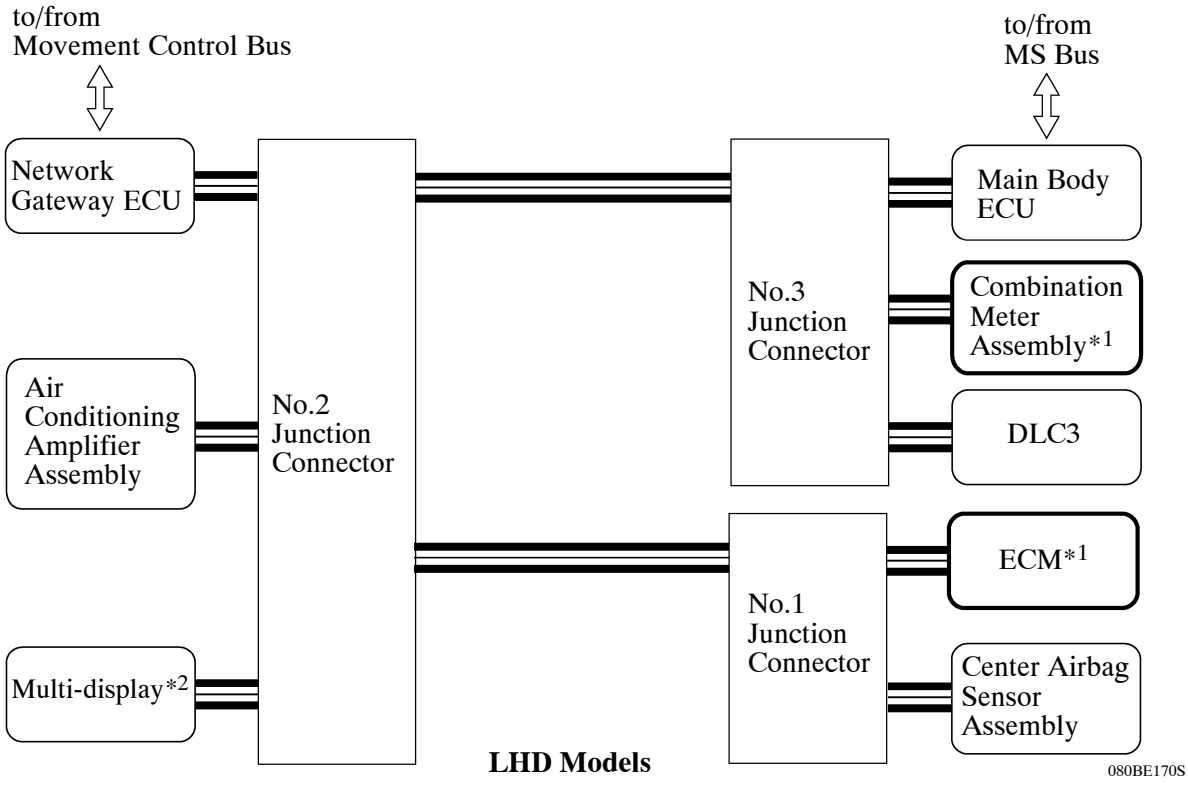
1. General

- The new Land Cruiser (Station Wagon) uses two types of CAN that have different communication speeds: HS-CAN (500kbps) and MS-CAN (250kbps).
- The HS-CAN consists of the V bus and movement control bus. The terminating resistors of the V bus are built into the ECM and combination meter assembly, and those of movement control bus are built into the network gateway ECU and No.1 CAN junction connector.
- The MS-CAN consists of the MS bus. The terminating resistors of the MS bus are built into the main body ECU and combination meter assembly.
- ECUs with the gateway functions are used to transmit data between buses (the network gateway ECU is used for data transmission between the V bus and the movement control bus, and the main body ECU is used between the V bus and the MS bus).

▶ Image of Data Transmission between Buses ◀

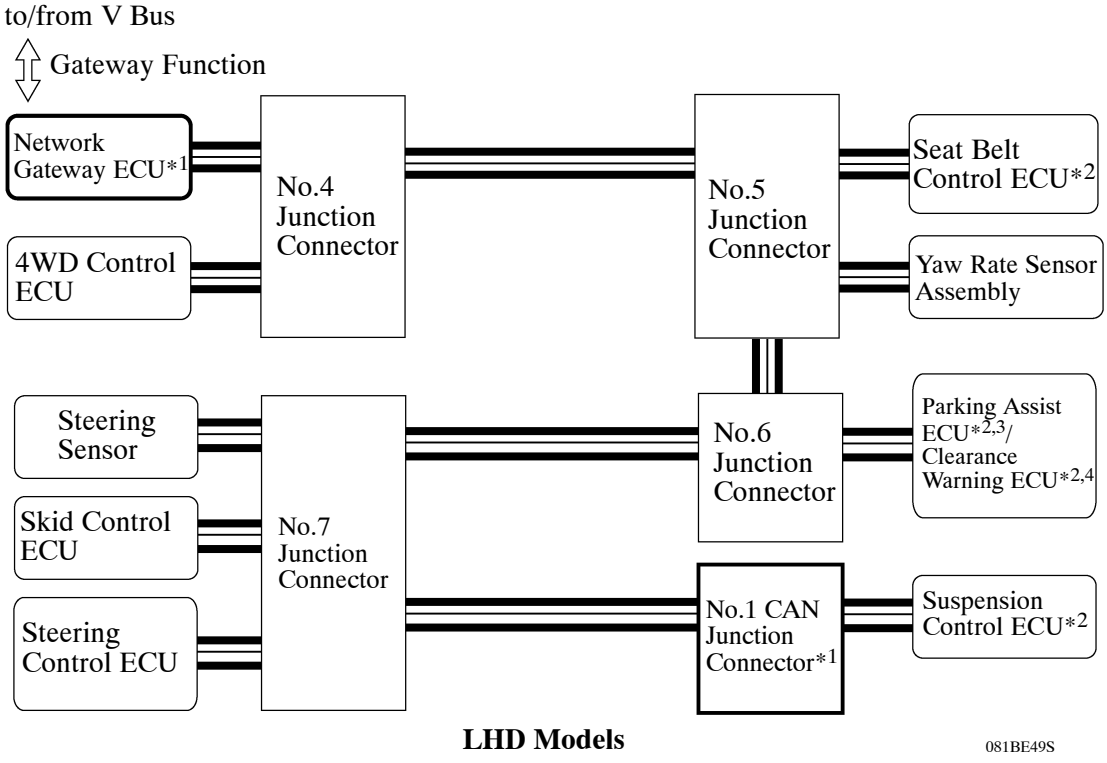
CAN	Bus	ECUs with Gateway Function	Connected Bus	ECUs with Terminating Resistor
HS-CAN	V Bus	Network Gateway ECU	Movement Control Bus	• ECM • Combination Meter Assembly
		Main Body ECU	MS Bus	
	Movement Control Bus	Network Gateway ECU	V Bus	• Network Gateway ECU • No.1 CAN Junction Connector
MS-CAN	MS Bus	Main Body ECU	V Bus	• Main Body ECU • Combination Meter Assembly

▶ V Bus ◀



*1: The ECUs enclosed by a bold line have a terminating register.
*2: Optional equipment

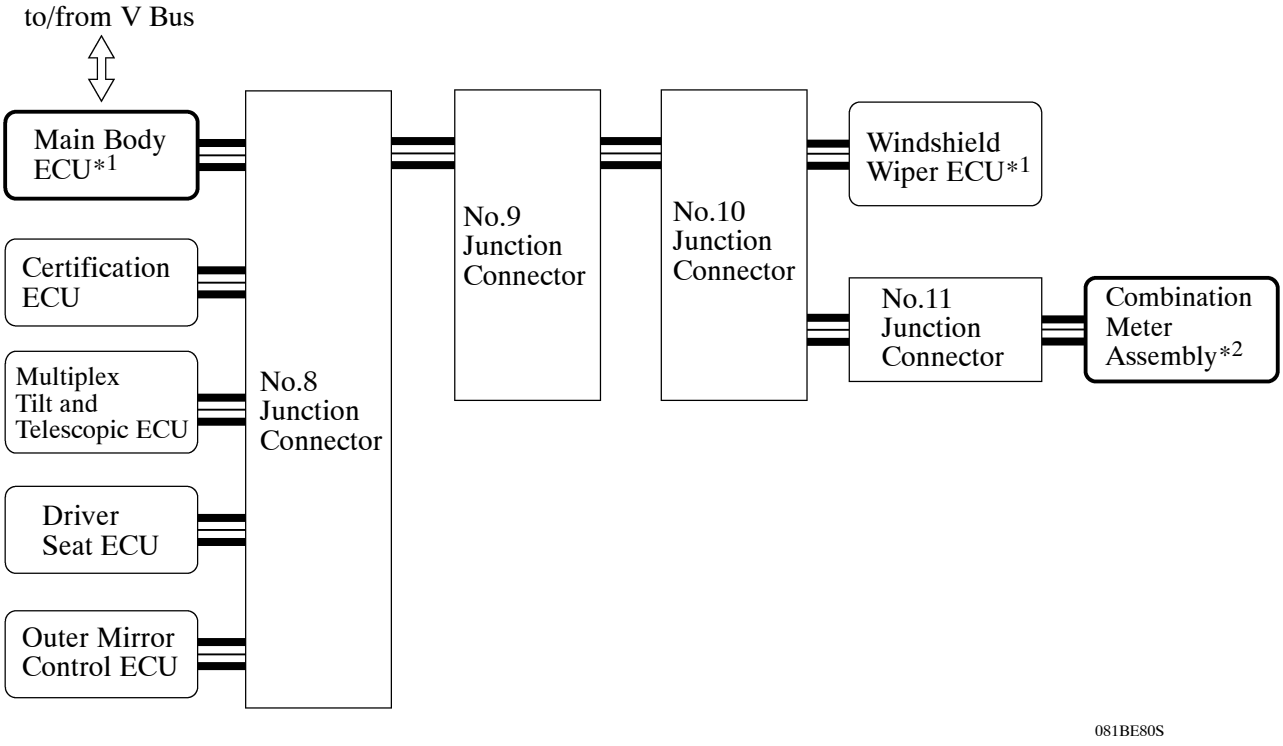
▶ Movement Control Bus ◀



*1: The ECUs and junction connector enclosed by a bold line have a terminating register.
*2: Optional Equipment
*3: Models with the parking assist monitor system
*4: Models with the clearance sonar system

BE

▶ MS Bus ◀

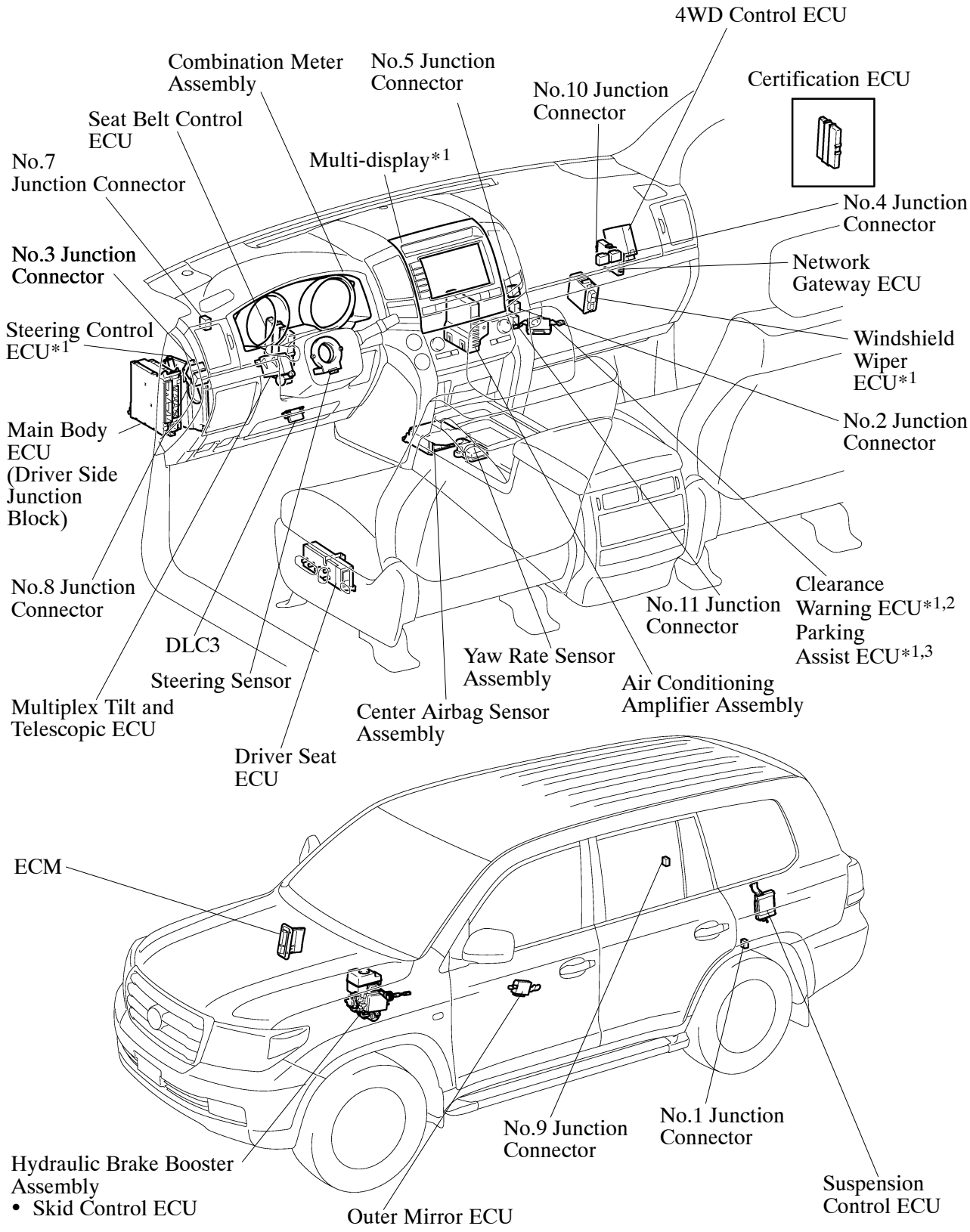


LHD Models

*1: The ECUs enclosed by a bold line have a terminating register.

*2: The combination meter assembly comprises a terminating register for the MS bus, however, this does not communicate as the MS bus.

2. Layout of Main Components



081BE05H

LHD Models

*1: Optional Equipment
*2: Models with the clearance sonar system
*3: Models with the parking assist monitor system

BE

3. Diagnosis

- If a malfunction occurs on the CAN communication line, the ECU that is connected to the CAN communication line stores the DTC (Diagnostic Trouble Code) in its memory.
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.
- The 2-digit DTC can be read by connecting a SST (09843-18040) between the TC and CG terminals of the DLC3.
- The DLC3 is equipped with CAN-H and CAN-L terminals for CAN diagnosis. It is possible to determine if there is an open or short in the main wire of the V bus by measuring the resistance value between these terminals.

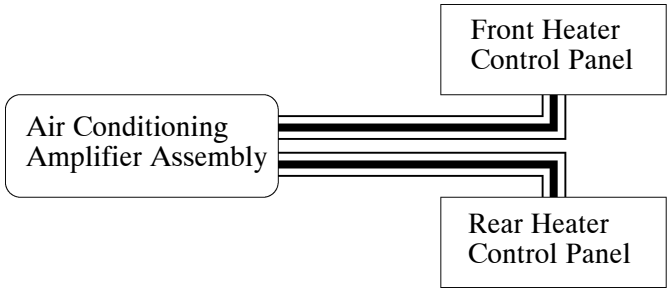
For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E)

■ LIN

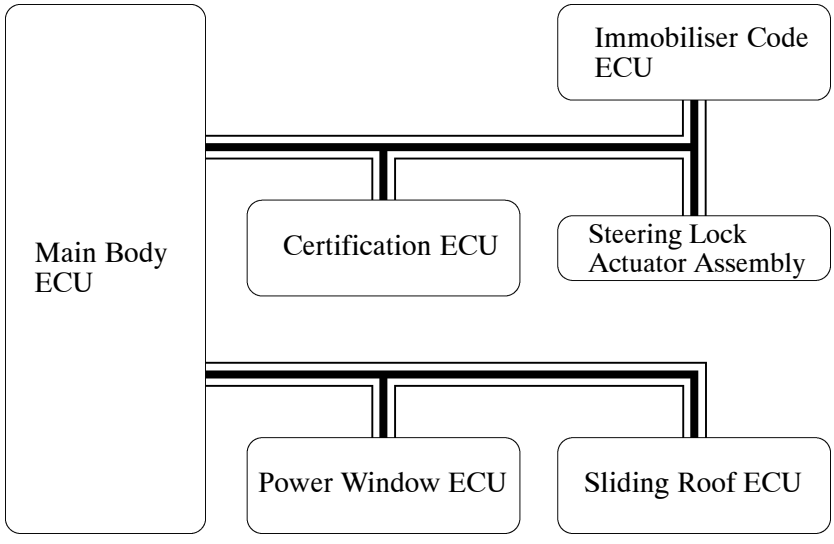
1. General

- The LIN (Local Interconnect Network) consists of bus for each system of the body electrical system, and used for communication between switches.
- The signals transmitted by the LIN can be gatewayed to the CAN through the ECUs or switches connected to the CAN.
- The LIN is used for the lighting system, air conditioning system, power window system, entry and start system and sliding roof system.

▶ System Diagram ◀

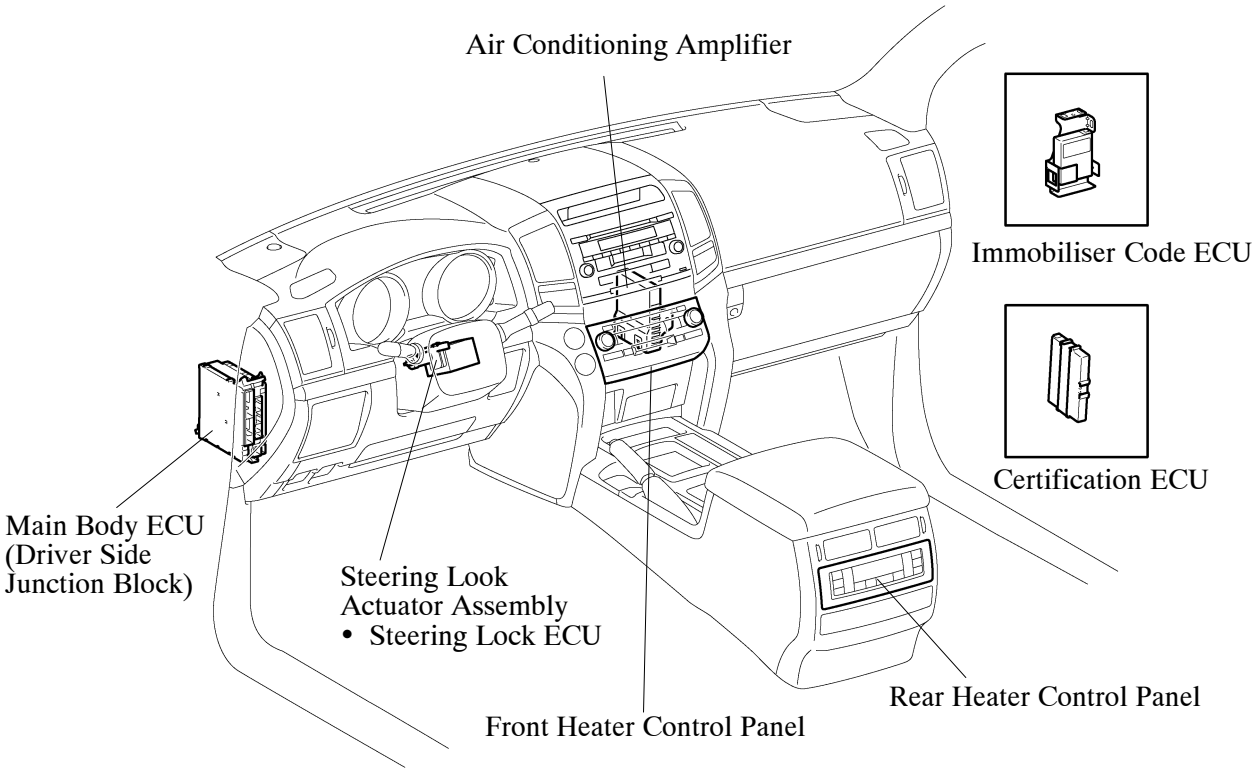


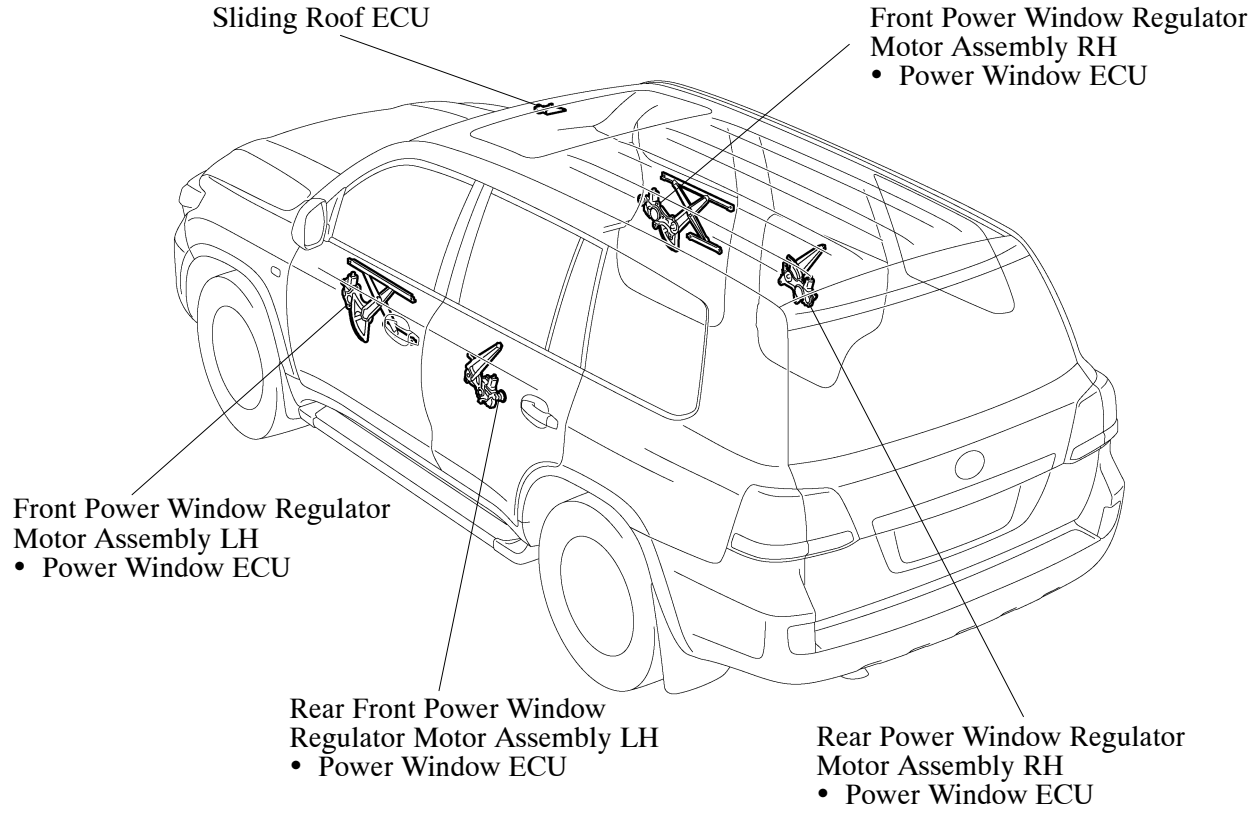
Air Conditioning System



Power Window System, Smart Key System and Sliding Roof System

2. Layout of Main Components





LHD Models

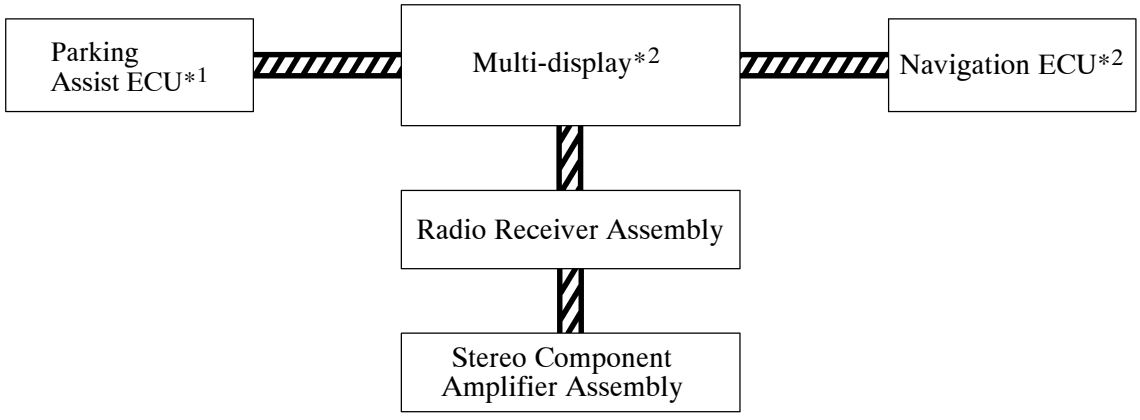
081BE79H

■AVC-LAN

1. General

The AVC-LAN is used among the multi display, radio receiver assembly, stereo component amplifier assembly, navigation ECU and parking assist ECU.

▶ System Diagram ◀

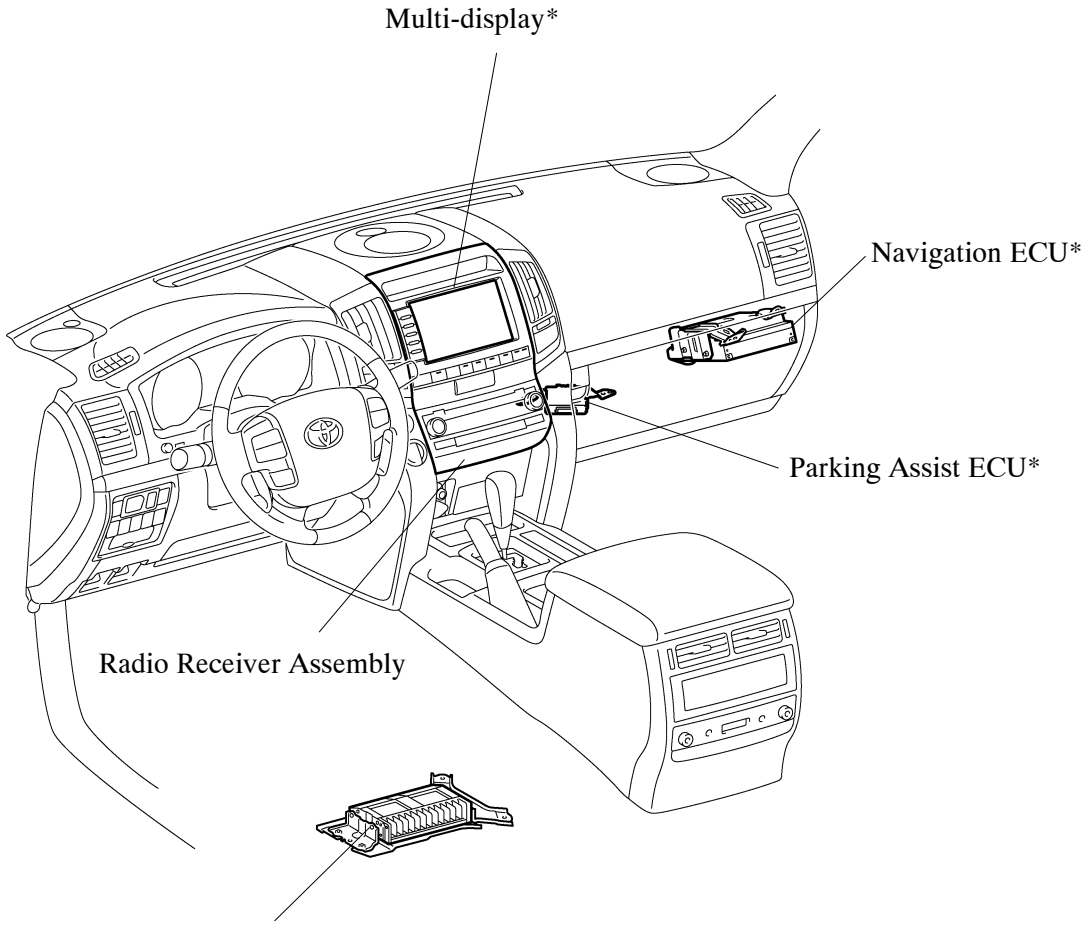


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*1: Models with the parking assist monitor system
*2: Optional Equipment

2. Layout of Main Components



*: Optional equipment

3. Diagnosis

- On models with the multi-display, if a malfunction occurs in the AVC-LAN communication line, the multi-display stores a DTC (Diagnostic Trouble Code) in its memory. On models without the multi-display, the radio receiver stores a DTC in its memory.
- The DTC of models with the multi-display can be read on the diagnosis menu on the multi-display.
- The DTC of models without the multi-display can be read on the LCD of the radio receiver assembly.

For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

■CUSTOMIZED BODY ELECTRONICS SYSTEM

An intelligent tester II can be used to customize the system settings.

System	Display Content	Contents	Default Setting	Available Setting
Wireless Door Lock	Wireless Control	ON/OFF of the wireless door lock function.	ON	ON/OFF
	Hazard Answer back	ON/OFF of the hazard answer back of the wireless door lock function.	ON	ON/OFF
	Open Door Warning	Function to make the buzzer sound for 10 seconds if the door is open when locking with the wireless door lock function.	ON/ OFF*1	ON/OFF*1
	Unlock 2 Operation	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.	OFF	ON/OFF
	Auto Lock Time	To change the time until re-locking after unlocking with the wireless door lock function.	30 s	30 s / 60 s/ 120 s
Door Lock	Unlock Key Twice	Function to unlock only the driver's door by doing the key operation once and to unlock all the doors by doing it twice. In the OFF setting, operating the key "UNLOCK" once makes all the doors unlocked.	OFF	ON/OFF
Power Window*2	Door Key P/W Up	Function to make all the door windows up manually by holding the driver's side door key to the lock side for 1.5 seconds when power source is OFF.	ON/OFF	ON/OFF
	Door Key P/W Down	Function to make all the door windows down manually by holding the driver's side door key to the unlock side for 1.5 seconds when power source is OFF.	ON/OFF	ON/OFF
	P/W Down W/Transmit	Function to make all the door windows down manually by pressing on the transmitter unlock button for 2.4 seconds when power source is OFF.	ON/OFF	ON/OFF
	P/W Up W/Transmit	Function to make all the door windows up manually by pressing on the transmitter lock button for 2.4 seconds when power source is OFF.	ON/OFF	ON/OFF
	P/W Up W/Smart	Function to make all the door windows up manually by pressing on the smart lock button for 3 seconds when power source is OFF.	ON/OFF	ON/OFF

(Continued)

System	Display Content	Contents	Default Setting	Available Setting
Illuminated Entry	Lighting Time	To change the lighting time after closing the door. (It will quickly fade out in case of turning the power source is ON.)	15 s	7.5 s/ 15 s/ 30 s
	I/L when ACC OFF	Function to switch on Room Light when the power source is operated from “ACC” to “OFF”.	ON	ON/OFF
	I/L ON W/Door Unlock	Function to switch on Room Light when unlocking with the door key cylinder.	ON	ON/OFF
	Room Light when Aprchd	Function to switch on Room Light when the owner approaches the vehicle.	ON	ON/OFF
Light Control	Response Time*3	To change the delay timing of lighting the taillight when going into the tunnel in case that the light control switch is at AUTO position.	Normal	Long/ Normal
	Sensitivity	To adjust the sensitivity of the lighting illumination.	Normal	Dark 2 / Dark 1 / Normal / Light 1/ Light 2
	Disp Ex ON Sen	To change the brightness of canceling the lowering the lights such as the indicator light of the combination meter, A/C indicator light, clock.	Normal	Dark 2 / Dark 1 / Normal / Light 1 Light 2
	Disp EX OFF Sen	To change the brightness of lowering the lights such as the indicator light of the combination meter, A/C indicator light, clock.	Normal	Dark 2 / Dark 1 / Normal / Light 1/ Light 2
Entry and Start	Ignition Available Area	Setting an available area of SMART ignition	ALL	ALL/ FRONT
	Park Wait Time	Setting a wait time to permit opening a door after it being locked.	2.5 s	0.5 s / 1.5 s / 2.5 s / 5 s
	Trunk Open Mode	Function to permit opening a trunk with the key.	ON	ON/OFF
	Key Low Battery Warning	Function to set a warning function for the time when a key battery becomes weak.	ON	ON/OFF

(Continued)

System	Display Content	Contents	Default Setting	Available Setting
Sliding Roof	Wireless Key Related Operation	Function to select the opening direction of the manual opening of the sliding roof linking with the power window if pressing on the transmitter unlock button for 1.5 seconds or more when the power source is OFF.	Slide	Tilt/ Slide
	Door Key Related Operation	Function to select the opening direction of the manual opening of the sliding roof linking with the power window if holding the driver side door key for 1.5 seconds or more to the unlock side when the power source is OFF.	Slide	Tilt / Slide
	Door Handle Lock Button	Function to close sliding roof manually linking with power window if pushing door lock switch for 3 seconds or more when power source is OFF and key is outside vehicle.	ON	ON /OFF
	Wireless Key Related Close	Function to close the sliding roof manually linking with the power window if pressing on the transmitter lock button for 2.4 seconds or more when the power source is OFF.	ON	ON / OFF
	Wireless Key Related Open	Function to open the sliding roof manually linking with the power window if pressing on the transmitter unlock button for 2.4 seconds or more when the power source is OFF.	ON	ON / OFF
	Door Key Related Close	Function to close the sliding roof manually linking with the power window if holding the driver side door key for 1.5 seconds or more to the lock side when the power source is OFF.	ON	ON / OFF
	Door Key Related Open	Function to open the sliding roof manually linking with the power window if holding the driver side door key for 1.5 seconds or more to the unlock side when the power source is OFF.	ON	ON / OFF
Theft Deterrent	Warning by Horn*4	Function to make the warning by the horn and theft deterrent horn available.	ON	ON / OFF
Tilt and Telescopic	Autoaway / Return function	ON / OFF of the auto away / return function.	ON	ON / OFF
Meter	Units By Region	Function to change the unit of the display.	Ml/g US	Km/l JP/Km/l / Ml/g US /Ml/g UK
	Driver Side Seatbelt Warning Buzzer	To change the seatbelt warning buzzer.	ON	ON/OFF
	Front Passenger Side Seatbelt Warning Buzzer	To change the seatbelt warning buzzer.	ON	ON/OFF
	Language*5	Function to change the language of the display.	English/ French/ German/ Spanish/ Italian/ Chinese	English/ French/ German/ Spanish/ Italian/ Chinese

(Continued)

System	Display Content	Contents	Default Setting	Available Setting
Clearance Sonar*6	Fr Sensor Onset Range	Function to set a range which front buzzer starts to beep.	Wide	Narrow / Wide
	Rr Sensor Onset Range	Function to set a range which rear buzzer starts to beep.	Wide	Narrow / Wide
	Keep Sense Buzzer	Function to make buzzer sound when distance between vehicle and obstacle does not change for more than 3 seconds.	Avail	Not Avail / Avail
	Fr & Rr Buzzer Freq	Function to change frequency of front and rear buzzer.	Middle	Low / Middle / High
	Fr & Rr Buzzer Volume	Function to change volume of front and rear buzzer.	M3	L/ M1/ M2/ M3/ H
	Sensor Condition N	Function to make sensors available when shift position is N.	Avail	Not Avail / Avail
	Front Side Dist Sensor	Function to change maximum distance that front side sensors are able to detect.	Long	Short/ Long
	Approach Display OFF	Function to make multi-information display turn off when vehicle starts to leave obstacle.	Avail	Not Avail / Avail
	Non P/R Range Rear Sensor	Function to set available sensors when shift position is not P or R.	R Stop	R / Rcrn / R Stop

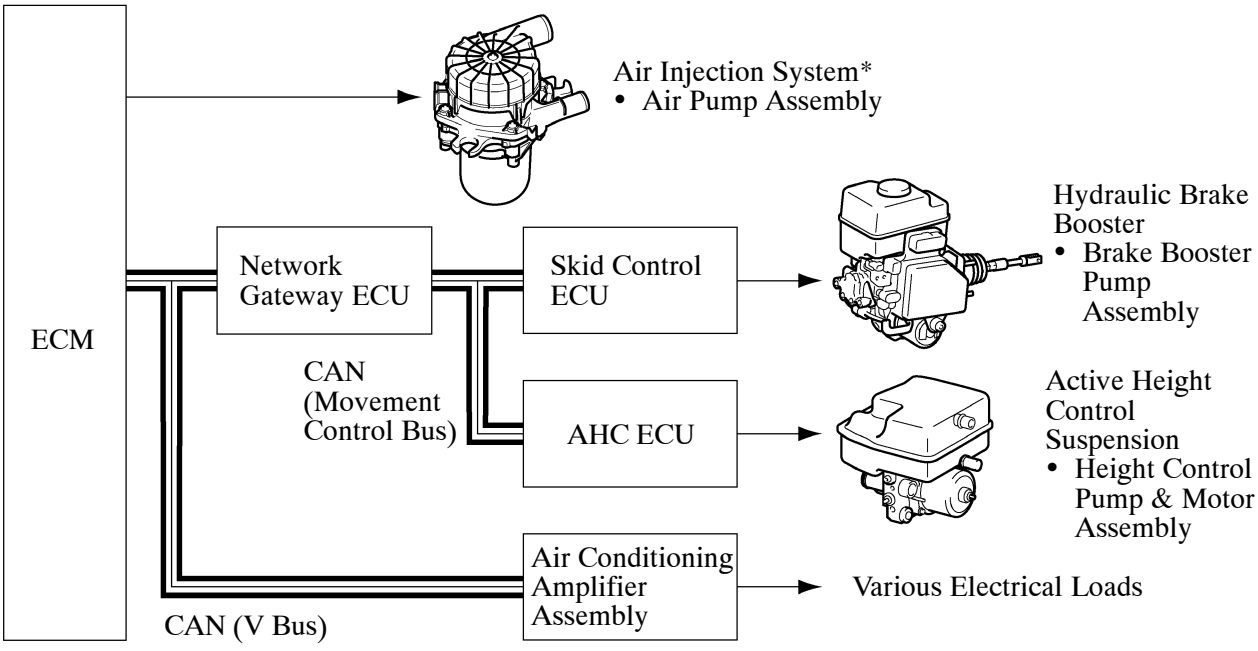
*1: Only OFF is set for the default setting and available settings on Chinese models
*2: Only for VX grade
*3: Except European models
*4: Models with security horn except European models
*5: Languages used on the display differ depending on destinations
*6: Optional Equipment

ELECTRIC POWER CONTROL SYSTEM

■ DESCRIPTION

- An electric power control system, which prevents the power supply voltage from temporarily decreasing when the engine is started and provides a stable power supply, is used on 2UZ-FE engine models.
- This system uses the following 2 controls to prevent the power supply voltage from decreasing excessively: The system activation timing control adjusts the activation timing of the controlled systems, and the load control suspends the system operation.
- The ECM controls this system.

▶ System Diagram ◀



*: Optional Equipment

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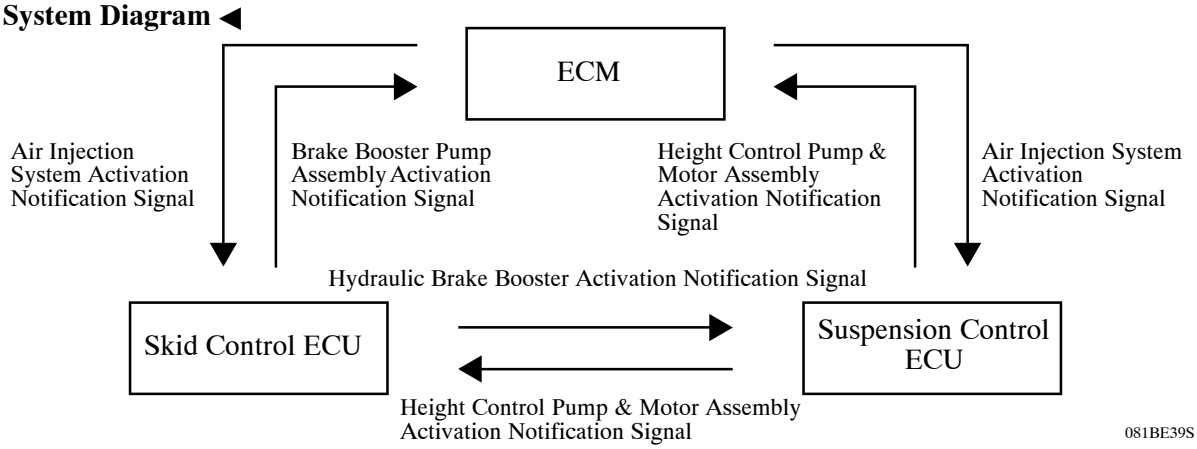
■SYSTEM OPERATION

1. System Activation Timing Control

General

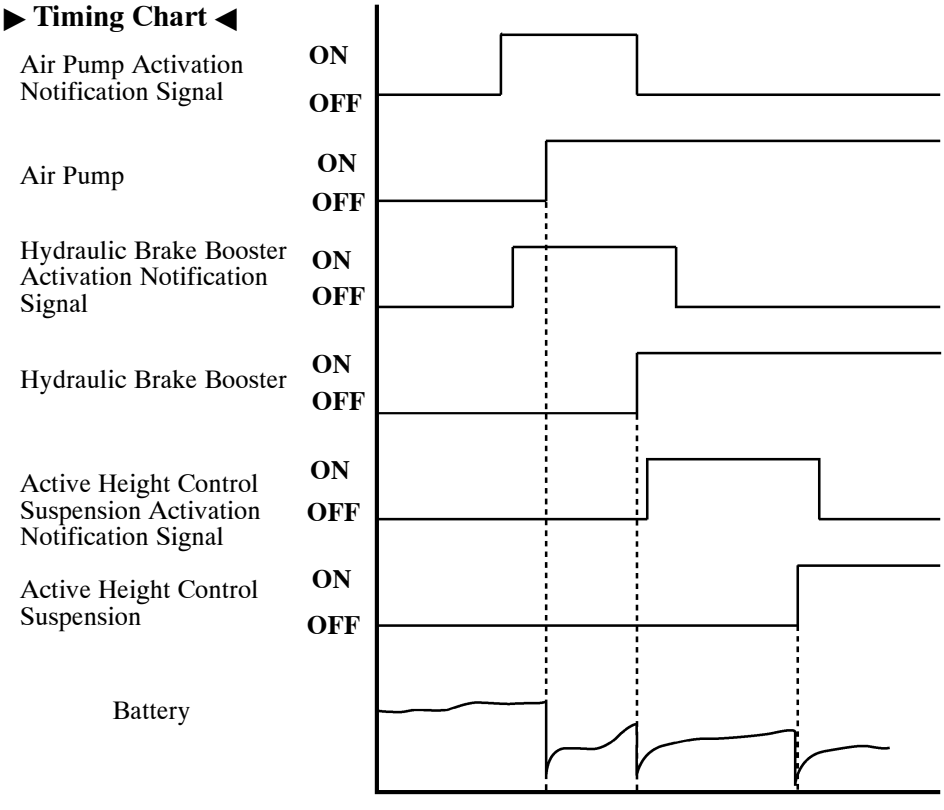
- This control controls the air injection system, hydraulic brake booster and active height control suspension. It adjusts the activation timing of each system to prevent systems which use a relatively high amount of electrical power from activating simultaneously and enables those systems to activate efficiently.
- If the ECM receives the brake booster pump assembly activation notification signal from the skid control ECU with actuator when the engine is started, the ECM advances the activation timing of the air pump so that the brake booster pump assembly and air pump are not activated simultaneously.
- The suspension control ECU controls the height control pump & motor assembly so that the height control pump & motor assembly is not activated while activation notification signals are being received from the ECM and skid control ECU with actuator. When a predetermined time has elapsed since receiving the activation notification signals, the suspension control ECU transmits the height control pump & motor activation notification signals to the ECM and skid control ECU with actuator, and activates the height control pump & motor assembly. As a result, the activation timing of each system is appropriately controlled and power supply voltage decrease is prevented.

▶ System Diagram ◀



081BE39S

▶ Timing Chart ◀

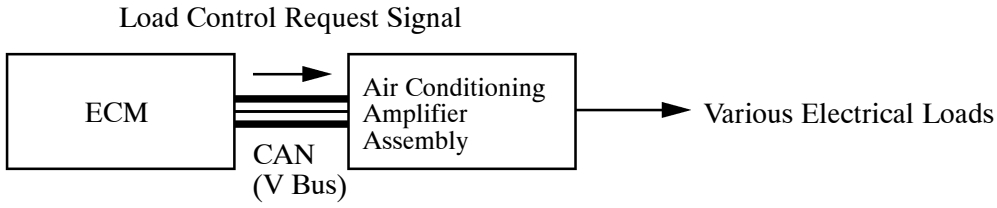


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2. Load Control

When the engine is started, the ECM transmits the load control request signal to the air conditioning amplifier assembly. Upon receiving this signal, the air conditioning amplifier assembly suspends the relevant system operations for a few seconds. As a result, when coupled with the system activation timing control, this control prevents the power supply voltage from decreasing excessively when the engine is started and provides a stable power supply.

▶ System Diagram ◀



080BE66S

LIGHTING

■ DESCRIPTION

1. General

The lighting system includes the following equipment:

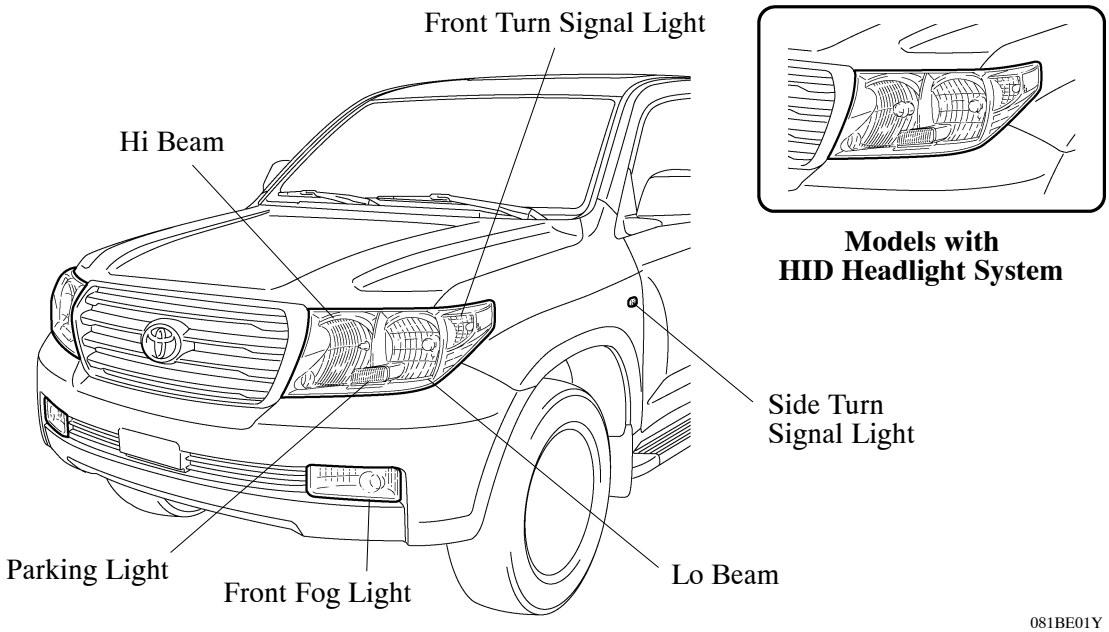
○: Standard OP: Option

Destination		Europe	G. C. C. Countries	
Grade		VX	VX	GX
Front Fog Light		○	○	OP
Rear Fog Light		○	—	—
Headlight	Halogen	○	○	○
	HID	—	OP*3	OP*3
Manual Headlight Beam Level Control System		○	OP*3	OP*3
Daytime Running Light		OP	—	—
Automatic Light Control System		OP	OP	—
Illuminated Entry		○	○	○
Light Turn-OFF System		○	○	○
Headlight Cleaner System		○*1/ OP*2	OP	OP*4

Destination		General Countries		Australia		China	
Grade		VX	GX	VX	GX	VX	GX
Front Fog Light		○	○*7	○	OP	○	○*8
Rear Fog Light		—	○*6	—	—	○	○
Headlight	Halogen	○	○	○	○	○	○
	HID	—	—	—	—	—	—
Manual Headlight Beam Level Control System		OP*5	○*6	—	—	○	○
Daytime Running Light		—	—	—	—	—	—
Automatic Light Control System		OP*5	—	—	—	○	—
Illuminated Entry		○	○	○	○	○	○
Light Turn-OFF System		○	○	○	○	○	○
Headlight Cleaner System		—	—	OP	—	○	○*8

*1: For all RHD models and Russian package models.
*2: For all models except the above-mentioned models
*3: For 8-seater models
*4: For 8-seater models with rear window wipers
*5: For LHD models
*6: For South African package models
*7: Only for Argentine package model
*8: Only when the electric winch is not mounted

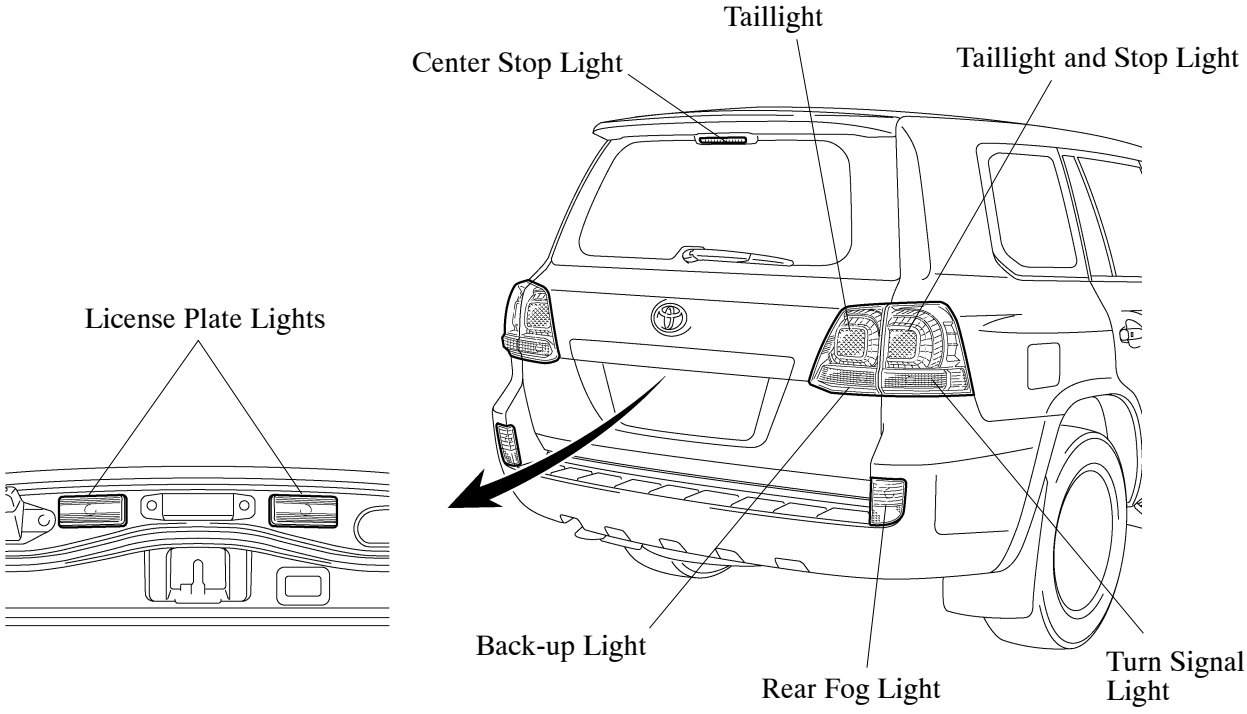
2. Front Exterior Light



▶ Specifications ◀

Light		Type	
Headlight Assembly	Hi Beam	Multi-Reflector (Halogen Bulb)	60W
		Multi-Reflector (Discharge Bulb)	35W
	Lo Beam	Multi-Reflector (Halogen Bulb)	55W
	Front Turn Signal Light	Wedge Base Bulb (Amber)	21W
	Parking Light	Wedge Base Bulb (Clear)	5W
	Side Turn Signal Light	Wedge Base Bulb (Clear)	5W
Fog Light		Multi-Reflector (Halogen Bulb)	51W

3. Rear Exterior Light



081BE02Y

▶ Specifications ◀

Light		Type	W
Rear Combination Light Assembly	Taillight and Stop Light	LED × 12 / LED × 21	0.6 / 7.9
	Taillight	LED × 12	0.5
	Turn Signal Light	Wedge Base Bulb (Amber)	21
	Rear Fog Light	Wedge Base Bulb (Clear)	21
	Back-up Light	Wedge Base Bulb (Clear)	16
License Plate Lights		Wedge Base Bulb (Clear)	5 × 2
Center Stop Light		LED × 4*1	1.0
		LED × 6*2	2.2

*1: Available on Australian GX grade models, all grade models for G. C. C. Countries, General Countries, China and Russian package models.

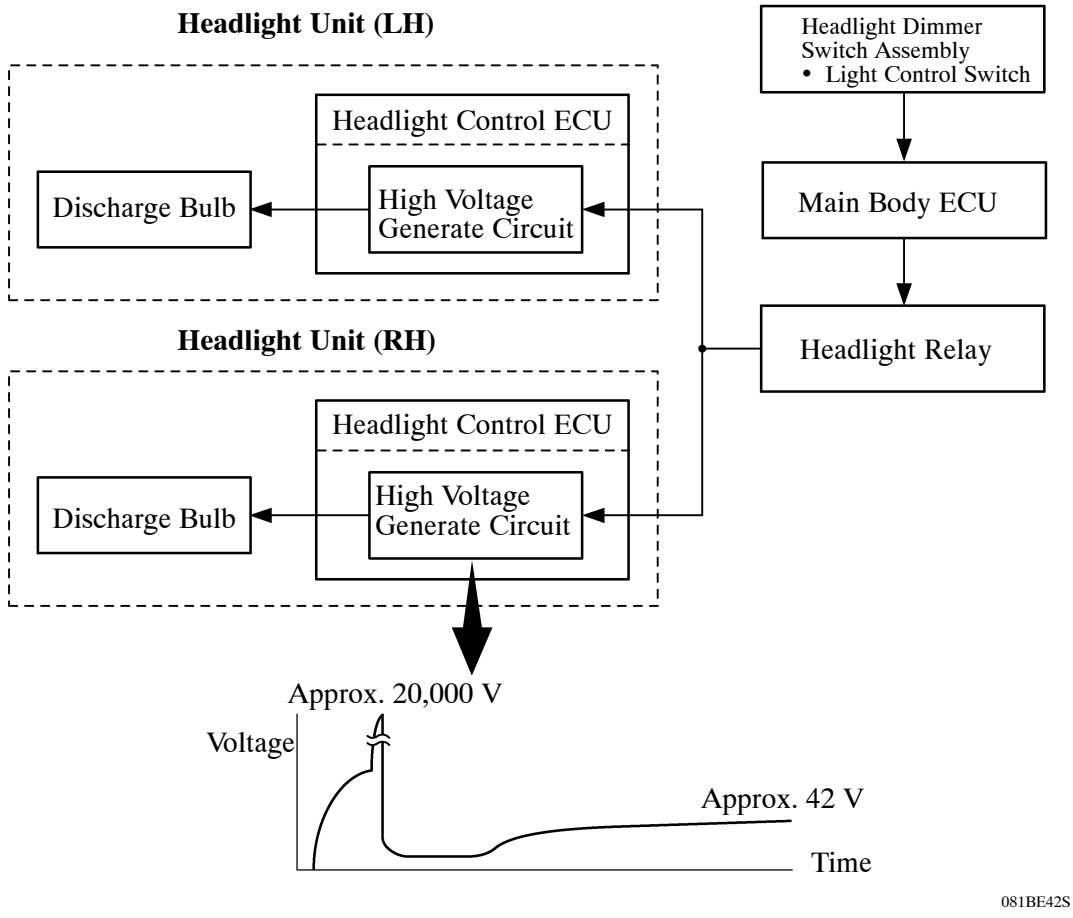
*2: Available on Australian VX grade models and all grade models for Europe.

■HID HEADLIGHT SYSTEM

1. General

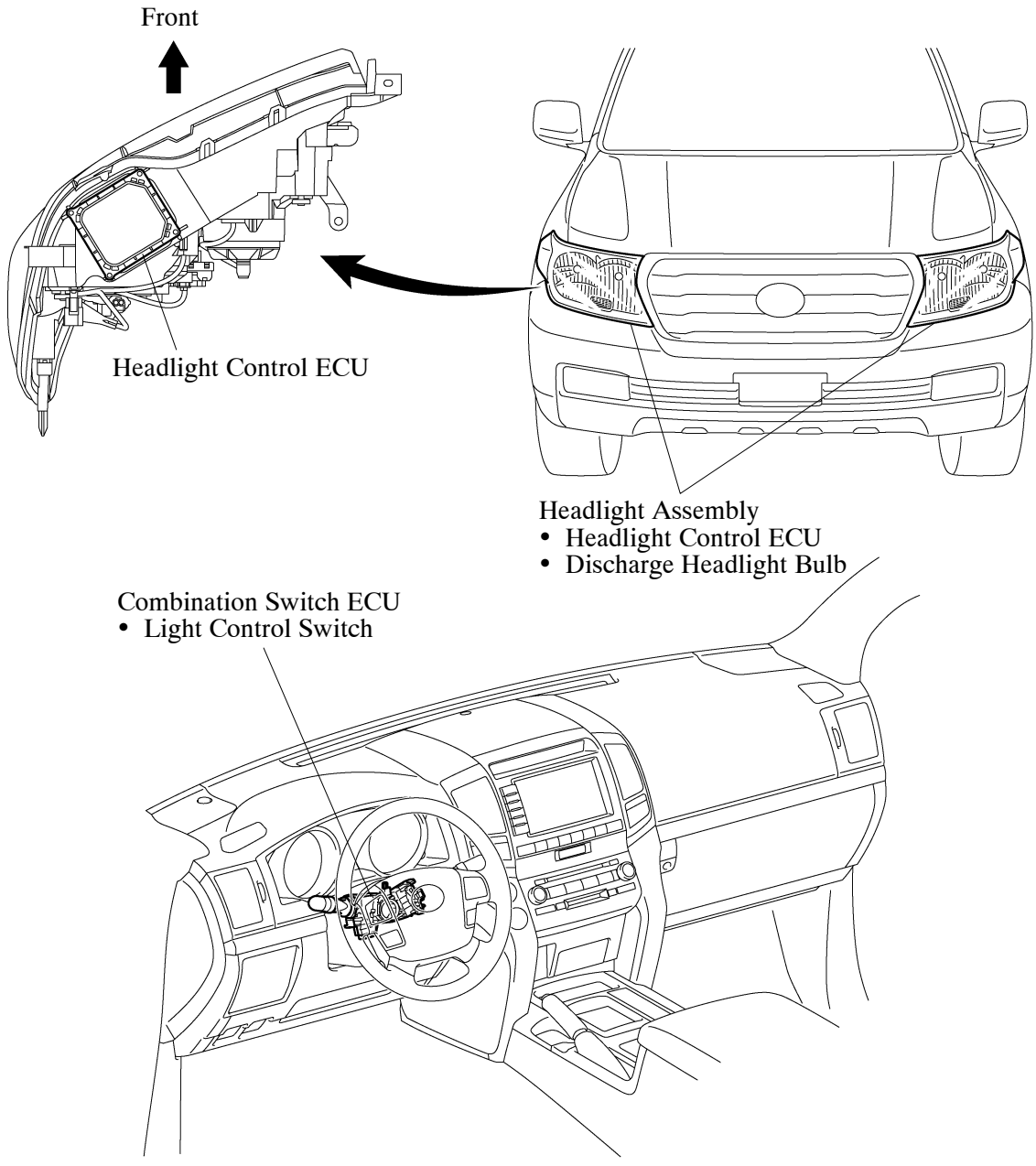
- The HID (High Intensity Discharge) headlight system uses a discharge bulb as its light source for the Hi beam. Discharge bulbs are superior to halogen bulbs.
- Discharge bulbs have the following features.
  - The light emitted by the bulb is close in color to sunlight. The light shines ahead over a broader area and further forward, increasing the area visible to the driver.
  - Less power is consumed.
- This system consists of discharge bulbs and headlight control ECUs.
- Headlight control ECU transforms the voltage that is input from the battery to a high voltage of up to 20,000V and applies it to the discharge bulbs in order to illuminate them.
- A fail-safe function is provided as a countermeasure against the high voltage that is generated in case that a problem occurs in the headlight system.

▶ System Diagram ◀



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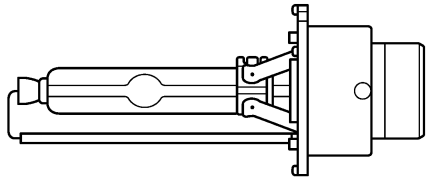
2. Layout of Main Components



081BE23H

3. Discharge Bulb

Instead of the filament contained in an incandescent bulb, a discharge headlight bulb contains an arc tube, which is filled with xenon gas, and metal halide.



240BE29

4. Fail-safe Function

The light control ECU executes the fail-safe actions listed below in accordance with the problem that has been detected.

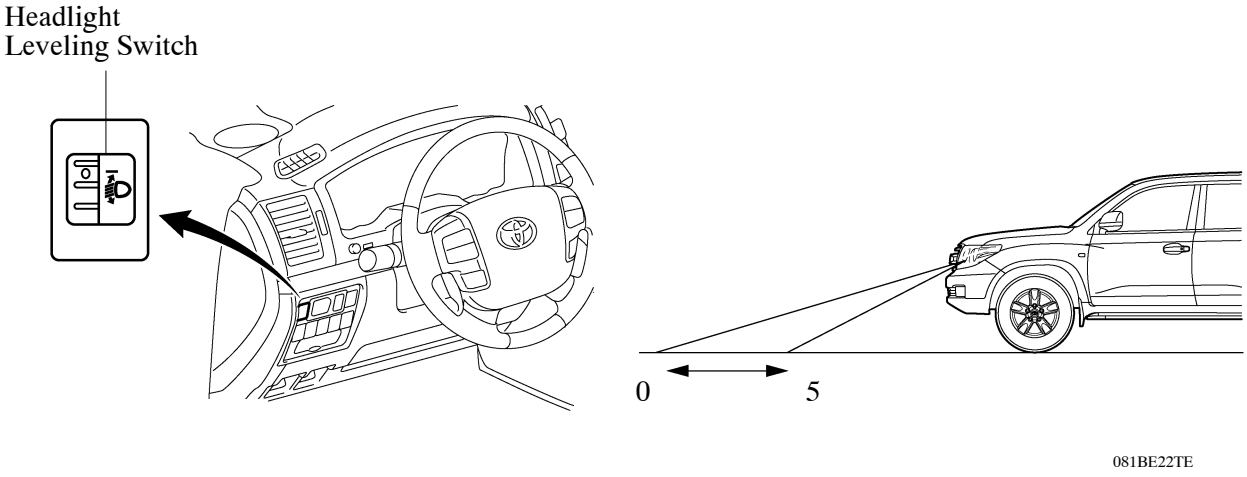
Problem	Outline
Detection of Abnormal Input Voltage	If the voltage that is input to headlight control ECU deviates from the normal operating voltage (9 - 16 volts), the headlight control ECU stops illuminating the headlights. It resumes illuminating the headlights once the voltage reverts to the operating voltage range. However, if the input voltage decreases after the headlights have illuminated, the headlights will remain illuminated until the input voltage is insufficient to light the bulbs.
Detection of Abnormal Output (Open Circuit or Short Circuit) or Flashing Bulb	If an abnormal condition (open or short) occurs in the voltage that is output by headlight control ECU, or if the bulb flashes, the headlight control ECU stops illuminating the headlights and will maintain this state until the power is reinstated. Power is reinstated by turning the headlight control switch from OFF to ON.
Detection of Bulb Open	If a bulb is not inserted in its socket, the headlight control ECU stops generating high voltage until the bulb is inserted correctly and the power is reinstated. Power is reinstated by turning the headlight control switch from OFF to ON or turning the engine switch from OFF to ON.

5. Precautions for HID Headlight System

- When the HID headlights illuminate, a high voltage (approximately 20,000V) is applied momentarily to the bulb sockets, which could lead to a serious accident. Never connect the tester to the high voltage socket of HID headlight for measurement, as this may lead to a serious accident because of high voltage.
- Whenever inspecting the HID headlight system, make sure water or rain is not present in order to prevent electric shock, the light control switch is OFF, the battery terminal is removed, and the connector of the headlight control ECU is disconnected.
- Whenever operating the HID headlight, make sure it is only after assembly has been completed and never operate without bulbs installed.
- Do not operate the HID headlight using a power source other than the vehicle's.
- When there is a defect in the HID headlight or any shock has been applied to it, replace the bulb with a new one.
- A discharge headlight bulb reaches a high temperature when it is illuminated. For this reason, the life of the bulb could be shortened if any oil comes in contact with the glass portion of the bulb. Do not touch the glass portion of a bulb with bare hands.

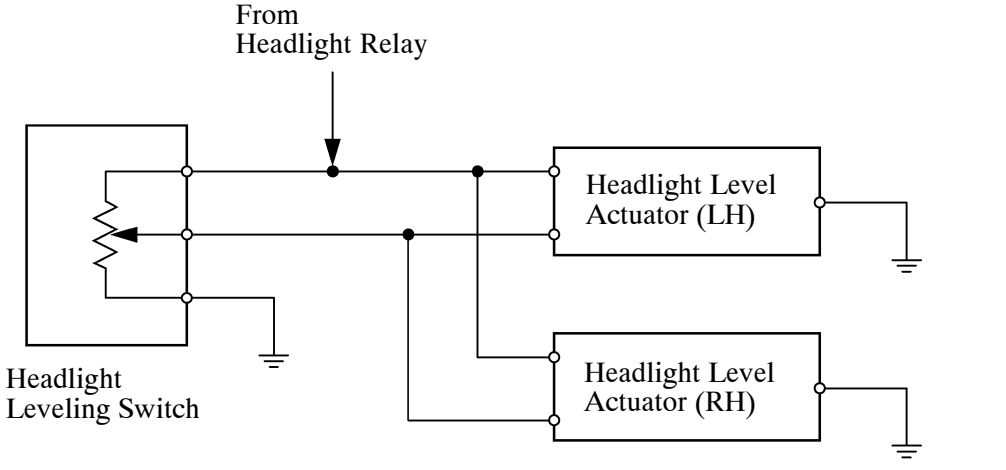
■ MANUAL HEADLIGHT BEAM LEVEL CONTROL SYSTEM

When the vehicle posture changes due to the number (weight) of passengers and volume of luggage, this system enables the driver to manually adjust the headlight beam level (in 5-steps) to the appropriate level by using the headlight leveling switch. The beam level of the headlights can be adjusted with the actuators that are integrated into the headlight units.



081BE22TE

▶ Wiring Diagram ◀

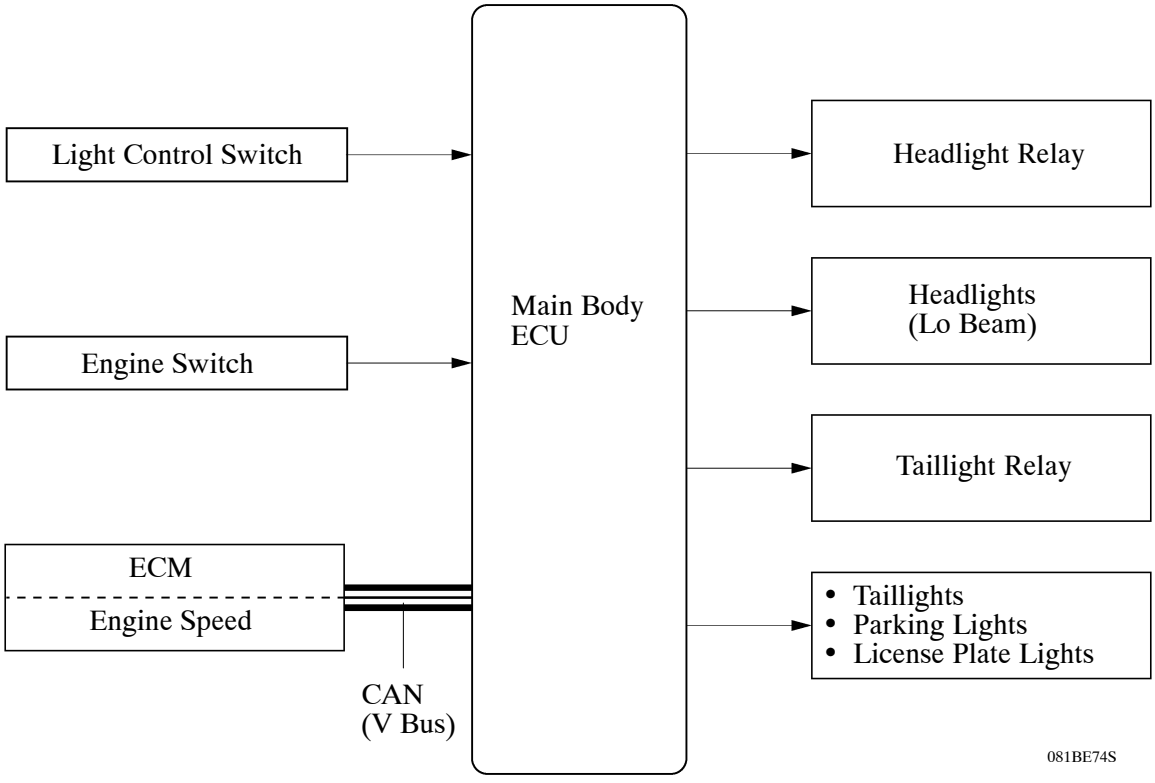


026BE08P

■ DAYTIME RUNNING LIGHT SYSTEM

- A daytime running light system is designed to automatically illuminate the headlights (Lo beam), parking lights, license plate lights, and taillights during the daytime to keep the car highly visible to other vehicles.
- The main body ECU controls this system.
- This system is enabled when the conditions given below are met:
  - Power Source: IG-ON
  - Engine Speed Signal Input
  - Light Control Switch OFF, or AUTO position (if headlight-on control is not being performed by the automatic light control.)

▶ System Diagram ◀

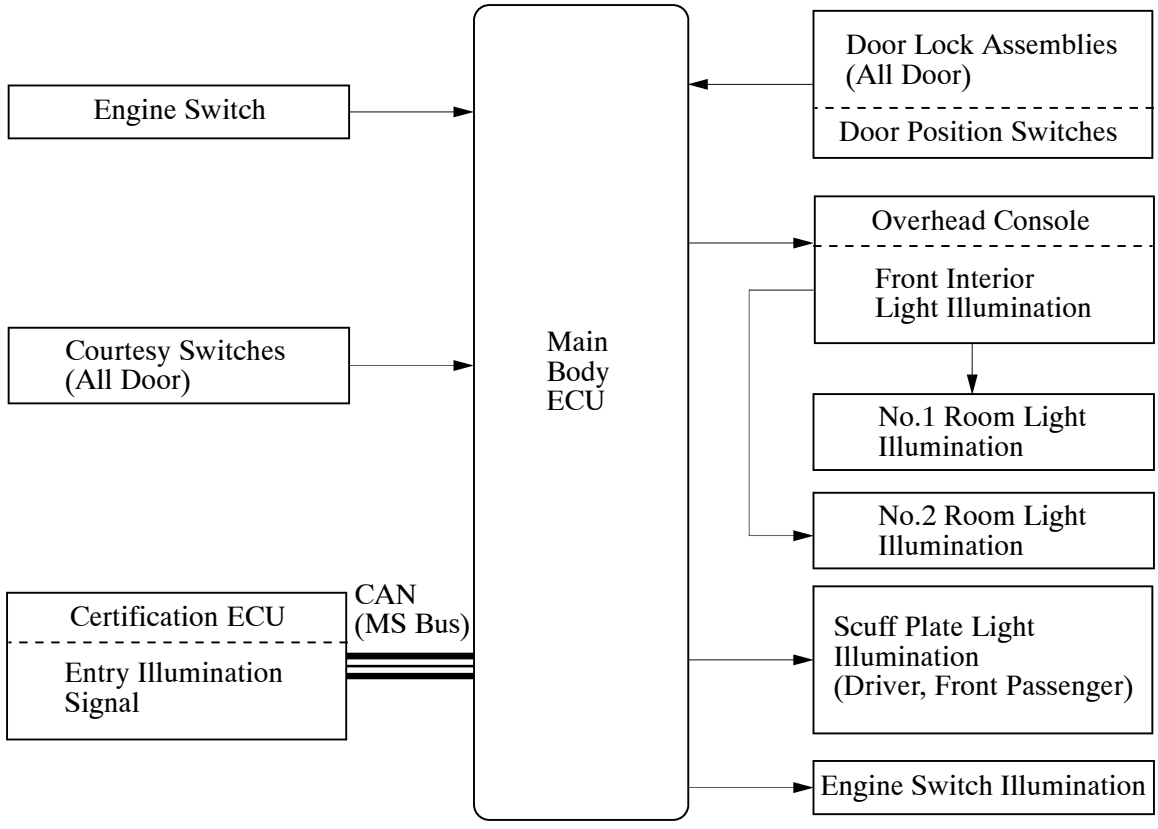


■ILLUMINATED ENTRY SYSTEM

1. General

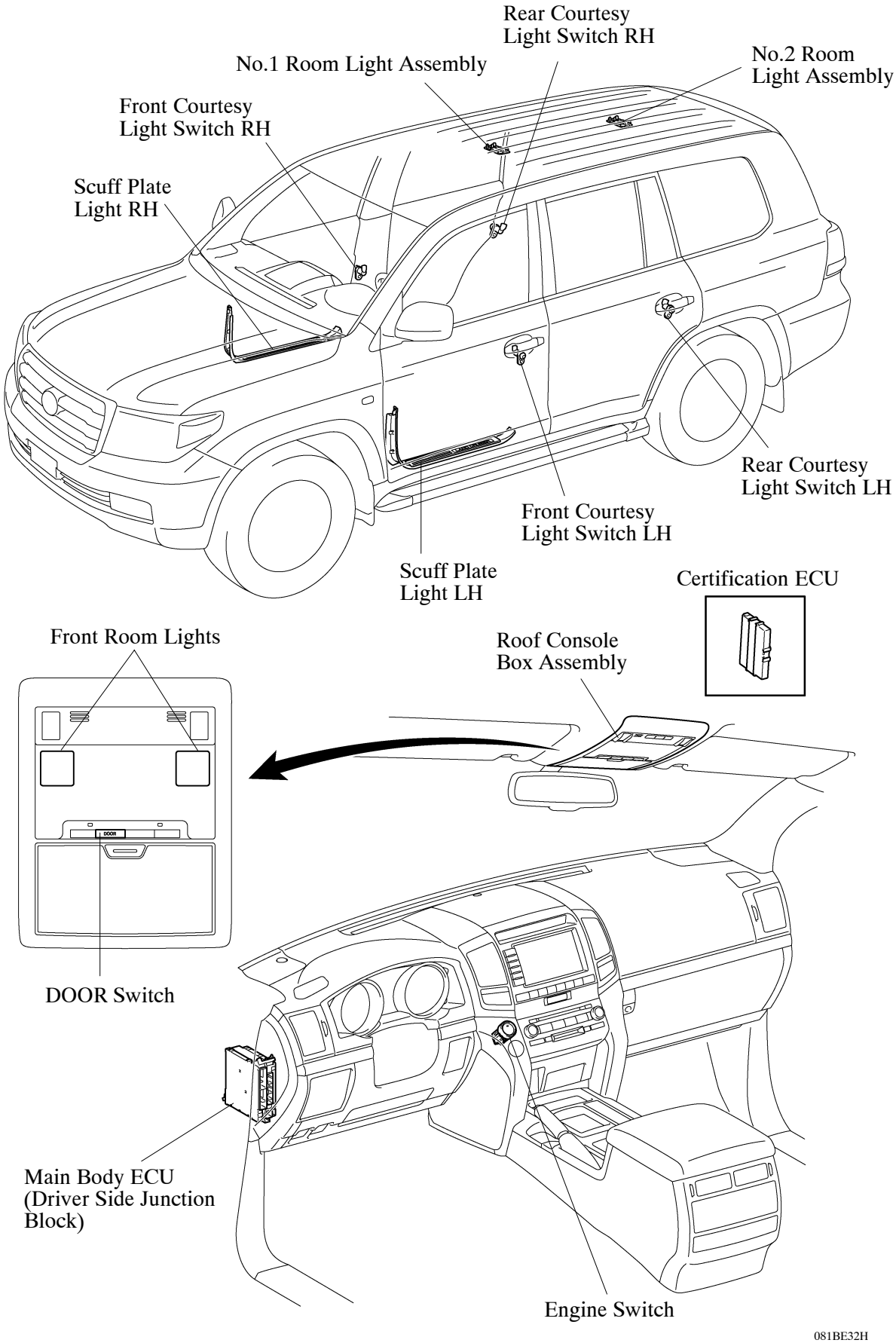
- The illuminated entry system of the new Land Cruiser (Station Wagon) controls interior light illumination.
- The interior light is operated when the light switch is in the DOOR position.

▶ System Diagram ◀



081BE45S

2. Layout of Main Components

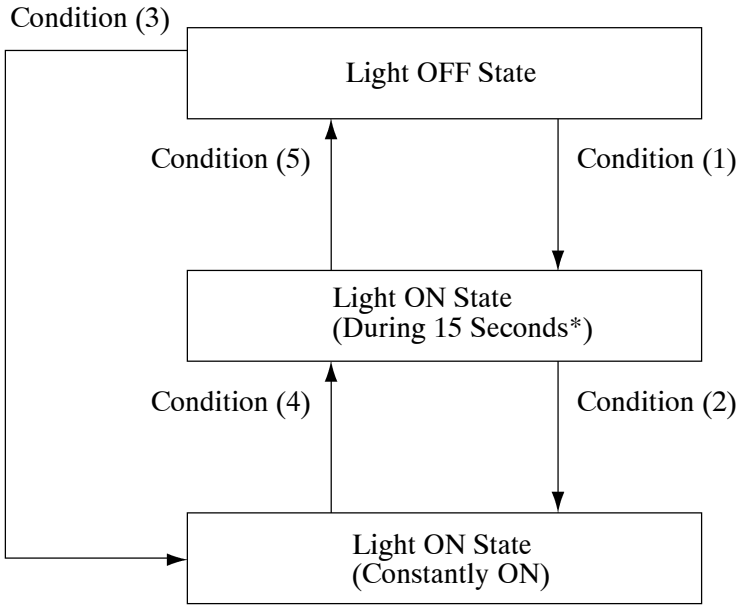


081BE32H

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3. Interior Light Control

- The interior light control (front/ rear room lights and engine switch illumination) consists primarily of the fade-in/fade-out function and timer illumination function.
- The interior light control activates as described in the diagram below when one of items is in the respective state.



Condition	Item
Condition (1)	• With engine switch OFF and all doors closed, key enters any actuation area around the doors. • Engine switch OFF and all doors closed, any door is unlocked. • Engine switch is turned from ACC, IG-ON to OFF.
Condition (2)	• Driver door or front passenger door is opened. • Rear passenger door is opened.
Condition (3)	• Driver door or front passenger door is opened. • Rear passenger door is opened.
Condition (4)	• Driver door or front passenger door is closed. • Rear passenger door is closed.
Condition (5)	• More than approximately 15 seconds have elapsed since the light ON state (15 seconds duration)*. • All doors are closed, and are locked. • Engine switch is turned from OFF to ACC, IG-ON. • Key is outside of all actuation area around the doors.

*: The function setting can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-17.

4. Battery Saving Control

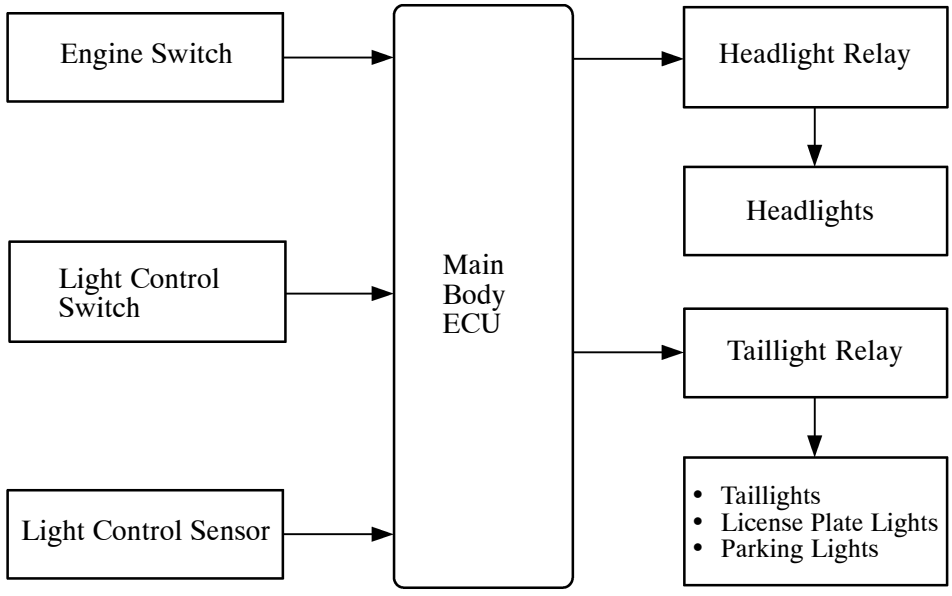
Under the following condition, battery saving control turns off the lights illuminated by the illuminated entry control.

- When any door is open, no door is opened or closed for approximately 20 minutes.
- Engine switch is turned from ACC, IG-ON to OFF.

■AUTOMATIC LIGHT CONTROL SYSTEM

- When the light control switch is in the AUTO position, the automatic light control system detects ambient light levels and controls the headlights and taillights (parking lights, taillights and license plate lights).
- Ambient light levels are detected by the light control sensor that is integrated in the air conditioner system's solar sensor.
- The main body ECU controls this system.

▶ System Diagram ◀

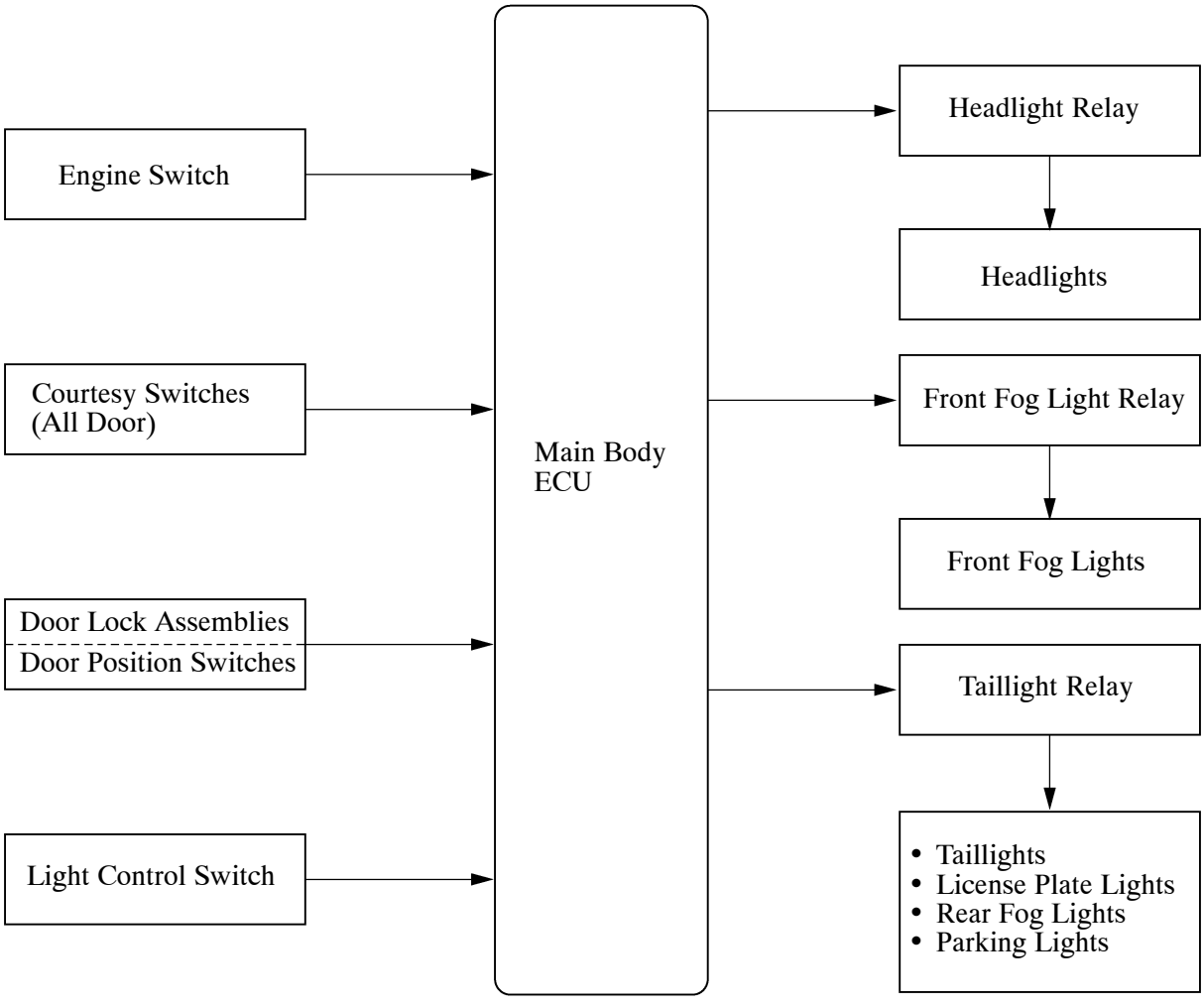


01YBE23P

■ LIGHT TURN-OFF SYSTEM

Destination	Switch Position			Outline
	TAIL	HEAD	AUTO	
Europe	-	-	○	While the lights (headlights, front fog lights, rear fog light, and taillights) are turned ON, this system automatically turns them OFF when the power source is turned OFF and the driver's door is opened.
	○	○	-	While the lights (headlights, front fog lights, rear fog light, and taillights) are turned ON, this system automatically turns OFF only the headlights and the front fog lights when the power source is turned OFF.
Except Europe	○	○	○	While the lights (headlights, front fog lights, rear fog light, and taillights) are turned ON, this system automatically turns them OFF when the power source is turned OFF and the driver's door is opened.

▶ System Diagram ◀



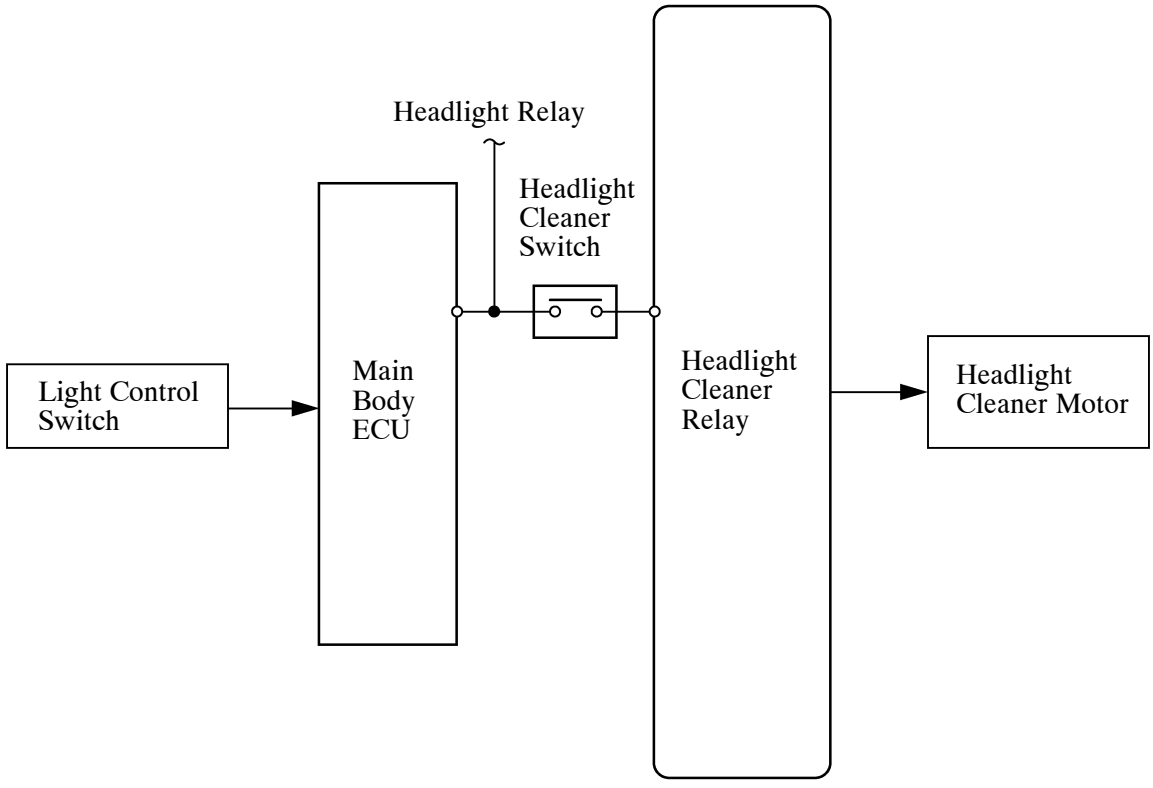
081BE44S

■HEADLIGHT CLEANER SYSTEM

1. General

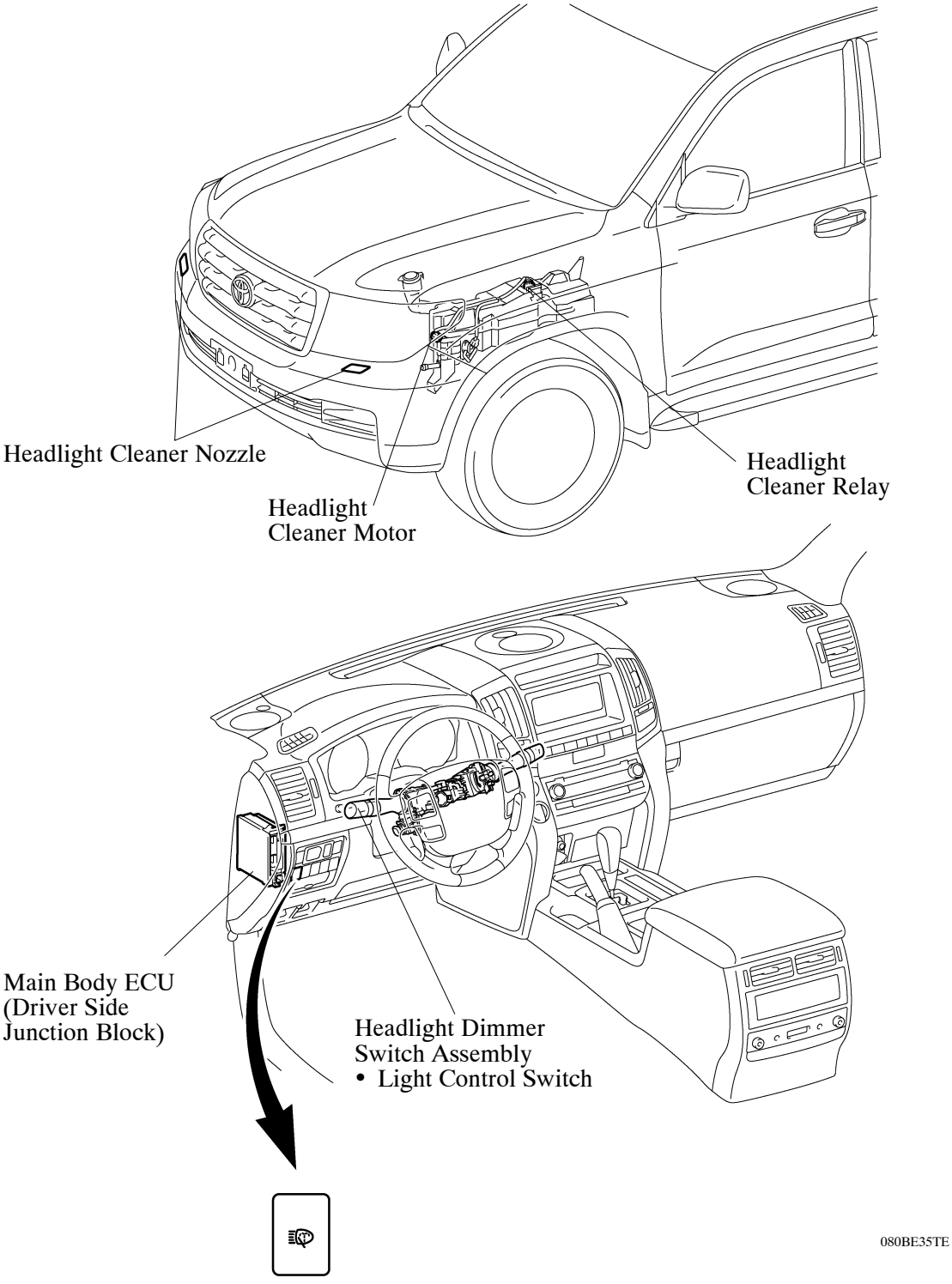
- The headlight cleaner system sprays washer fluid on the headlight lenses to clean them.
- The headlight cleaner relay controls this system.

▶ System Diagram ◀



080BE98S

2. Layout of Main Components



METER

■COMBINATION METER

1. General

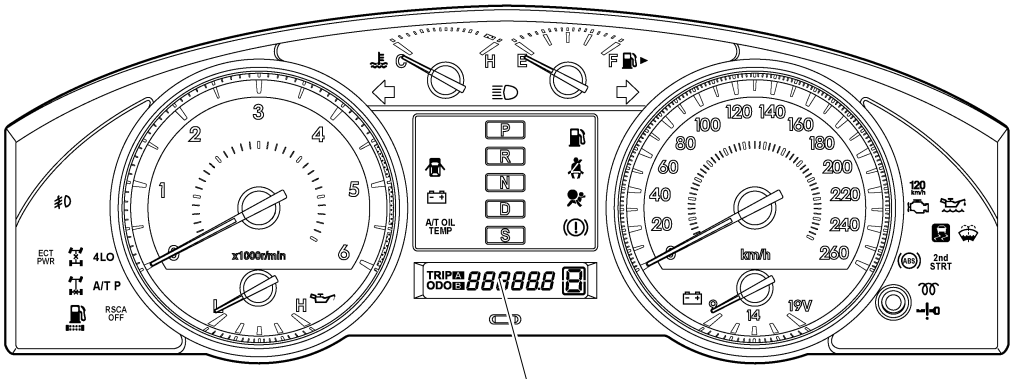
- An optitron display type combination meter is provided on VX grade models. The optitron display type meter realizes excellent visibility through the use of smoke acrylic in the protective panel, and bright LEDs (Light Emitting Diodes) that have high contrast to illuminate the dial.
- A multi-information display is mounted in the center of the optitron display type combination meter.
- An analog type combination meter is provided on GX grade models.
- A meter ECU and buzzer are enclosed in the combination meter. This ECU maintains communication with other ECUs through the CAN.
- Illumination control, which turns on the combination meter illumination at different time intervals when the power source is switched to IG-ON, has been provided.
- A speed warning system has been provided as standard on models for G. C. C. Countries. When the vehicle speed exceeds 120km/h, the system warns the driver by sounding the buzzer and flashing the warning lights.
- On dual fuel tank models, the meter ECU determines the remaining fuel amount in the fuel tank from the signals received from the sender gauges on both the fuel tank and fuel sub tanks.



Multi-information Display

European models with 2UZ-FE engine

081BE03Y



LCD (Liquid Crystal Display)

081BE04Y

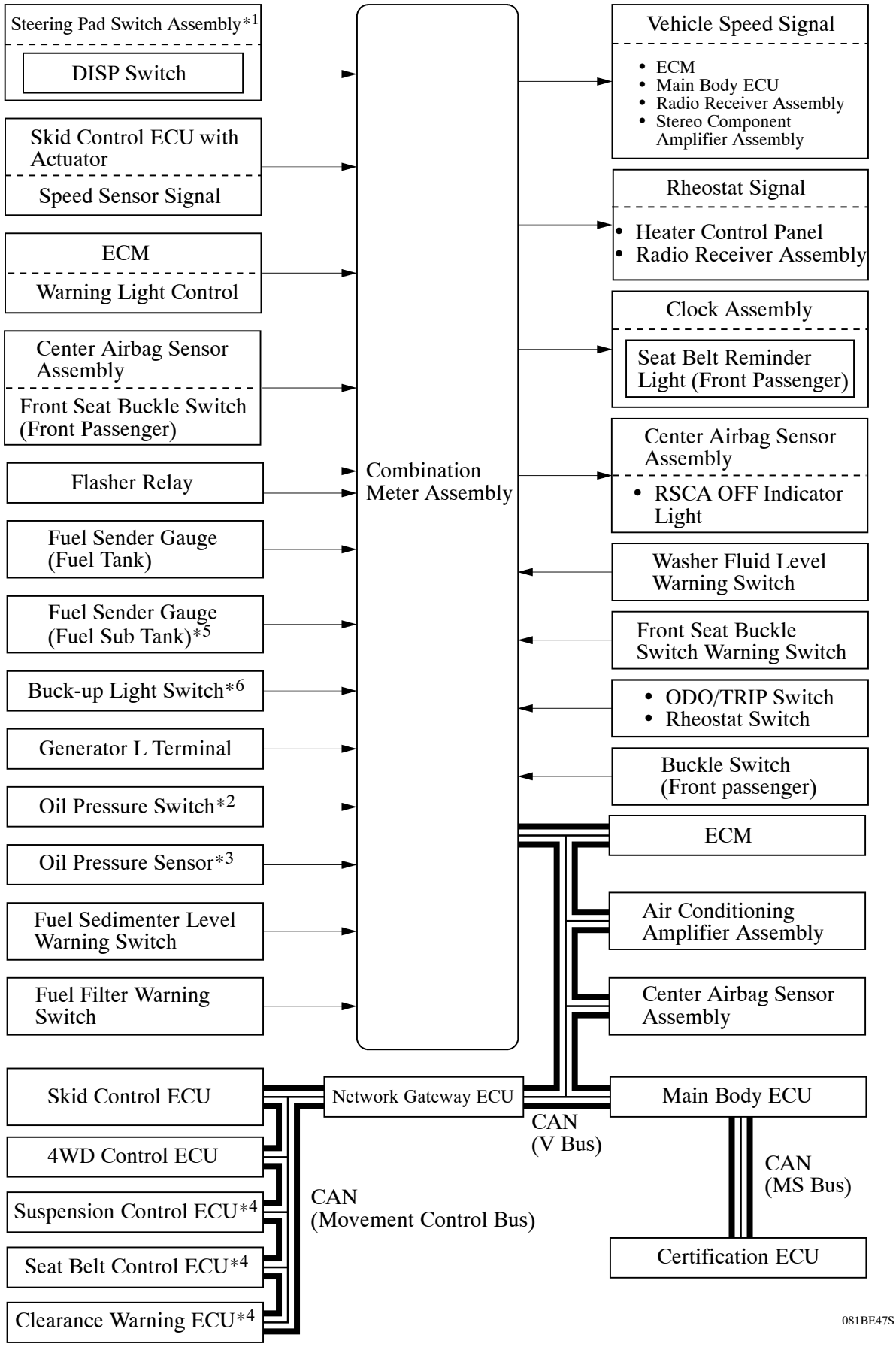
G.C.C. Countries models with 1VD–FTV engine

Service Tip

If the LEDs malfunction, the entire combination meter assembly must be replaced. For details, refer to the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

BE

2. System Diagram



*1: Only for models with Optitron type Combination Meter
*2: Only for models with 1GR-FE Engine
*3: Except 1GR-FE Engine
*4: Optional Equipment
*5: Only for diesel engine models with dual tank
*6: Models with manual transmission

▶ Input and output communication signals of the combination meter ◀

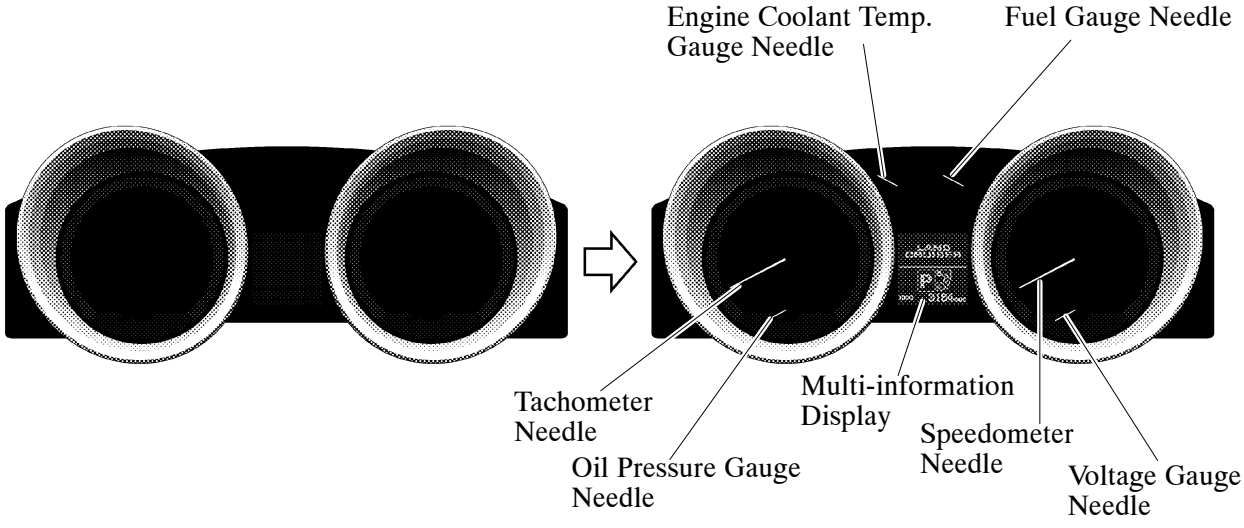
ECU	Input Signal	Output Signal
ECM	• Engine speed • Shift position • S mode position • Fuel injection volume • Warning Light Control • Engine coolant temperature • Current range position • Buzzer sounding request • Indicator light illumination request • Warning message display request • Diagnosis (Cruise)	• Vehicle Speed • Remaining Fuel Amount*1 (Fuel tank/ Fuel sub tank)
Air Conditioning Amplifier Assembly	• Diagnosis	Vehicle speed
Center Airbag Sensor Assembly	• Warning light illumination request • Seat belt remainder control (Driver and Front Passenger) • Diagnosis	Vehicle speed
Main Body ECU	• Lighting status • Parking brake switch • Courtesy switch • Warning message display request • Buzzer sounding request • Auto dimmer signal • Diagnosis	–
Skid Control ECU	• Warning message display request • Warning light illumination request • Indicator light illumination request • Diagnosis	–
Seat Belt Control ECU*2	• Warning message display request • Warning light illumination request • Buzzer sounding request • Diagnosis	–
Clearance Warning ECU*2	• Warning message display request • Buzzer sounding request • Intuitive parking assist status indication	Vehicle speed
Certification ECU	• Warning message display request • Buzzer sounding request	–
4WD Control ECU	• Indicator light illumination request • Buzzer sounding request	–
AHC ECU*2	• Warning message display request • Warning light illumination request • Buzzer sounding request • Diagnosis	–

*1: Only for diesel engine models with dual tank
*2: Optional equipment

3. Illumination Control

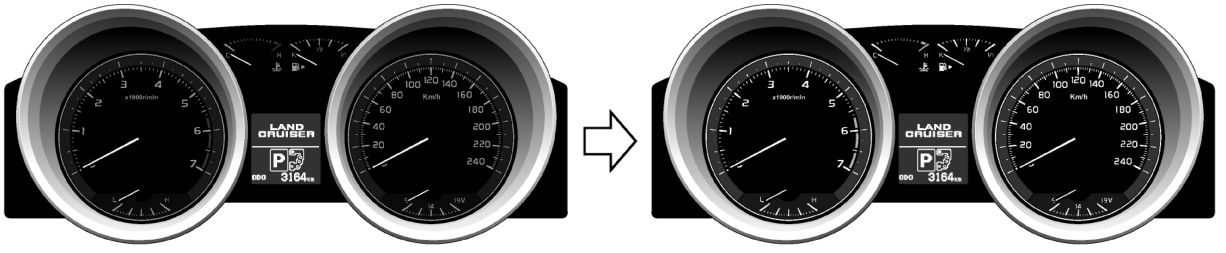
- When the power source is switched to IG-ON, the illumination control operates as follows (1, 2). However, all illuminations turn off while the engine is cranked.
- When the power source is switched to OFF, the illumination control is as follows (3).

1) The needles of the speedometer, tachometer, fuel gauge, engine coolant temperature gauge, and voltage gauge and oil pressure gauge are illuminated and “LAND CRUISER” appears on the multi-information display.



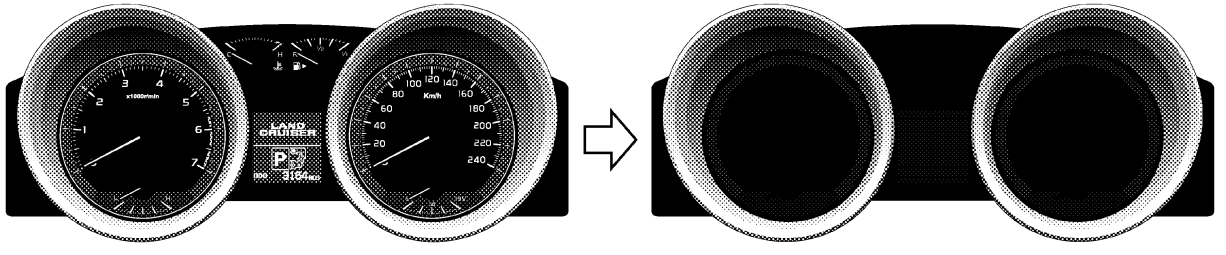
080BE09Y

2) After the multi-information display illuminates, the meter illumination gradually fades in.



081BE06Y

3) All illuminations fade out.



081BE07Y

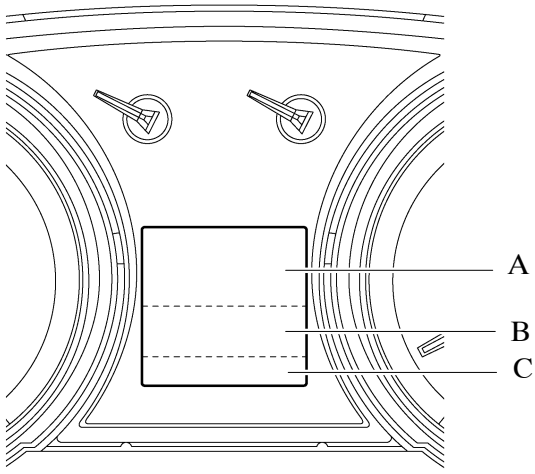
◆: The above illustration expresses only the transition of the illumination, therefore, the actual illumination transition is different from the illustration above.

4. Multi-information Display

General

The new Land Cruiser (Station Wagon) multi-information display has three areas depending on the display mode.

▶ Display Areas ◀



080BE73H

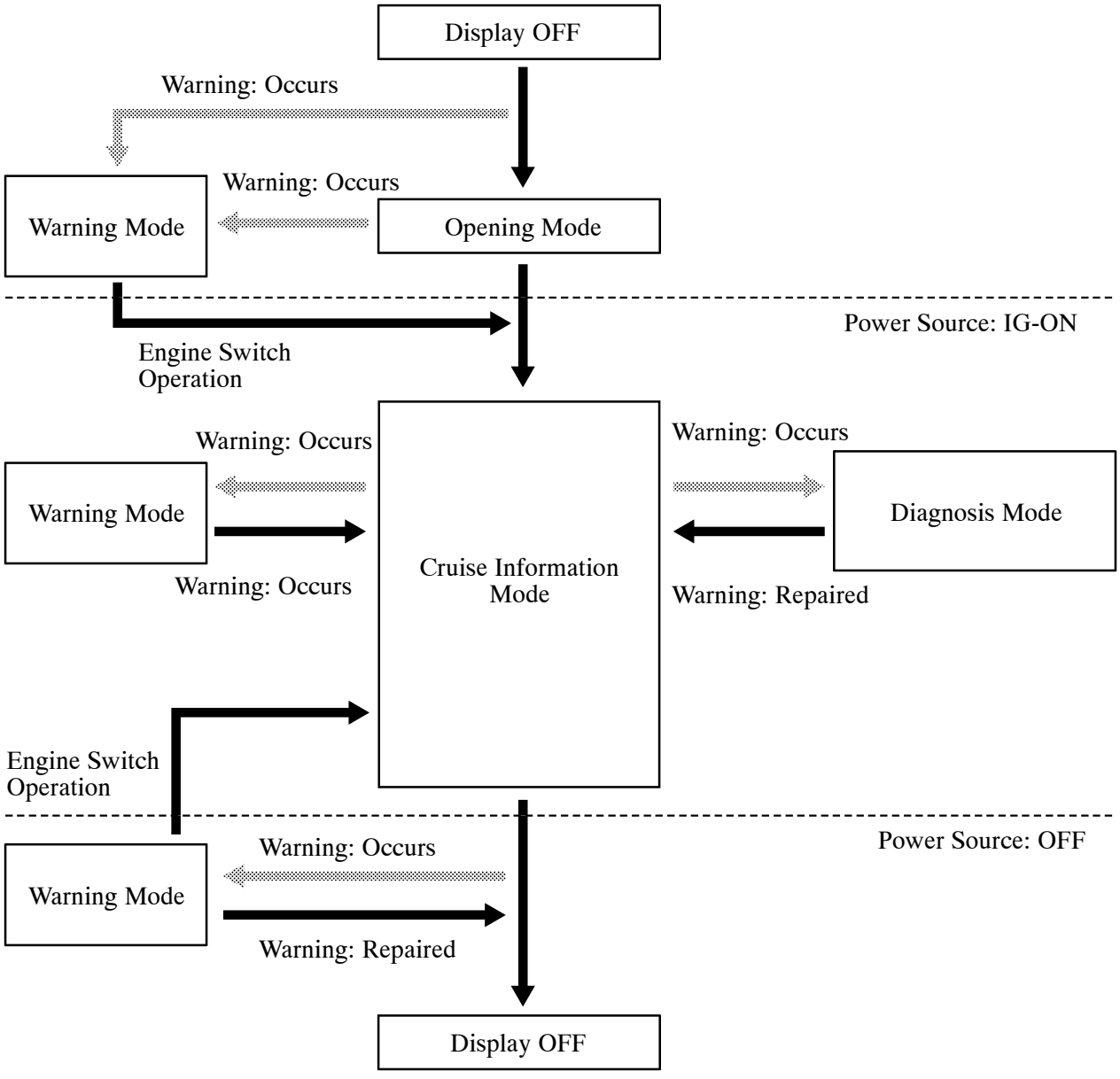
▶ Displayed Information ◀

Display Areas	Mode	Outline
A	Cruise Information (See page BE-45)	• Eight types of information (instant fuel consumption, average fuel consumption after refueling, driving range, average fuel consumption, average speed since engine start, distance driven since engine start) can be displayed. • The display can be switched by using the DISP switch.
	Warning (See page BE-46)	Interrupts the multi-information display immediately when a warning occurs.
	Clearance Sonar (See page BE-112)	Displays the location of an obstacle and the approximate distance between the vehicle and the obstacle.
	Diagnosis (See page CH-230, 248)	DTC (Diagnostic Trouble Code) for the brake control system (TRAC and VSC function), tire pressure warning system and VGRS can be displayed.
B	Shift Position	Displays the current shift position.
	Active Height Control Suspension	Displays the currently selected vehicle height.
C	ODO/TRIP	Switches the display of the ODO/TRIP and displays the ODO/TRIP.

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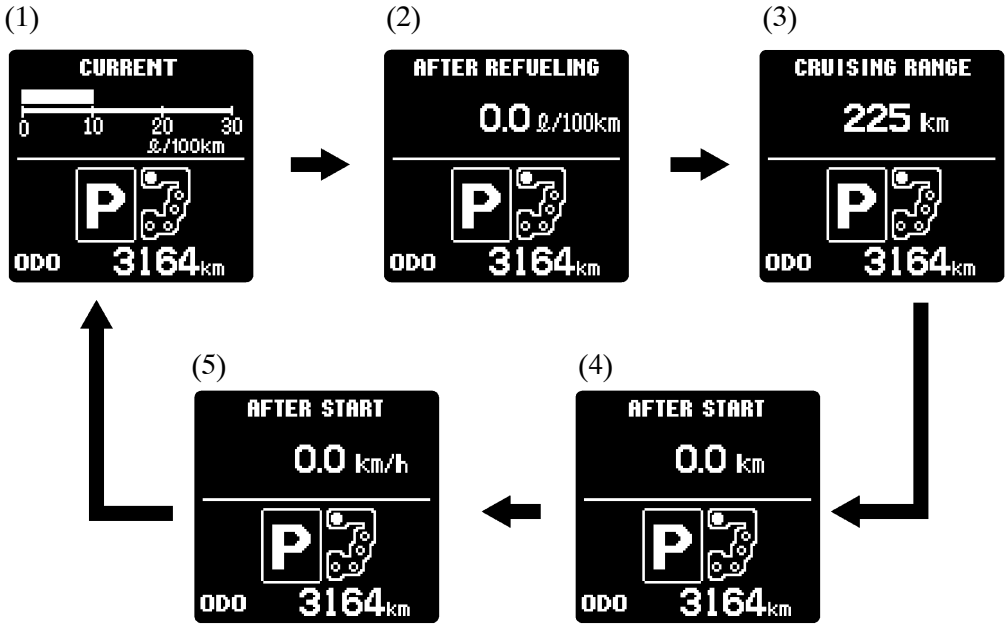
Flow of The Multi-information Display Indication

The display mode shown in area A on the multi-information display can be changed as shown in the flow chart below:



Cruise Information Mode

The cruise information mode is displayed on area A of the multi-information display, and the display switches in the following sequence every time the DISP switch of the steering pad switch is pressed.



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Information	Outline
(1)	• Displays the value, calculated by the combination meter, which is based on the distance driven and the volume of fuel consumed (fuel injection signals from the No.1 cylinder) • Updated every 0.5 seconds.
(2)	• Displays the value, calculated by the combination meter, which is based on the distance driven since refueling and the fuel consumption volume (fuel injection signals from the No.1 injector). • The combination meter determines the vehicle has been refueled through the signal from the fuel sender gauge. • Updated every 10 seconds.
(3)	• Displays the range, calculated by the combination meter which continuously monitors and stores fuel consumption data and the residual fuel volume when IG-ON was selected. • Updated every 1 mile (U.S.A. model) or 1 km (Mexican package model).
(4)	• Displays the value, calculated by the combination meter, which is based on the distance driven since engine start. • Updated every 10 seconds.
(5)	• Displays the average speed, which is calculated by the combination meter based on the length of time and the driven distance since engine start. • Updated every 10 seconds.

Warning Mode

General

- When a warning is necessary, the warning display interrupts the multi-information display.
- The master warning light may illuminate or flash and the buzzer may sound depending on the item in the multi-information display.

Warning	Detail	Warning	Detail
 ⚠ : Flash 080BE13Y	The key is not inside the vehicle.	 ⚠ : Flash 080BE18Y	The driver door is opened with the shift lever in any position other than P.
 ⚠ : Illuminate Buzzer: Sound 080BE14Y	Steering lock has not been released.	 ⚠ : Illuminate Buzzer: Sound 080BE19Y	Steering lock is malfunctioning.
 Buzzer: Sound 080BE15Y	The power source is switched from OFF to ACC twice with the brake pedal released.	 ⚠ : Illuminate Buzzer: Sound 080BE20Y	A-TRC and VSC are malfunctioning.
 ⚠ : Flash 080BE16Y	Key battery is low.	 ⚠ : Flash 080BE21Y	Vehicle is traveling with the parking brake engaged.
     ⚠ : Flash : Illuminate 080BE17Y	Any door is open.	 ⚠ : Flash 080BE22Y	The sliding roof is open and the driver door is open.
		 ⚠ : Illuminate Buzzer: Sound 080BE23Y	VSC function is OFF

Warning	Detail	Warning	Detail
 :Illuminate 080BE24Y	Clearance Sonar System is dirty or covered with ice.	 :Illuminate 080BE29Y	Clearance Sonar System is malfunctioning.
 :Illuminate Buzzer: Sound 080BE25Y	Pre-crash safety system is malfunctioning.	 :Illuminate Buzzer: Sound 081BE09Y	Active height control Suspension is malfunctioning.
 Buzzer: Sound 080BE30Y	Pre-crash safety system is not currently functional.	 :Illuminate Buzzer: Sound 080BE31Y	Transmission oil temperature exceeds the applicable standards.
 :Illuminate Buzzer: Sound 080BE26Y	Engine oil level is low.	 :Illuminate Buzzer: Sound 080BE32Y	Fuel System is malfunctioning. *1
 :Illuminate Buzzer: Sound 080BE27Y	Fuel level is low.	 080BE33Y	Diesel engine oil is exchange timing.*1
 :Illuminate Buzzer: Sound 081BE11Y	Fuel filter clogging is detected. *1	 081BE10Y	The total driving distance has reached 150,000 km or more since the last time the timing belt was replaced. *2
 :Illuminate Buzzer: Sound 081BE12Y	Some moisture has been detected in the fuel filter. *1	-	-

*1: Diesel engine models
*2: 2UZ-FE engine models for G.C.C. Countries, China and general countries

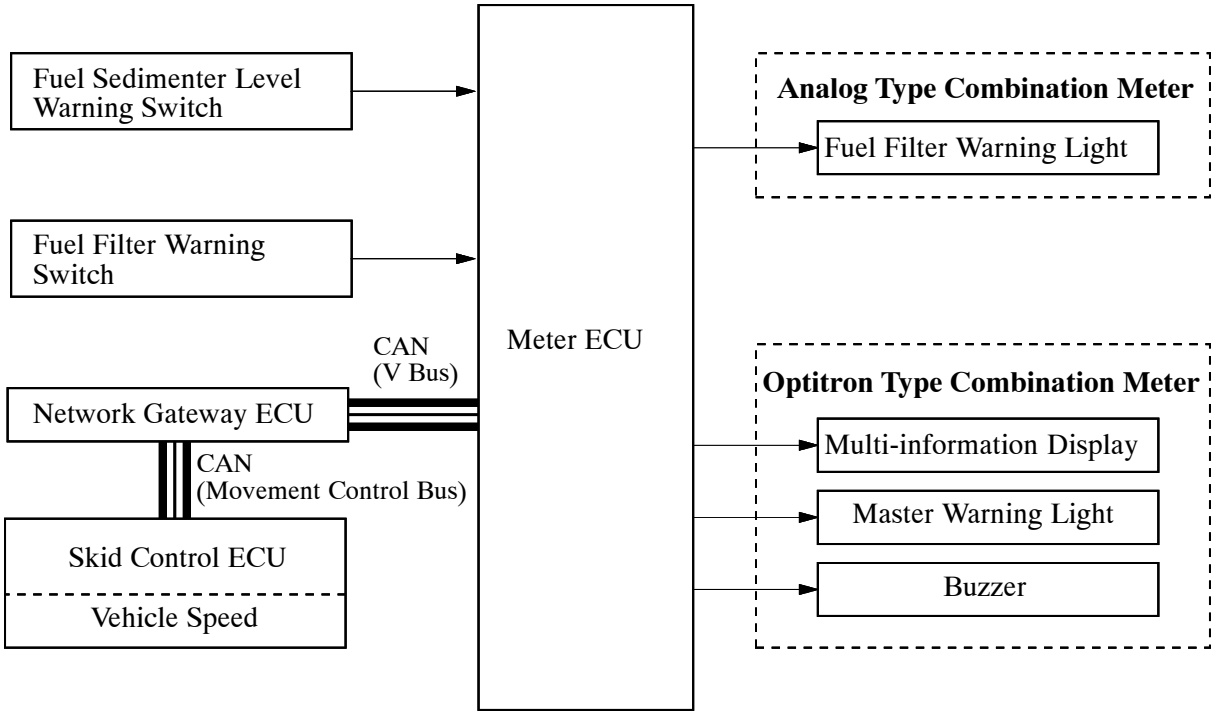
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5. Fuel Filter Warning (Diesel Engine Model)

General

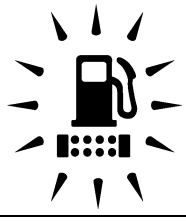
- On the analog type combination meter, the fuel filter warning light illuminates when the fuel light is clogged or blinks when condensed water on the fuel filter is detected.
- On the optitron display type combination meter, a warning message corresponding to individual warning items is indicated on the multi-information display.
- This system is controlled by meter ECU.

▶ System Diagram ◀



081BE48S

▶ Function List ◀

Function	Analog Type Combination Meter	Optitron Type Combination Meter
Fuel Filter Warning	 Illuminate 081BE55Y	 :Illuminate Buzzer: Sound 081BE11Y
Fuel Sedimenter Warning	 Blinking 081BE56Y	 :Illuminate Buzzer: Sound 081BE12Y

Operation

1) Fuel Filter Warning

- The fuel filter warning switch is located in the upper area of the fuel filter.
- To prevent false alarms on a cold engine, the meter ECU starts its judgment function with the engine switch turned ON, after a total of 30 minutes have elapsed with the input of vehicle speed signal information (minimum vehicle speed of 2.5 km/h).
- The fuel filter warning switch turns OFF when the vacuum in the fuel filter reaches a predetermined level.
- When the meter ECU receives OFF signals from the fuel filter warning switch under the following conditions, it alerts the driver in accordance with the meter specifications.
  - OFF signals from the fuel filter warning switch are input continuously for 10 minutes.
  - When the engine switch is in the ON position, OFF signal (between 1 second and 10 minutes in duration) from the fuel filter warning switch is input twice with a minimum interval of 1 second.
- On all models with the optitron display type combination meter, the driver is alerted by the master warning light illuminating, a warning message appearing on the “Fuel Filter Maintenance Reqd” and a buzzer.
- On all models with the analogy type combination meter, the driver is alerted by the fuel filter warning light illuminating.

2) Fuel Sedimenter Warning

When the amount of water that has accumulated in the sedimenter reaches a predetermined level, the fuel sedimenter level switch, which is located in the bottom of the fuel filter, turns ON. The meter ECU renders this signal as a fuel sedimeter warning and then alerts the driver in accordance with the meter specifications.

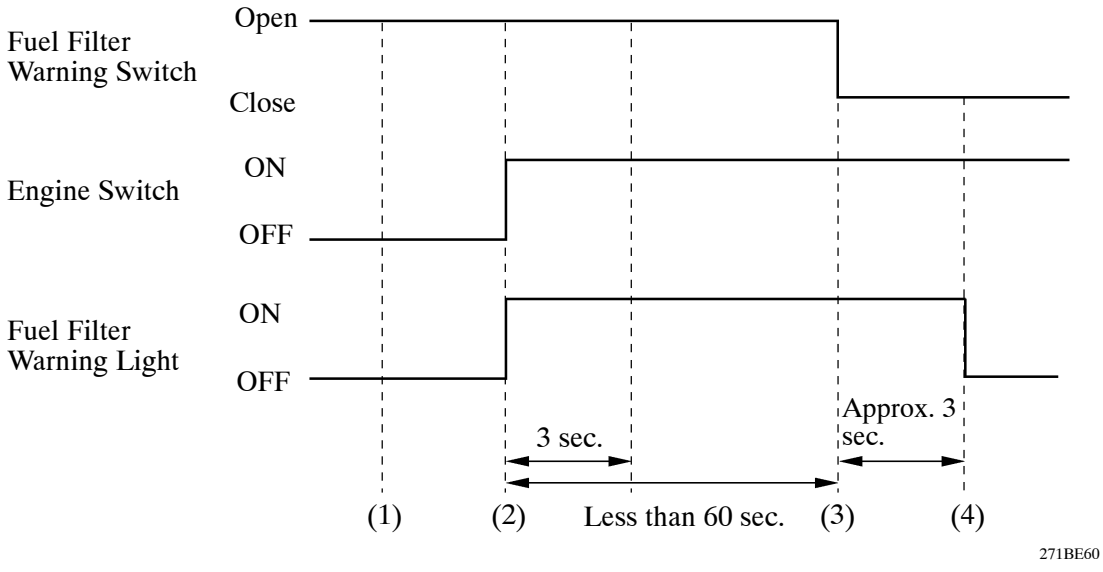
- On models with the optitron display type combination meter, the driver is alerted by the master warning light illuminating, a warning message “High Water Level” appearing on the combination meter and the buzzer sounding.
- On models with the analogy type combination meter, the driver is alerted by the fuel filter warning light blinking and the buzzer sounding.

Service Tip

When the fuel filter warning switch detects a failure, the meter ECU stores this failure in memory, and continues to illuminate* the fuel filter warning light. Therefore, after replacing the fuel filter, the illumination information stored in the meter ECU memory must be erased through the following procedure:

(1) With the engine switch turned OFF, disconnect the fuel filter warning switch connector.
(2) Turn the engine switch from OFF to ON.
(3) After more than 3 seconds but less than 60 seconds have elapsed, reconnect the connector.
(4) After approximately 3 seconds have elapsed with the fuel filter warning switch closed, the system confirms the deletion of the illumination information by turning OFF* the warning light.

*: The warning light will blink in case of a sedimenter failure.



6. Buzzer

The table below shows the warning and reminder functions of the buzzer.

Function	Item
Warning	• Multi-information Display Warning Mode Indication (See page BE-46) • Speed Limit Warning (Only for G.C.C. Countries models) • Fuel Filter Warning (See page BE-48) • Fuel Sedimenter Warning (See page BE-48)
Reminder	• Key Reminder (See page BE-186) • Seat Belt Reminder (See page BE-229) • Oil Maintenance Reminder (See page EG-210)

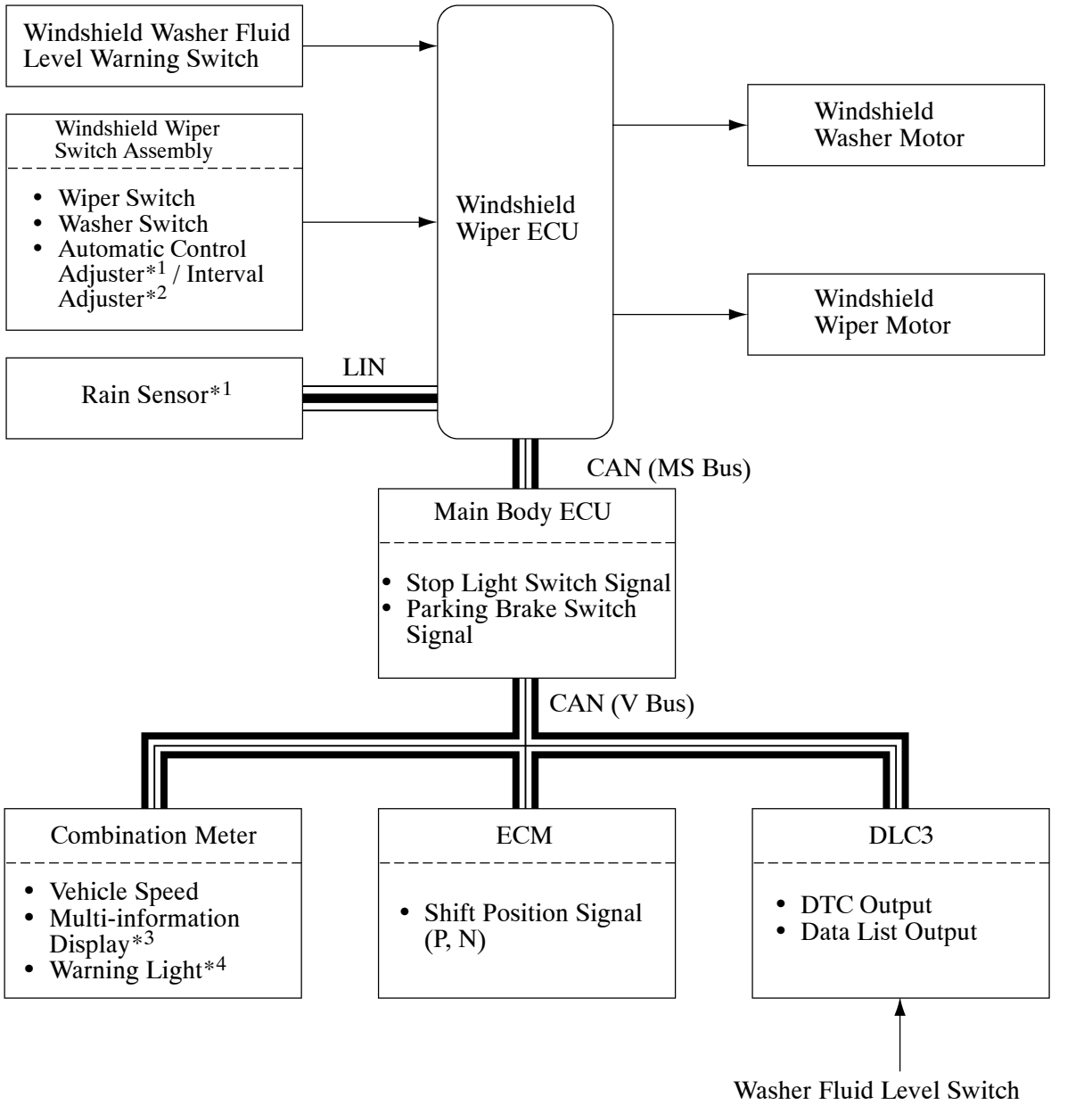
WIPER AND WASHER

■ DESCRIPTION

- The wiper system with rain sensing function is available as an option on European and Chinese models.
- The washer fluid warning function is standard on all models.
- This system has the following functions.

Function		Outline
Wiper	Vehicle Speed-sensing, Adjustable Interval	This function controls the wiper interval time in accordance with the vehicle speed when the wiper switch is in the AUTO or INT position.
	Vehicle Speed Switching	Automatically selects an intermittent operation when the vehicle is stopped with the wiper switch in LO position.
	Stopped Vehicle Intermittent Wiper	Automatically selects an intermittent operation when the wiper switch is switched to LO position from any positions other than LO with the vehicle stopped.
	Rain Sensing	Controls the wiping interval and speed in accordance with the amount of rain, vehicle speeds and taillight signals when the wiper switch is in the AUTO position.
	Washer-linked Wiper with Drip-prevention	To prevent the fluid from dripping after the washer has been operated, this function operates the wipers once after they have operated in unison with the washer.
Washer	Washer Fluid Level Warning	When the volume of washer fluid decreases to below a certain level, the combination meter warns the driver through the master warning light illumination and the warning message on the multi-information display.

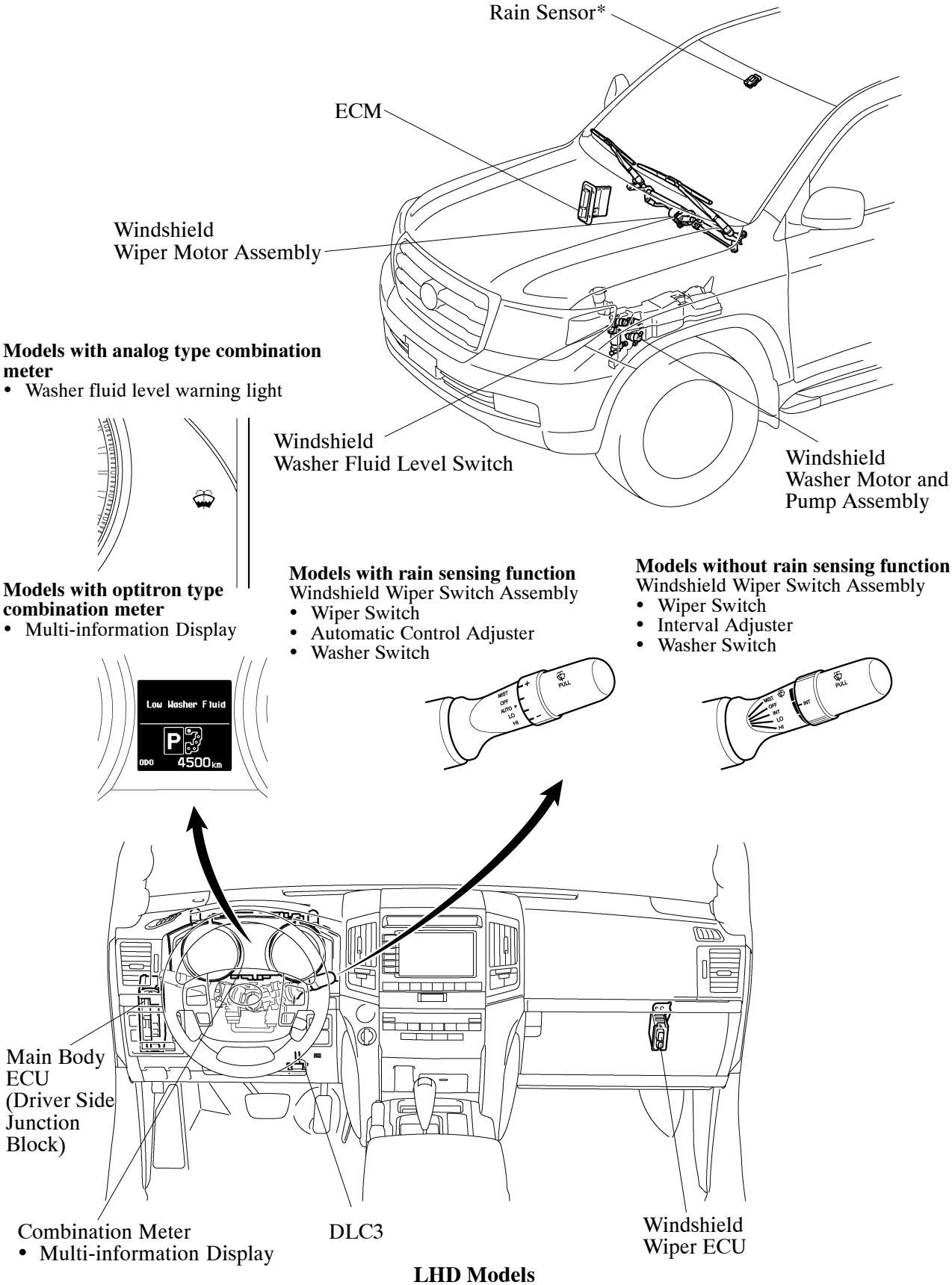
▶ System Diagram ◀



081BE46S

*1: Models with rain sensing function
*2: Models without rain sensing function
*3: Models with analog type combination meter
*4: Models with optitron type combination meter

■LAYOUT OF MAIN COMPONENTS



LHD Models

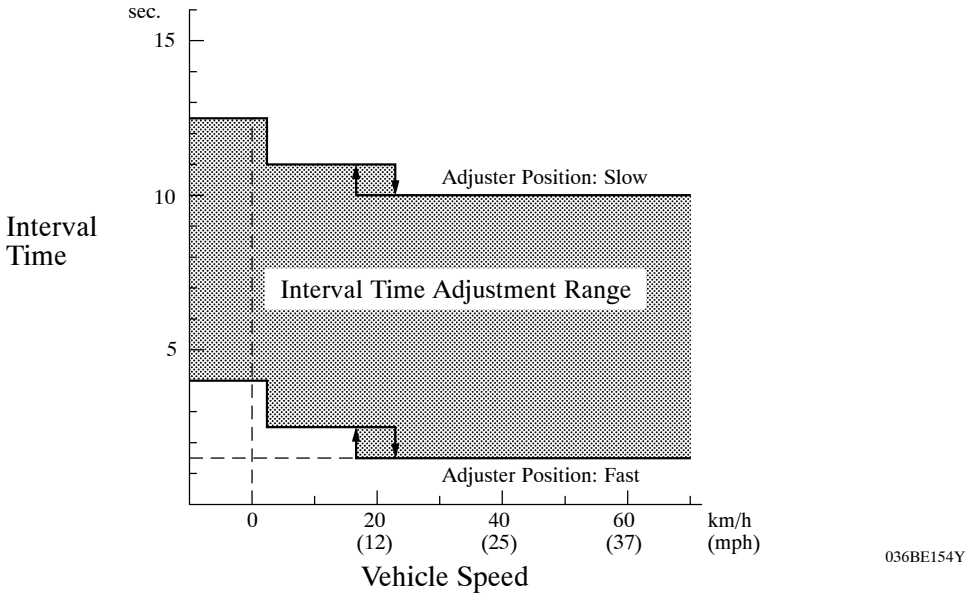
080BE70H

*: With rain sensing function

BE

■VEHICLE SPEED-SENSING, ADJUSTABLE INTERVAL FUNCTION

- When the wiper switch is in the INT position (models without rain sensing function), or AUTO position (models with rain sensing function), the interval time of the wiper is controlled in 3 stages in accordance with the automatic control adjuster position and the vehicle speed.
- The interval time can be controlled steplessly within each range.

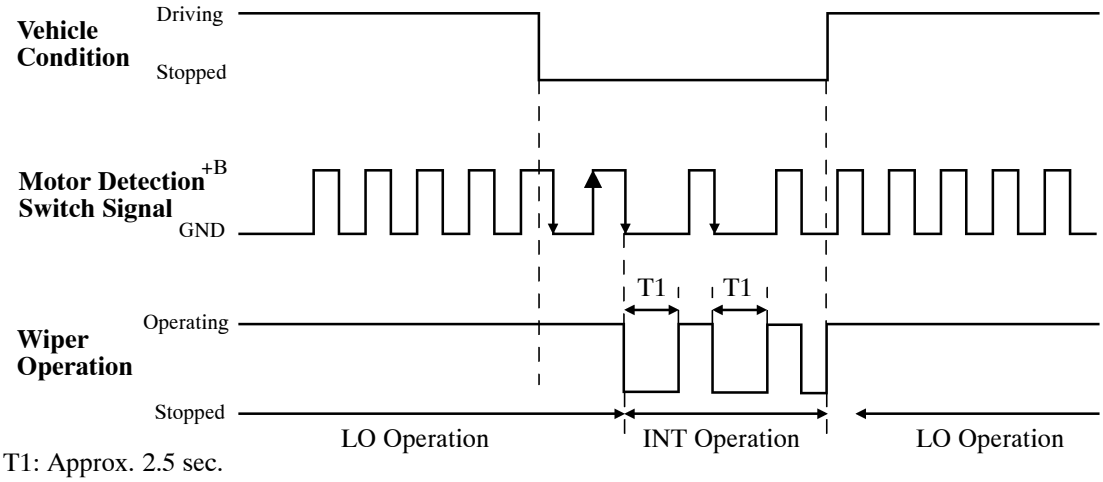


■VEHICLE SPEED SWITCHING FUNCTION

When the wiper switch is in the LO position and vehicle has stopped running, wiper operation is automatically switched to intermittent operation.

- The front controller judges that the vehicle is being driven if either of the following conditions exists:
  - The vehicle speed is other than 0 mph (0 km/h).
  - The stop light switch and the parking brake switch is OFF and the shift lever is in a position other than P or N.
- If other conditions exist, the front controller judges that the vehicle is stopped. It controls the wipers as shown in the timing chart below.
- When the vehicle stops running while driving and the wiper switch is in the LO position, the wiper operates twice in LO. It then switches to intermittent operation with an interval time of approximately 2.5 seconds. If the vehicle starts running during this intermittent wiper operation, the wiper returns automatically to LO operation.

▶ Timing Chart ◀

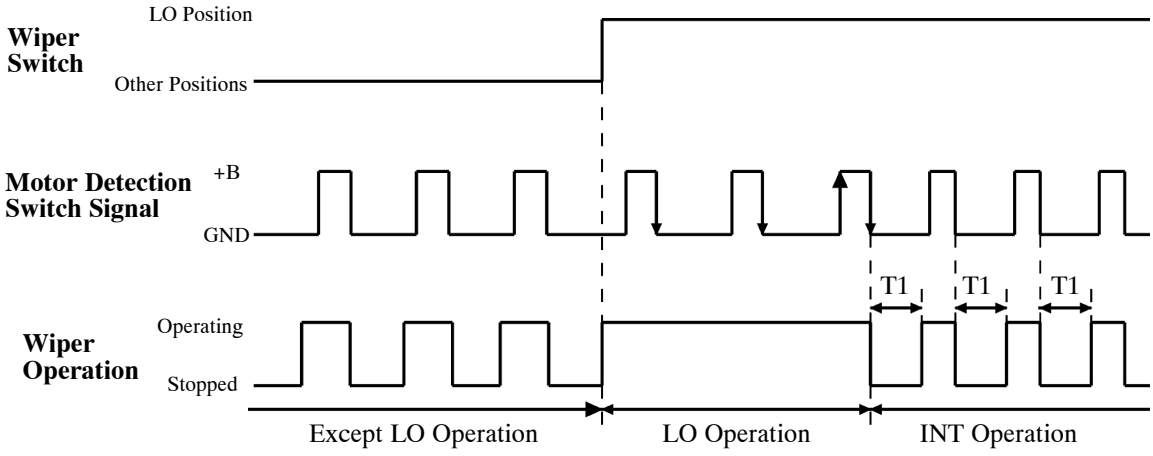


T1: Approx. 2.5 sec.

■ STOPPED VEHICLE INTERMITTENT WIPER FUNCTION

- When the wiper switch is changed to the LO position while the vehicle is stopped, the wiper operates three times in LO. It then switches automatically to an intermittent operation with an interval time of approximately 2.5 seconds.
- When the automatic control adjuster is in the FAST position, the wiper operates in LO when the vehicle is stopped.

▶ Timing Chart ◀



T1: Approx. 2.5 sec.

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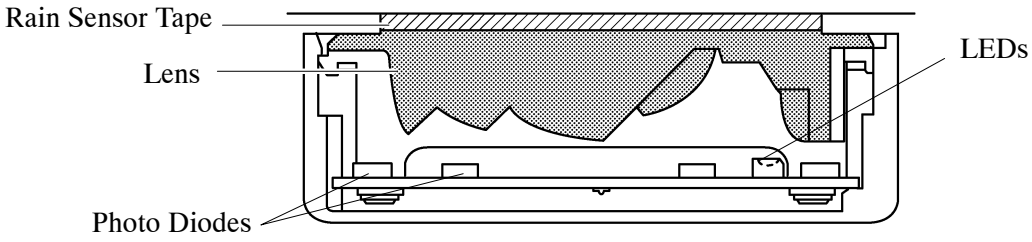
■ RAIN SENSING FUNCTION

1. General

- The rain sensing function controls the wiper timing in accordance with the amount of raindrops that strikes the windshield when the wiper switch is in the AUTO position.
- The windshield wiper ECU controls the timing based on the signal from the rain sensor.

2. Rain Sensor

The rain sensor consists of two LEDs (Light Emitting Diodes) that emit infrared rays, 3 photo diodes that can receive those rays, a lens and rain sensor tape.

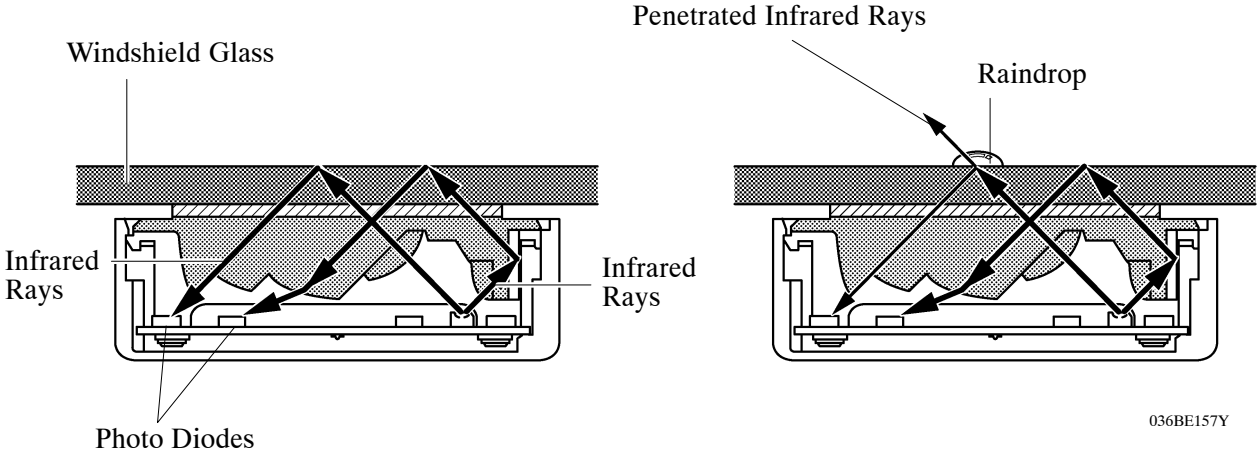


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Service Tip

If the rain sensor tape has been peeled off during a windshield glass replacement, make sure to affix new rain sensor tape. Failure to do so will lead to a system malfunction.

- If no rain are present in the detection area, the infrared rays emitted by the LED are all reflected from the outer surface of the windshield glass and are received by the photo diode.
- If rain are present in the detection area, a portion of the emitted infrared rays penetrate the windshield glass due to the change in the difference of the index of refraction between the glass and the area outside the windshield (difference between air and water).
  The ability of the windshield glass to reflect all light back inside changes due to the presence of rain. This change of internal reflection due to presence of water reduces the amount of infrared rays that are received by the photo diode.
  The amount of this reduction is then used to determine the amount of rain. Thus, this function selects the INT, LO, and HI wiper operation in order to operate the wipers at an optimal speed and timing.

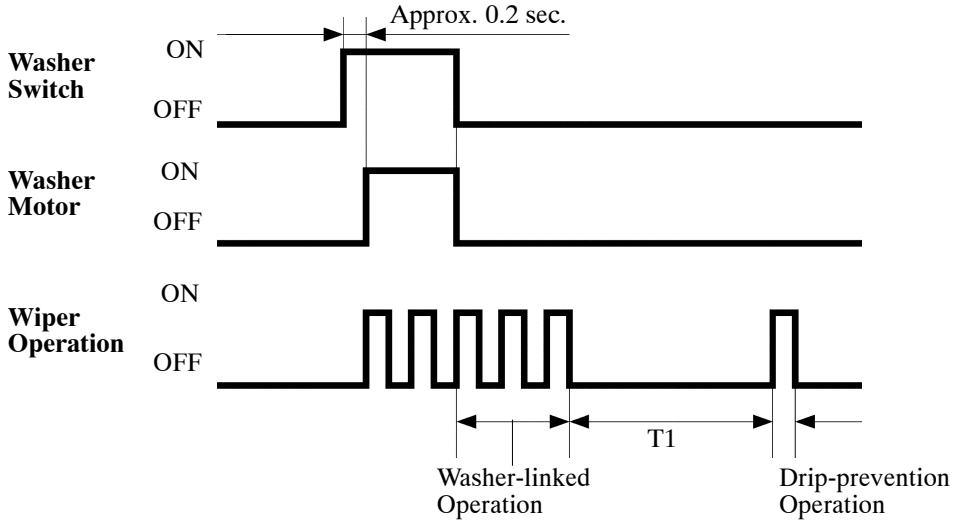


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■WASHER-LINKED WIPER WITH DRIP-PREVENTION FUNCTION

- When the wiper switch is set to OFF, INT (models without raindrop sensing function) or AUTO (models with raindrop sensing function) and the washer switch is turned ON for approximately 0.2 seconds or more, the wipers start on LO at the same time as the washer fluid is sprayed.
- The wipers operate three times on LO after the washer switch is turned OFF.
- As shown in the following diagram, after the end of this operation, the wipers operate once more. They do so after an interval time determined by the vehicle speed, so that any washer fluid drips are wiped away.

▶ Timing Chart ◀



T1: From the interval time table

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▶ Interval Time Table ◀

Vehicle Speed km/h (mph)	Interval Time
Approx. 0 to 59 (0 to 37)	Approx. 3 sec.
Approx. 60 to 79 (37 to 49)	Approx. 5 sec.
Approx. 80 to 119 (50 to 74)	Approx. 7 sec.
Approx. 120 to 159 (75 to 99)	Approx. 5 sec.
Approx. 160 to 169 (99 to 105)	Approx. 3 sec.
Approx. 170 or more (106 or more)	No operation

■ FAIL-SAFE

The following measures are taken as fail-safe when any malfunction is detected by the windshield wiper ECU.

Trouble Area	Condition
Wiper Motor Malfunction	Stops the operation of the rain sensing function.
Communication Signal Malfunction	Rain Sensor: • Continuously performs a wiper operation prior to occurrence of a malfunction. • Switches to the intermittent operation if a malfunction of the rain sensor is detected when the power source is switched from IG-OFF to IG-ON or the wiper switch is in AUTO position.
	Wiper Switch: Continuously perform a wiper operation prior to occurrence of a malfunction.
	Main body ECU, ECM and combination meter: Continuously perform the LO operation.

■ DIAGNOSIS

- If the windshield wiper ECU detects a malfunction in the washer system, it stores 5-digit DTC (Diagnostic Trouble Code) in memory.
- When the rain sensor detects a malfunction, it stores 5-digit DTC (Diagnostic Trouble Code) in memory.
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.

AIR CONDITIONING

■ DESCRIPTION

- Automatic air conditioning using left / right independent temperature control and neural network control is standard equipment on all models.
- A multi-zone automatic climate control has been provided, which independently regulates the outlet air temperature for both the front and rear seats and the automatic air conditioning using the neural network control to improve climate comfort all occupants. For details, see the equipment list in the MO section.
- For further comfort enhancement for rear passengers, the rear cooler unit is provided on the automatic air conditioning with left/right independent temperature control setting models, and the rear air conditioning unit is provided on the multi-zone automatic climate control setting models.
- The air conditioning system used on new Land (Station Wagon) Cruiser has the following features:

High Performance	• Neural network control is used so passengers can control the air conditioning accurately for maximum comfort. • The cooling box is available as an option. The ejector arranged inside the refrigerant pipes is capable of allowing refrigerant to flow to the cooling box without cutting off the refrigerant flow to the air conditioning unit, thereby improving air conditioning performance and ensuring the refrigeration ability. • The sub-cool accelerator system has been provided. This system consists of inner and outer pipes, and is capable of improving the cooling performance because of its effective heat exchanging design. • The PTC (Positive Temperature Coefficient) heater system is used. This system contains a PTC heater that heats the air that has passed through the heater core to ensure proper heater performance. • A micro dust and pollen filter, which removes pollen, is used as the clean air filter. • Micro dust pollen filter mode control is used to remove pollen in the area around the upper part of the bodies of the driver and front passenger. • For further enhancement of heater performance, a viscous type power heater has been provided on European diesel engine models. • The blower control has 7 levels in manual mode and 31 levels in auto mode for more precise control.
Lightweight	A BUS connector with a built-in IC is used in a lightweight wire harness design with a reduced number of wires. The use of this connector means that pulse pattern type servo motors are used.
Compact	• A blower motor with a built-in blower motor controller is used in a compact construction. • A rotary compact air mix door requiring less operational space is mounted in the front air conditioning unit.
Others	The following parts are used to ensure high cooling or heating performance while realizing a compact and lightweight construction. • Semi-center Location Front A/C Unit • RS (Revolutionary super-slim Structure) Evaporator • SFA (Straight Flow Aluminum)-II Heater Core • MF (Multi-Flow)-IV Sub-cool Condenser • Fixed capacity type compressor (10SR19 type)

■ PERFORMANCE AND SPECIFICATION

1. Performance

▶ Front Air Conditioning Unit ◀

Heater	Heat Output	W	5890
	Air Flow Volume	m^3/h	360
	Power Consumption	W	250
Air Conditioning	Cooling Capacity	W	5450
	Air Flow Volume	m^3/h	600
	Power Consumption	W	300

▶ Rear Cooler / Rear Air Conditioning Unit ◀

Heater*	Heat Output	W	3750
	Air Flow Volume	m^3/h	240
	Power Consumption	W	180
Air Conditioning	Cooling Capacity	W	3300
	Air Flow Volume	m^3/h	320
	Power Consumption	W	200

*: Models with the rear air conditioning unit

2. Specifications

Destinations				G.C.C. Countries	Europe
Ventilation and Heater Core	Heater Radiator Unit	Front	Type	SFA (Straight Flow-Aluminum)-II	←
			Size W × H × L mm (in.)	295 × 120 × 27 (11.6 × 4.8 × 1.1)	←
			Fin Pitch mm (in.)	1.5 (0.06)	←
		Rear	Type	SFA (Straight Flow-Aluminum)-II	←
			Size W × H × L mm (in.)	191.1 × 130 × 21 (7.5 × 5.1 × 0.8)	←
			Fin Pitch mm (in.)	1.8 (0.07)	←
Ventilation and Heater Core	Blower	Front	Motor Type	Brushless Step-IV	←
			Fan Type	Semi Sirocco	←
			Fan Size Dia. × H mm (in.)	165 × 70 (6.5 × 2.8)	←
		Rear	Motor Type	K62	←
			Fan Type	High Pressure Drop Type	←
			Fan Size Dia. × H mm (in.)	140 × 70 (5.5 × 2.8)	←
Air Conditioning	Condenser		Type	MF (Multi-Flow)-IV	←
			Size W × H × L mm (in.)	626 × 524 × 22 (24.6 × 20.6 × 0.9)	640 × 524 × 16 (25.2 × 20.6 × 0.6)
			Fin Pitch mm (in.)	3.1 (0.12)	3.15 (0.12)
	Evaporator	Front	Type	RS (Revolutionary super-slim Structure)	←
			Size W × H × L mm (in.)	293 × 235 × 50 (11.5 × 9.3 × 2)	←
			Fin Pitch mm (in.)	3.0 (0.1)	←
		Rear	Type	RS (Revolutionary super-slim Structure)	←
			Size W × H × L mm (in.)	146 × 255 × 50 (5.7 × 10 × 2)	←
			Fin Pitch mm (in.)	3.4 (0.13)	←
	Compressor		Type	10SR19	←
			Pulley	Steel with Magnetic Clutch	←
	Refrigerant		Type	HFC 134a	←
			Charge Volume g	870±30*1 1010±30*2 970±30*3	770±30*1 970±30*2 920±30*3

*1: Models with the automatic air conditioning using left/right independent temperature control and without the rear cooler unit

*2: Models with the rear cooler unit or rear air conditioning unit, and cooling box

*3: Models with the rear cooler unit or the rear air conditioning unit, and without cooling box

Destinations				Australia	General Countries and China
Ventilation and Heater Core	Heater Radiator Unit	Front	Type	SFA (Straight Flow-Aluminum)-II	←
			Size W × H × L mm (in.)	295 × 120 × 27 (11.6 × 4.8 × 1.1)	←
			Fin Pitch mm (in.)	1.5 (0.06)	←
		Rear	Type	SFA (Straight Flow-Aluminum)-II	←
			Size W × H × L mm (in.)	191.1 × 130 × 21 (7.5 × 5.1 × 0.8)	←
			Fin Pitch mm (in.)	1.8 (0.07)	←
Ventilation and Heater Core	Blower	Front	Motor Type	Brushless Step-IV	←
			Fan Type	Semi Sirocco	←
			Fan Size Dia. × H mm (in.)	165 × 70 (6.5 × 2.8)	←
		Rear	Motor Type	K62	←
			Fan Type	High pressure drop type	←
			Fan Size Dia. × H mm (in.)	140 × 70 (5.5 × 2.8)	←
Air Conditioning	Condenser		Type	MF (Multi-Flow)-IV	←
			Size W × H × L mm (in.)	640 × 524 × 16 (25.2 × 20.6 × 0.6)	←
			Fin Pitch mm (in.)	3.15 (0.12)	←
	Evaporator	Front	Type	RS (Revolutionary super-slim Structure)	←
			Size W × H × L mm (in.)	293 × 235 × 50 (11.5 × 9.3 × 2)	←
			Fin Pitch mm (in.)	3.0 (0.1)	←
		Rear	Type	RS (Revolutionary super-slim Structure)	←
			Size W × H × L mm (in.)	146 × 255 × 50 (5.7 × 10 × 2)	←
			Fin Pitch mm (in.)	3.4 (0.13)	←
	Compressor		Type	10SR19	←
			Pulley	Steel with Magnetic Clutch	←
	Refrigerant		Type	HFC 134a	←
			Charge Volume g	770±30*1 970±30*2 920±30*3	770±30*1 970±30*2 920±30*3

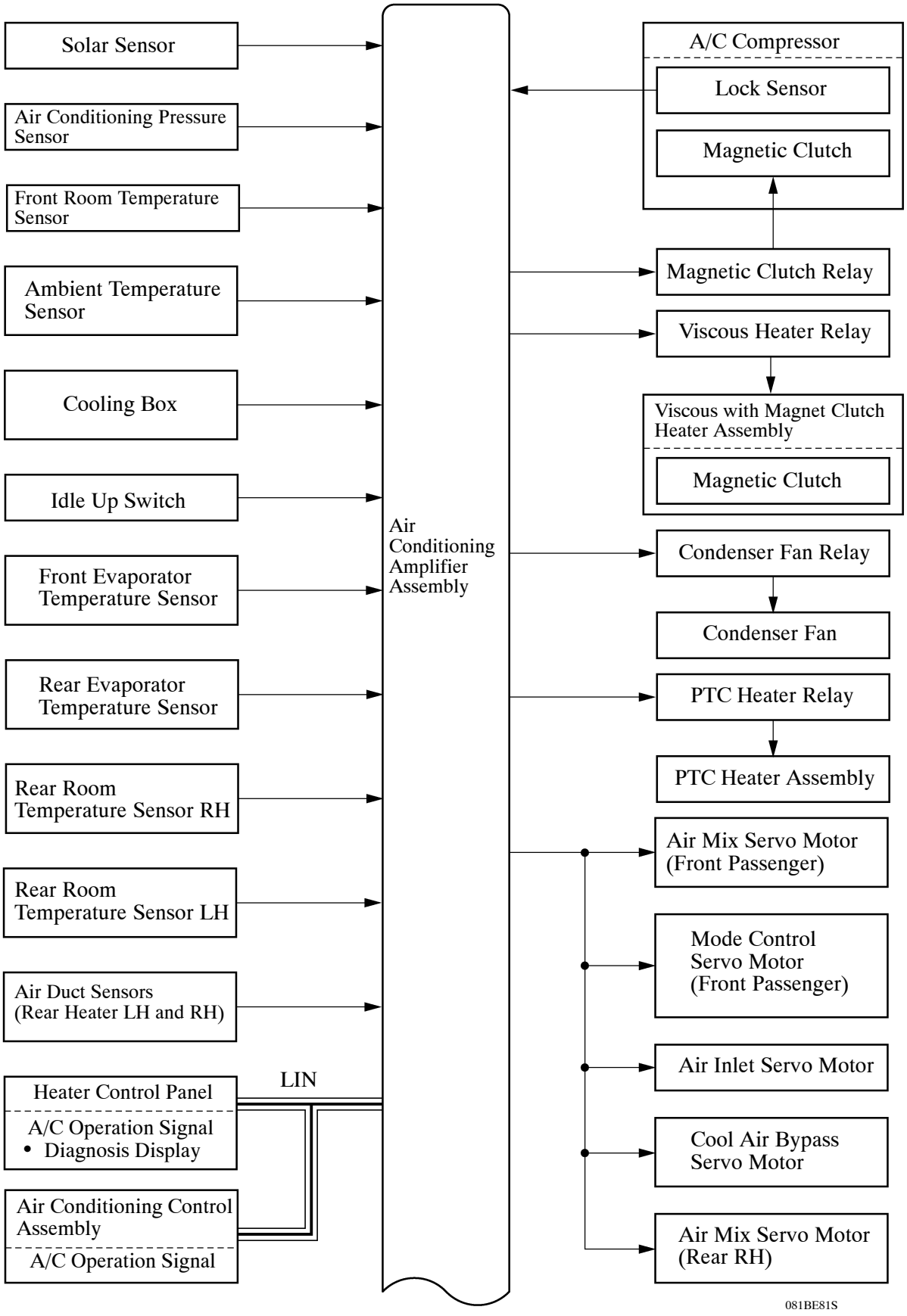
*1: Models with the automatic air conditioning using left/right independent temperature control and without the rear cooler unit

*2: Models with the rear cooler unit or rear air conditioning unit, and cooling box

*3: Models with the rear cooler unit or the rear air conditioning unit, and without cooling box

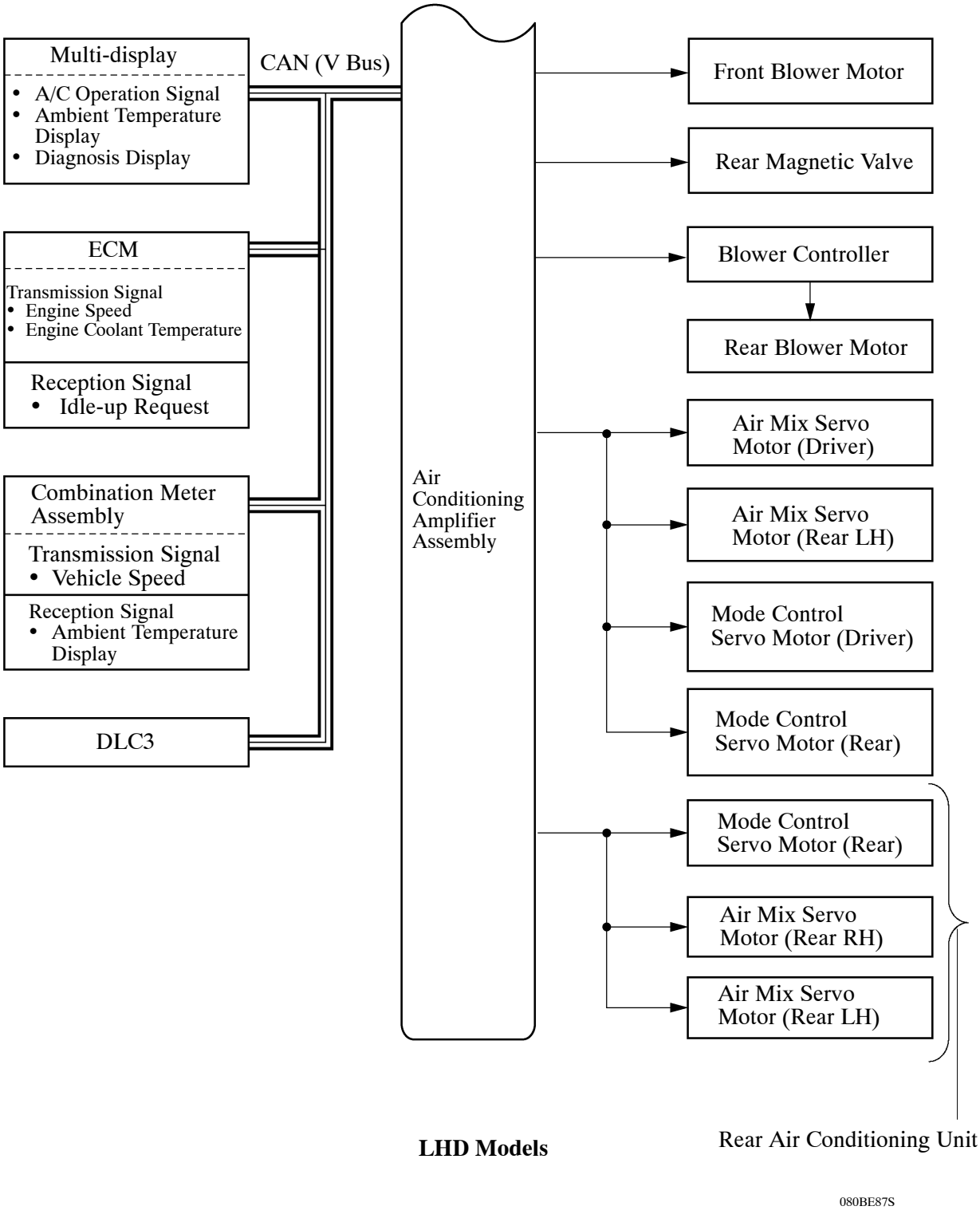
■SYSTEM DIAGRAM

▶ Models with the multi-zone automatic climate control ◀



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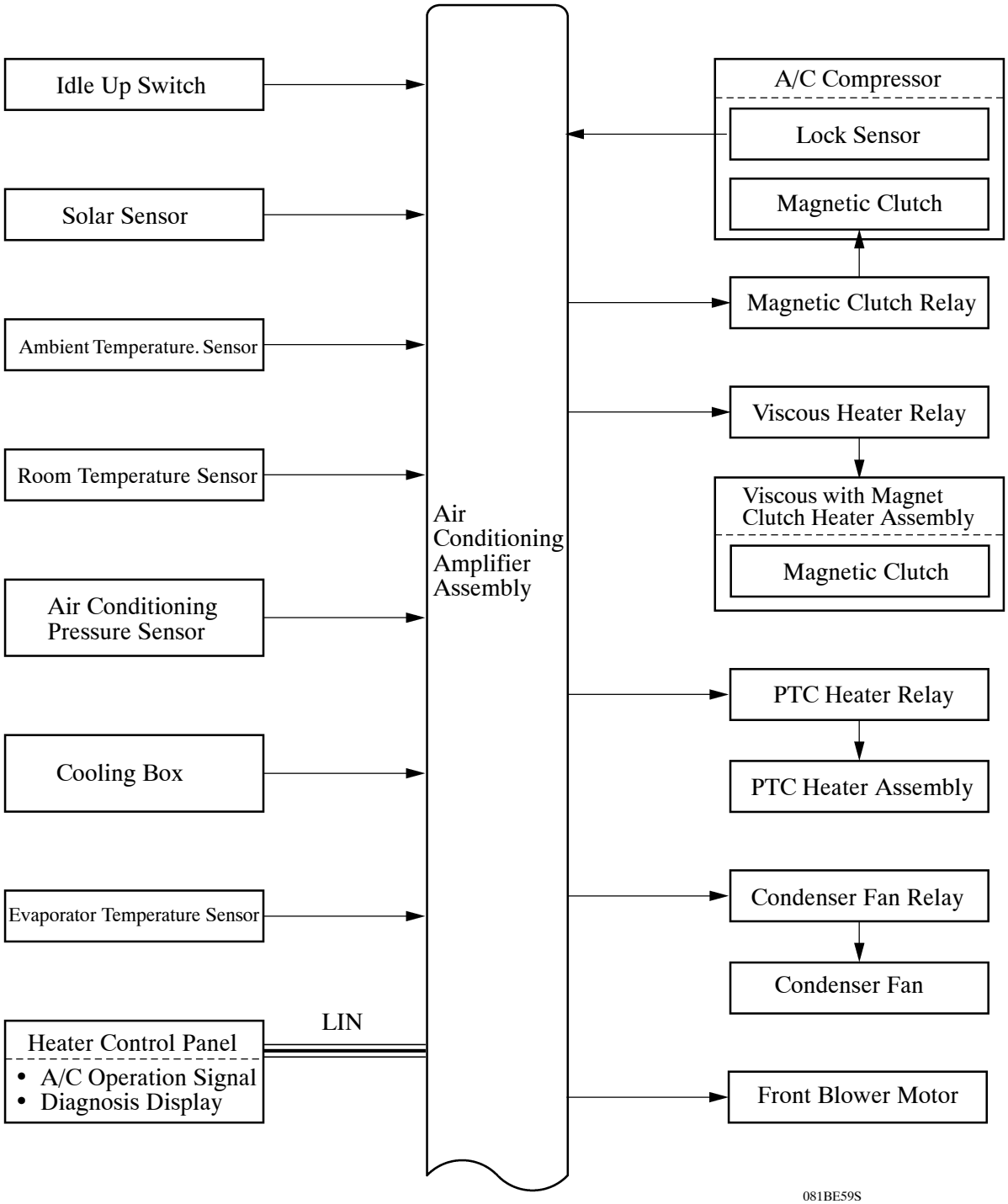
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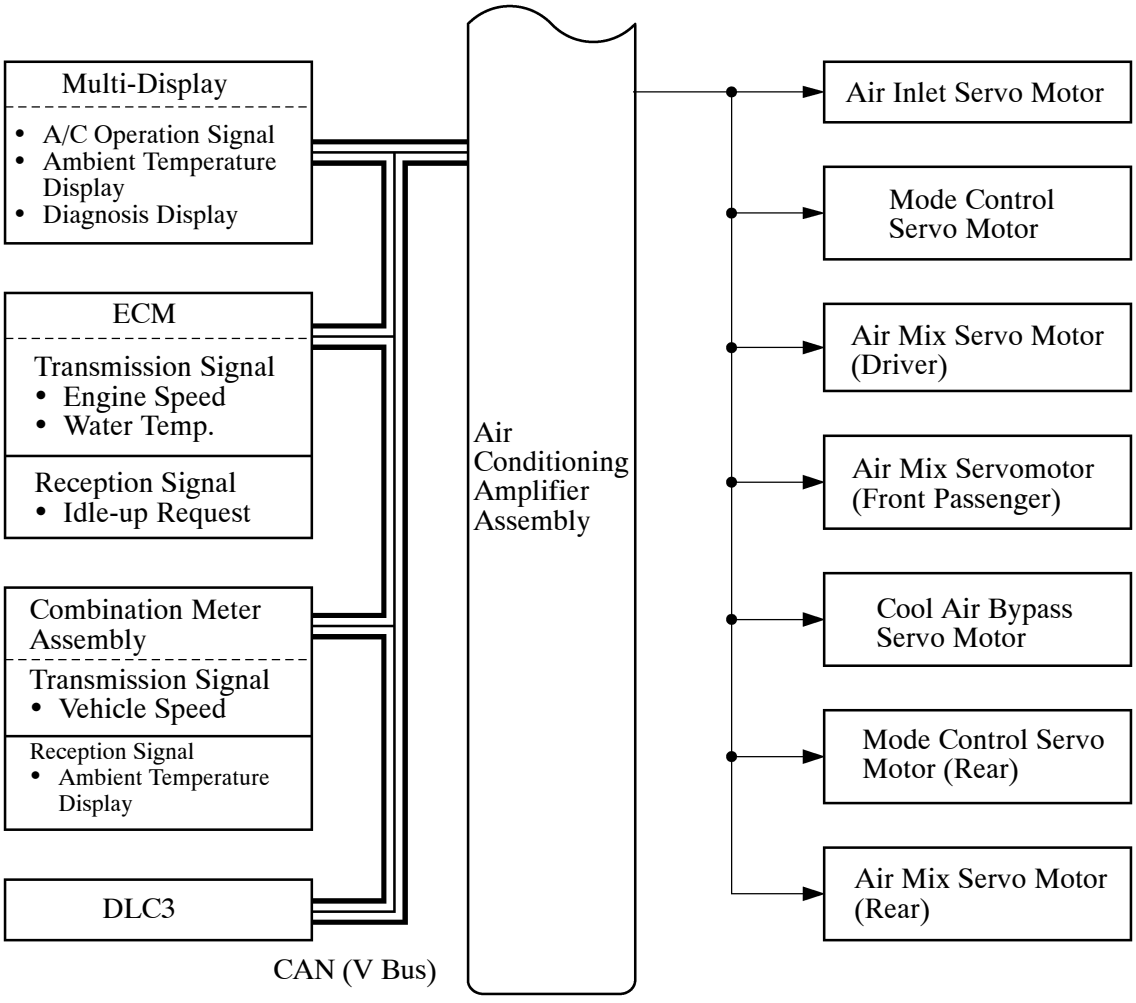
LHD Models

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▶ Models with the right-left independent temperature control ◀



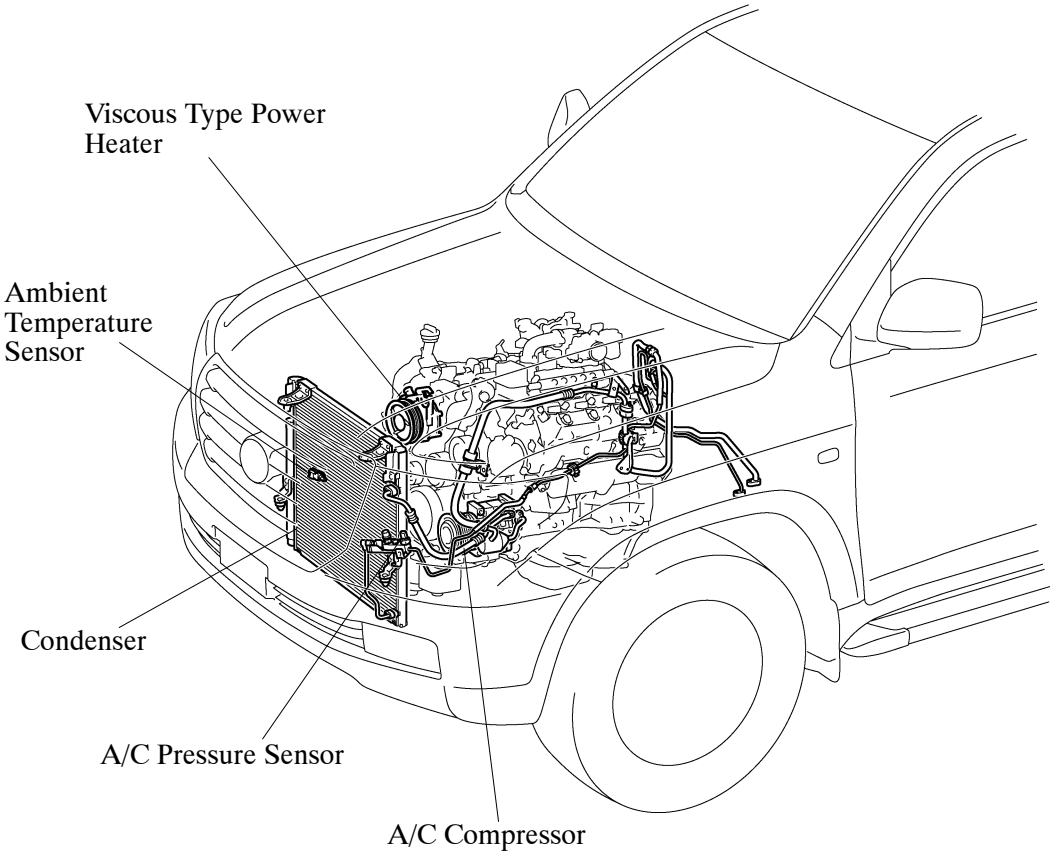
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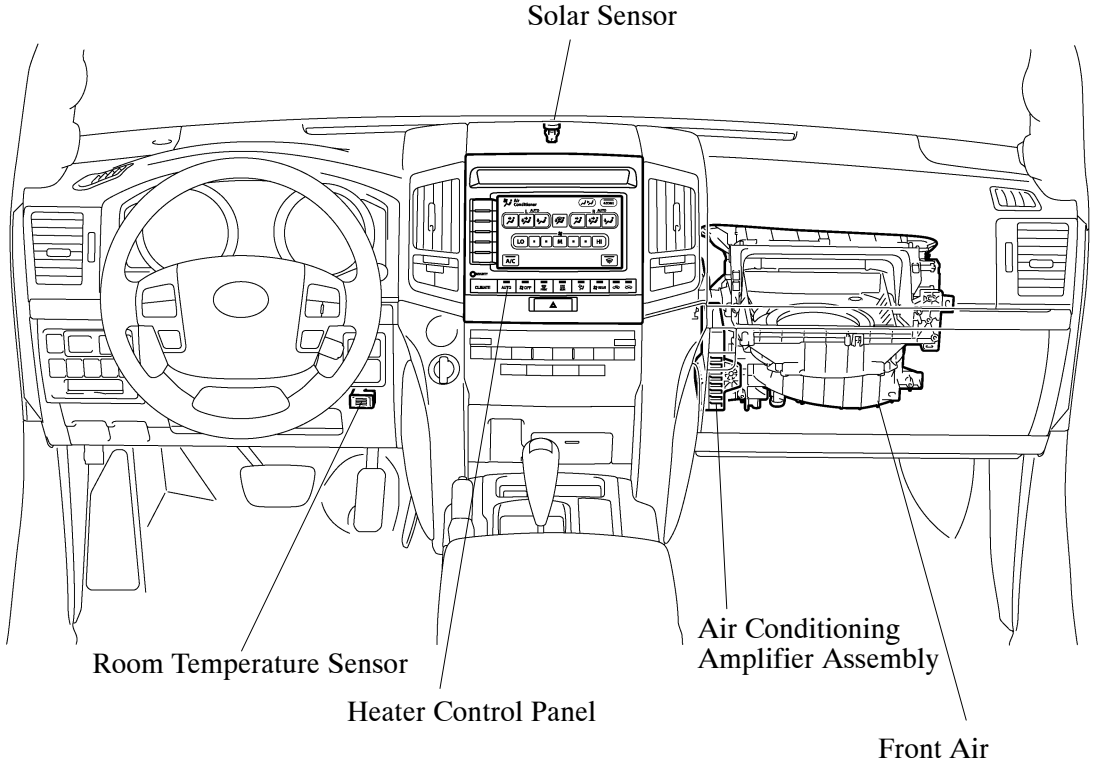


LHD Models

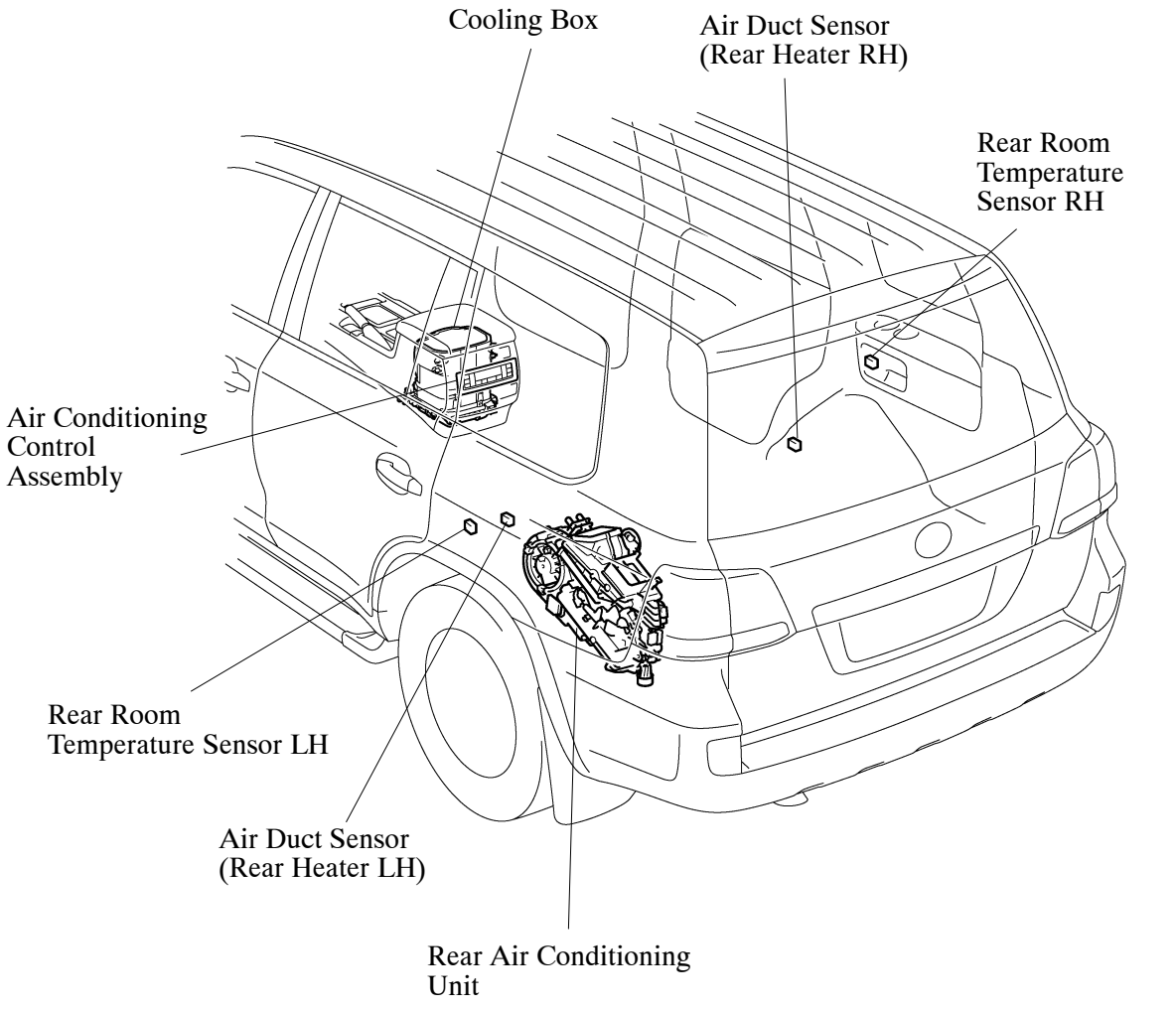
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■LAYOUT OF MAIN COMPONENTS

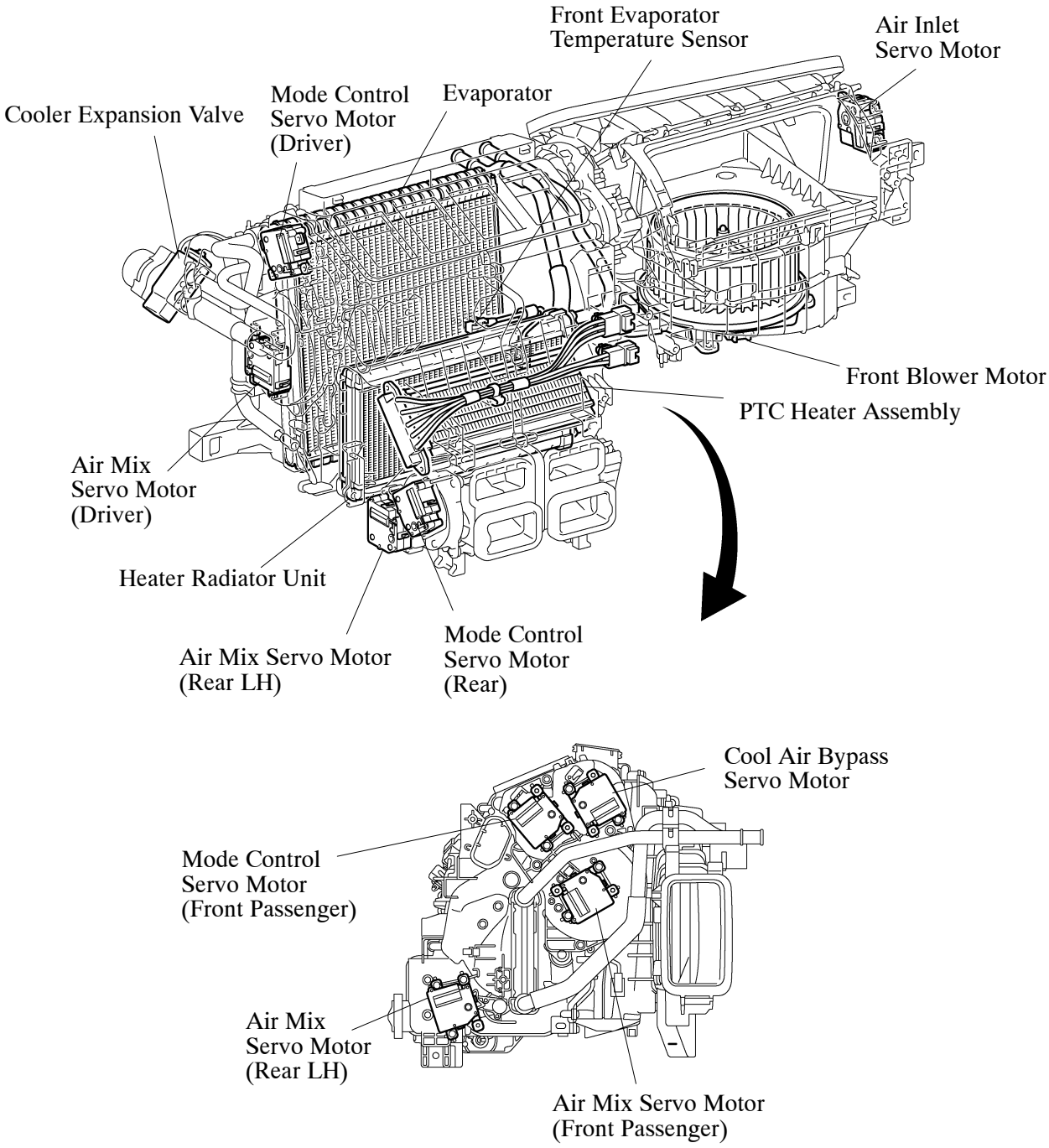




LHD Models


Cooling Box
Air Duct Sensor
(Rear Heater RH)
Rear Room
Temperature
Sensor RH
Air Conditioning
Control
Assembly
Rear Room
Temperature Sensor LH
Air Duct Sensor
(Rear Heater LH)
Rear Air Conditioning
Unit
080BE36H

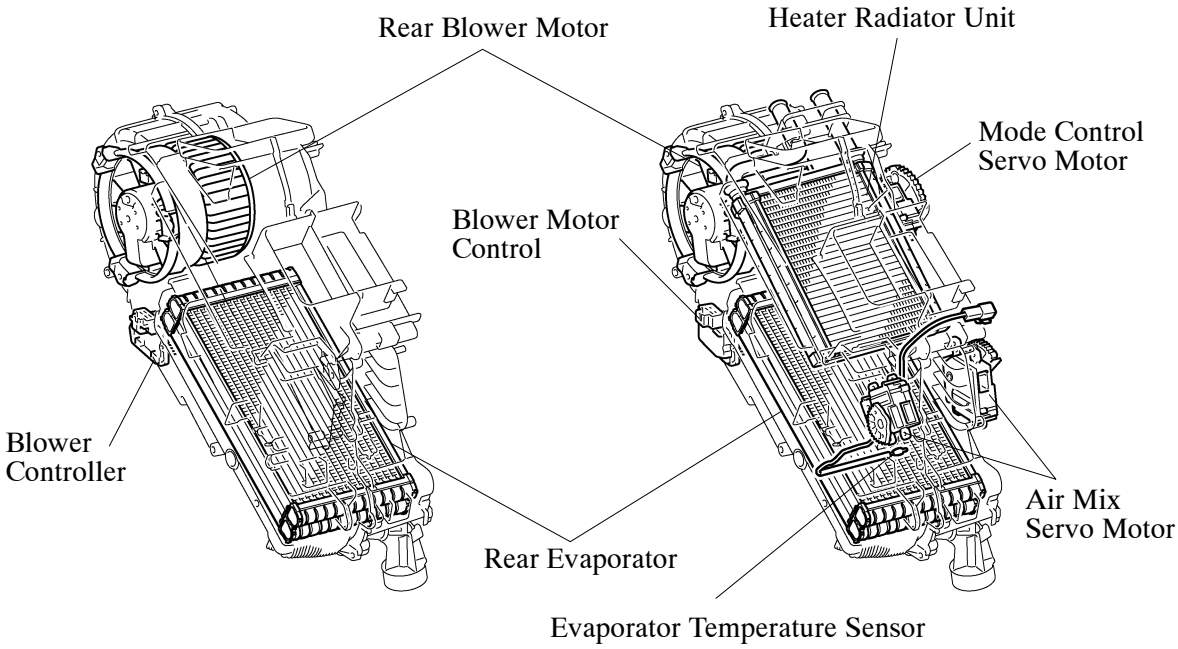
LHD Models



Front Air Conditioning Unit
(LHD Models)

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BE

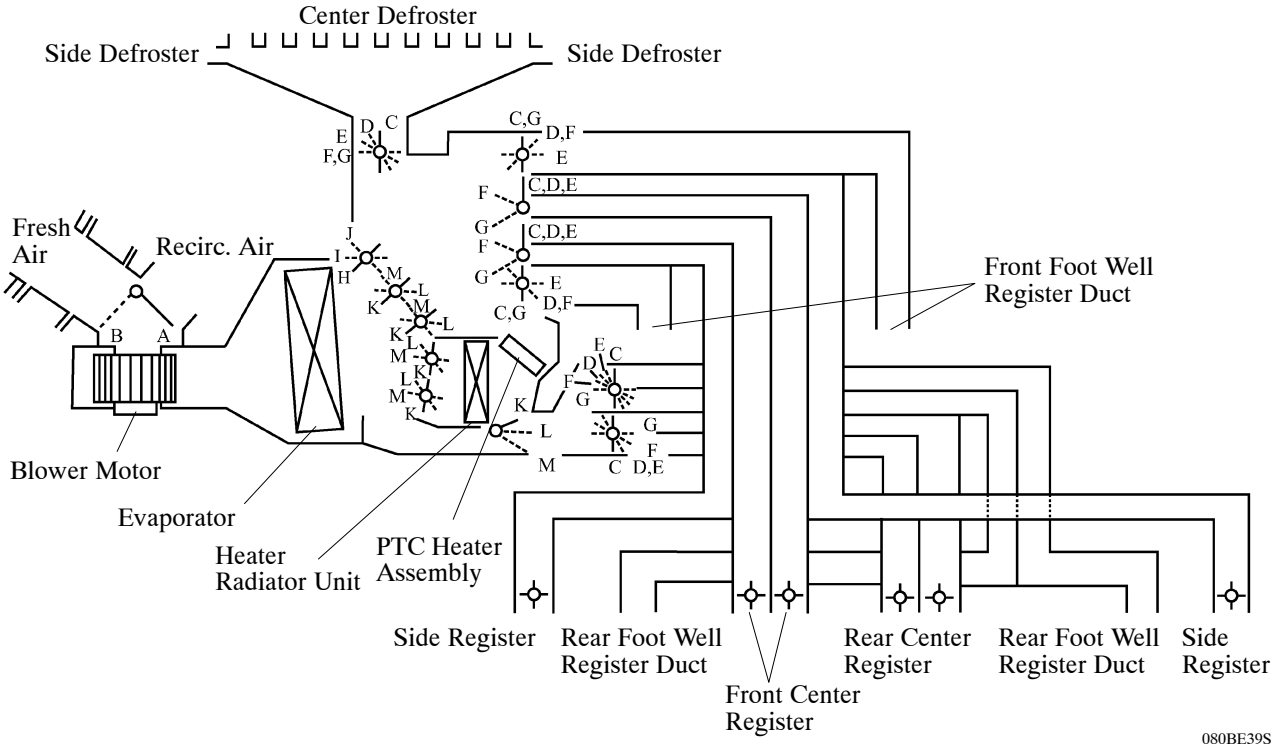


Models with Rear Cooler **Models with Rear Air Conditioning**

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■MODE POSITION AND DAMPER OPERATION

▶ Front Air Conditioning (Models with the multi-zone automatic climate control) ◀

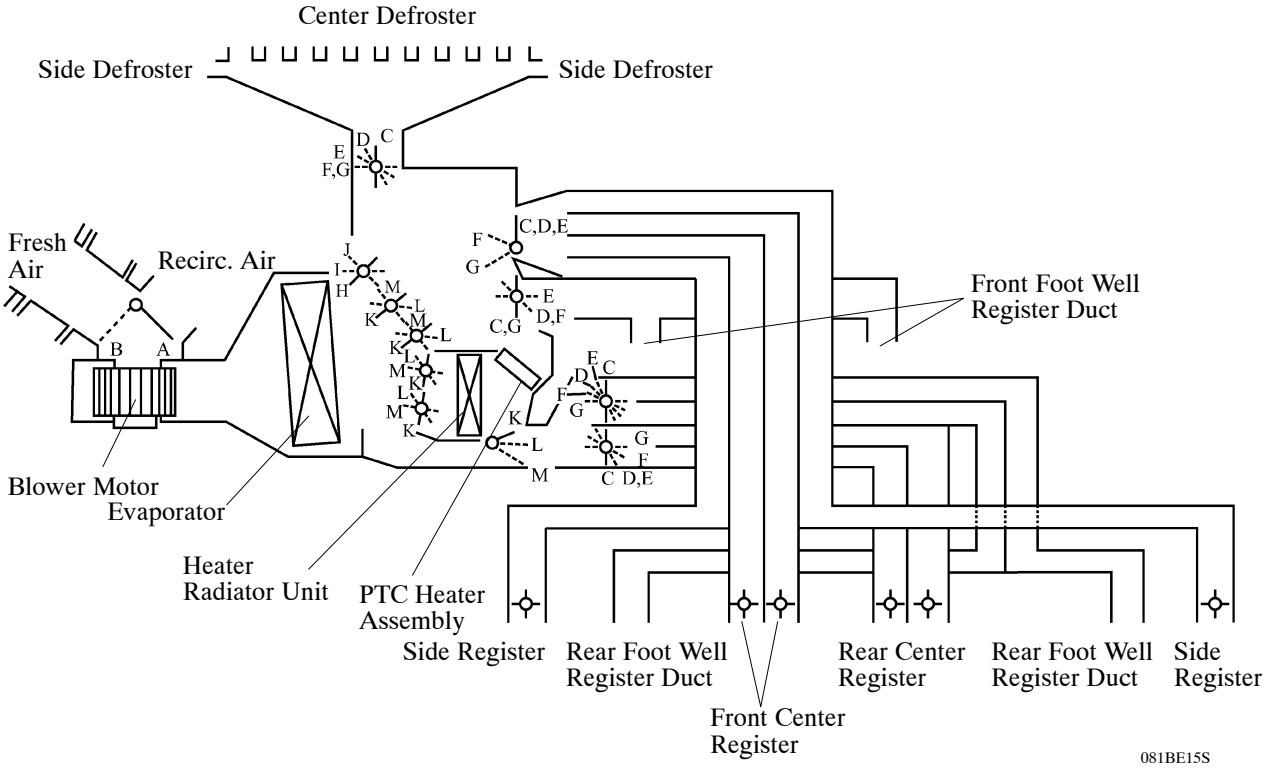


▶ Function of Main Damper ◀

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 to MAX HOT Temp. Setting	K-L-M	Varies the mixture ratio of the cold air and the hot air in order to regulate the temperature continuously from HOT to COLD.
Cool Air Bypass Damper	MAX COLD to MAX HOT Temp. Setting	H-I-J	Cool air blows out from the front center register and side registers, in order to adjust the temperature around the heads of the occupants during cooling or warming.
Mode Control Damper	 DEF 187BE28	C	Defrosts the windshield through the center defroster, and side defroster.
	 FOOT / DEF 187BE27	D	Defrosts the windshield through the center defroster, side defroster, while air is also blown out from the front and rear footwell register ducts. In addition, air blows out slightly from front and rear center registers and side register.
	 FOOT 187BE26	E	Air blows out of the front and rear foot well register duct, front and rear center register, and side register. In addition, air blows out slightly from the center defroster, side defroster and side register.
	 BI-LEVEL 187BE25	F	Air blows out of the front and rear center registers, side register, and front and rear footwell register ducts.
	 FACE 187BE24	G	Air blows out of the front and rear center registers, and side register.

BE

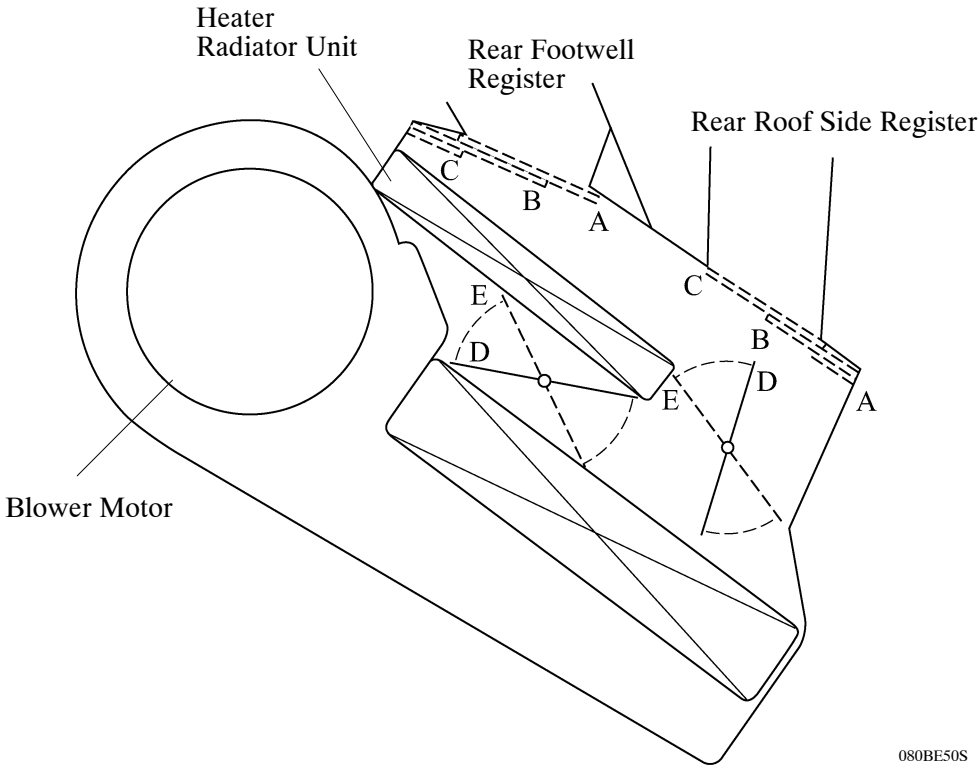
▶ Front Air Conditioning Unit (Models with left / right independent temperature control) ◀



▶ 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 to MAX HOT Temp. Setting	K-L-M	Varies the mixture ratio of the cold air and the hot air in order to regulate the temperature continuously from HOT to COLD.
Cool Air Bypass Damper	MAX COLD to MAX HOT Temp. Setting	H-I-J	Cool air blows out from the front center register and side registers, in order to adjust the temperature around the heads of the occupants during cooling or warming.
Mode Control Damper	DEF 187BE28	C	Defrosts the windshield through the center defroster, and side defroster.
	FOOT / DEF 187BE27	D	Defrosts the windshield through the center defroster, side defroster, while air is also blown out from the front and rear footwell register ducts. In addition, air blows out slightly from front and rear center registers and side register.
	FOOT 187BE26	E	Air blows out of the front and rear foot well register duct, front and rear center register, and side register. In addition, air blows out slightly from the center defroster, side defroster and side register.
	BI-LEVEL 187BE25	F	Air blows out of the front and rear center registers, side register, and front and rear footwell register ducts.
	FACE 187BE24	G	Air blows out of the front and rear center registers, and side register.

▶ Rear Air Conditioning ◀



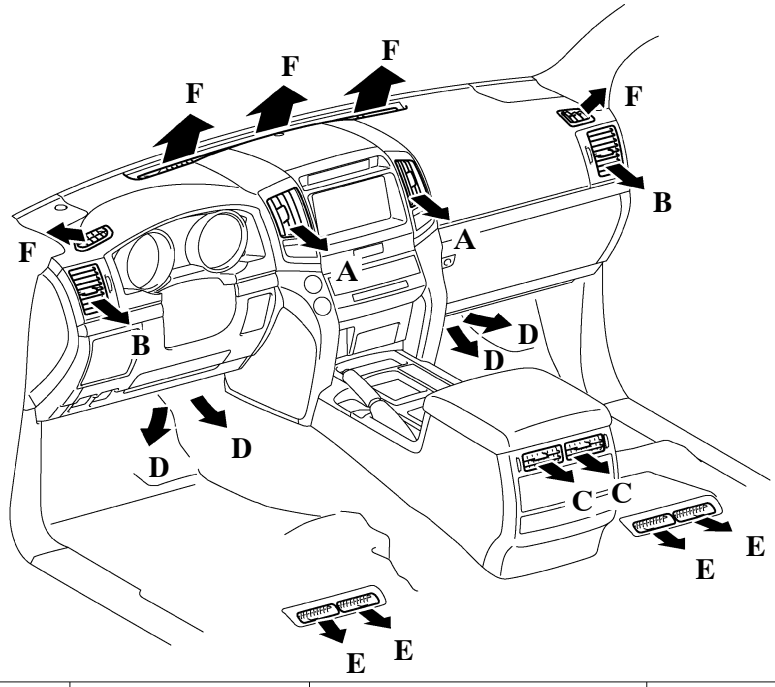
▶ Function of Main Damper ◀

BE

Control Damper	Operation Position	Damper Position	Operation
Mode Control Door	 187BE24 FACE	A	Air blows out of the rear roof side register.
	 187BE25 BI-LEVEL	B	Air blows out of the rear roof side register and the rear footwell register.
	 187BE26 FOOT	C	Air blows out of the rear footwell register.
Air Mix Control Damper	MAX COLD to MAX HOT Temp. Setting	D-E	Varies the mixture ratio of the cold air and the hot air in order to regulate the temperature continuously from HOT to COLD.

■AIR OUTLETS AND AIRFLOW VOLUME

1. Front Registers



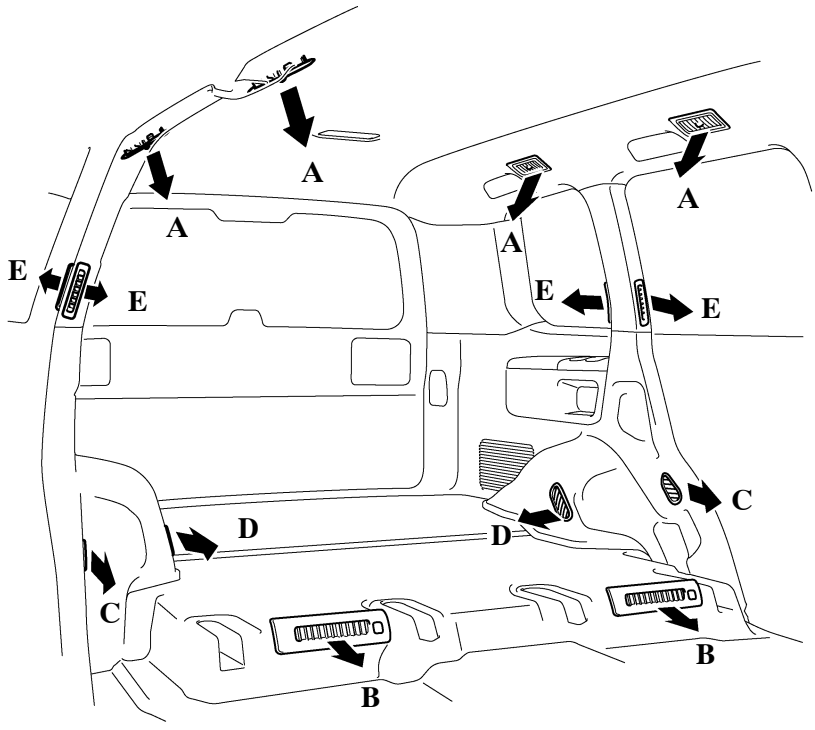
INDICATION	MODE	SELECTION		FACE			FOOT		DEF
				CTR	SIDE	RR (CTR)	FR	RR	CTR
		AUTO	MANUAL	A	B	C	D	E	F
	FACE-U	○	○	◯	◯	○	—	—	—
	FACE-L*1	○	—	◯	◯	○	○	—	—
	B/L-U*2	○	○	○	○	○	◯	○	—
	B/L-L*3	○	—	○	○	○	◯	◯	—
	FOOT-F*4	○	—	○	○	○	◯	◯	○
	FOOT-R*5	○	—	○	○	○	◯	◯	○
	FOOT-D*6	○	—	○	○	○	◯	◯	○
	F/D	○	○	○	○	○	◯	◯	◯
	DEF	○	○	—	—	—	—	—	◯

080BE41H

The size of the circle ○ indicates the proportion of airflow volume.

*1: The airflow volume is set to be greater than that in FACE-U mode.
*2: Greater airflow volume at the upper area. *3: Greater airflow volume at the lower area.
*4: Greater airflow volume at the front. *5: The airflow volume is set to be greater than that in FACE-F mode.
*6: The airflow volume is set to be greater than that in FOOT-R mode.

2. Rear Registers



INDICATION	MODE	A	B	C	D	E
	FACE	◯	—	—	—	—
	BI-LEVEL	◯	○	○	○	○
	FOOT	—	○	○	◯	◯

080BE42H

*: The rear cooler unit is only equipped with air vent holes A.

■CONSTRUCTION AND OPERATION

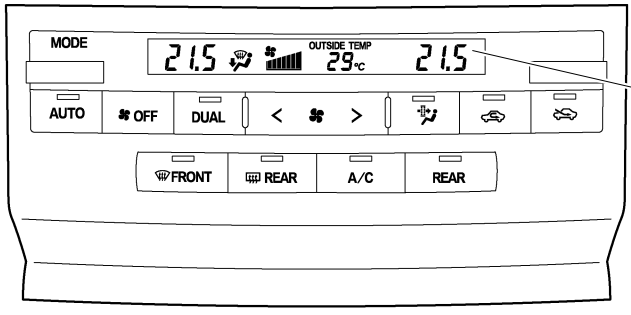
1. Air Conditioning Control Panel

General

- A push-button type heater control panel is used. There are two types of control panels, one with and one without the multi display.
- The air conditioning control assembly is located behind the center console panel.

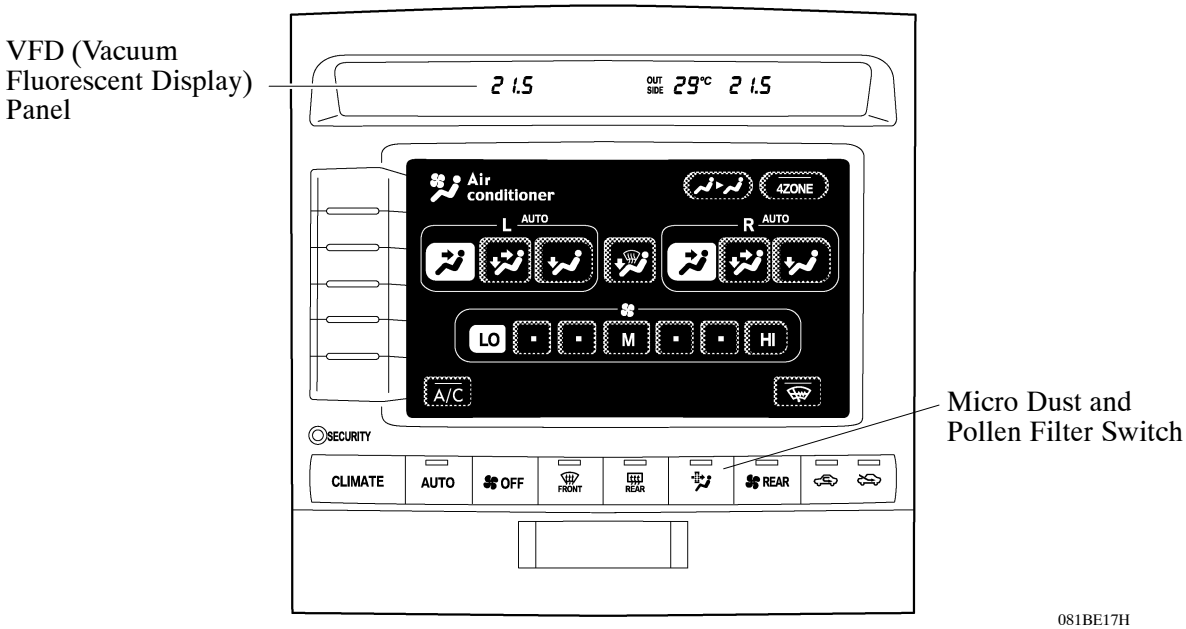
Heater Control Panel

- On models without the multi-display, the air conditioning status is displayed on an LCD (Liquid Crystal Display) panel.
- Furthermore, the set temperatures for the driver seat and front passenger seat and ambient temperature are displayed on VFD (Vacuum Fluorescent Display) panel below the multi display.
- Along with the use of the right/left independent temperature control, the temperature control switches for the driver and the front passenger have been located closer to the respective seats to enhance their ease of use.
- The set temperature and blower level for the rear seat can be changed by pressing the REAR switch on the heater control panel.



Models without Multi Display

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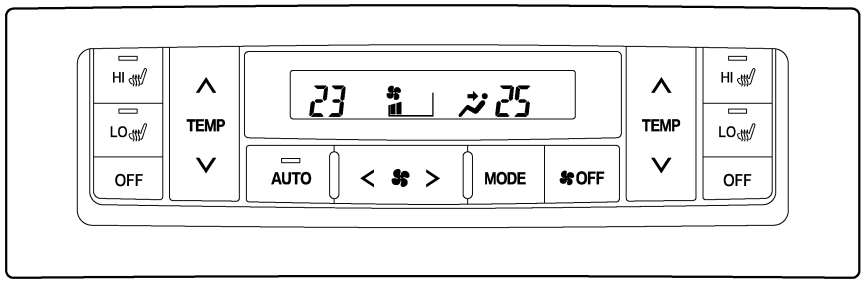


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Models with Multi Display

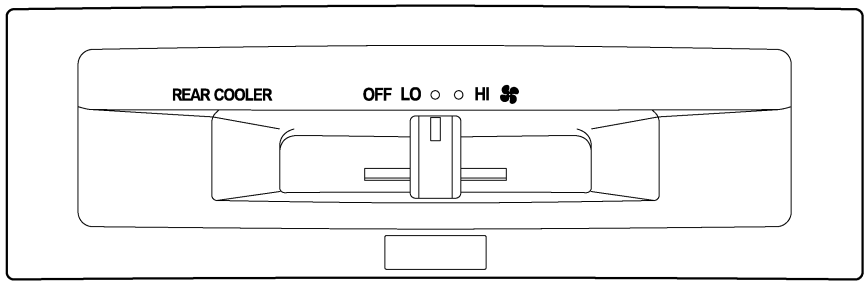
Air Conditioning Control Assembly

- The set temperatures for both seats and the operation mode for the rear air conditioning can be adjusted by individually operating the switches arranged on the air conditioning control assembly located behind the center console.
- The set temperatures for the rear air conditioning zone and both seats are displayed on the LCD (Liquid Crystal Display) air conditioning control assembly.
- On all models with the rear cooler unit, the blow volume can be adjusted by moving the lever left and right.



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Models with Rear Air Conditioning Unit



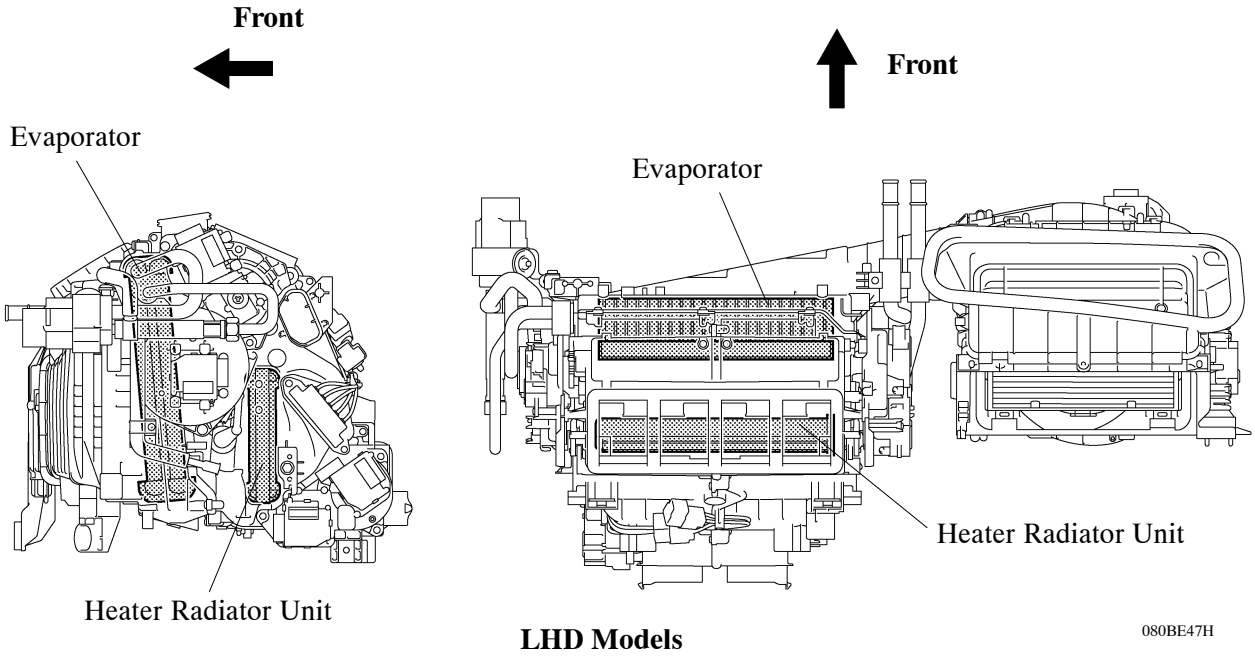
081BE18H

Models with Rear Cooler Unit

2. Air Conditioning Unit

Front Air Conditioning Unit

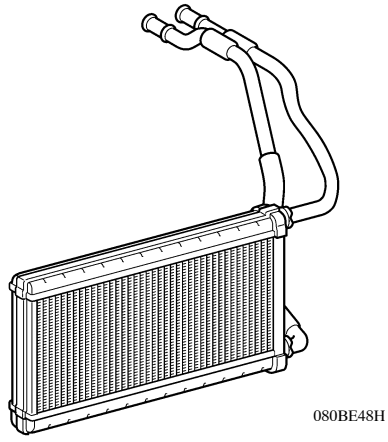
A semi-center location air conditioning unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioning unit has been made compact and lightweight.



LHD Models

Heater Radiator Unit

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

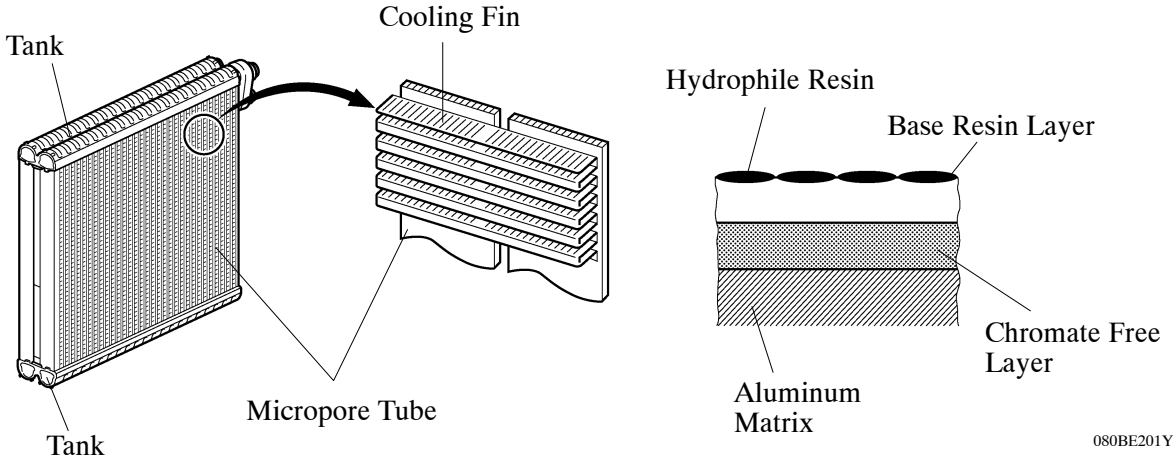


Evaporator

- 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: 90 mm (3.5 in.)→50 mm (1.9 in.)

- The evaporator body has been coated with a type of resin is capable of preventing the growth of various bacteria which can produce a bad odor which can stick to the evaporator surfaces. The substrate for this coating material includes a chromate-free layer for environmental protection.



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Evaporator Temperature Sensor

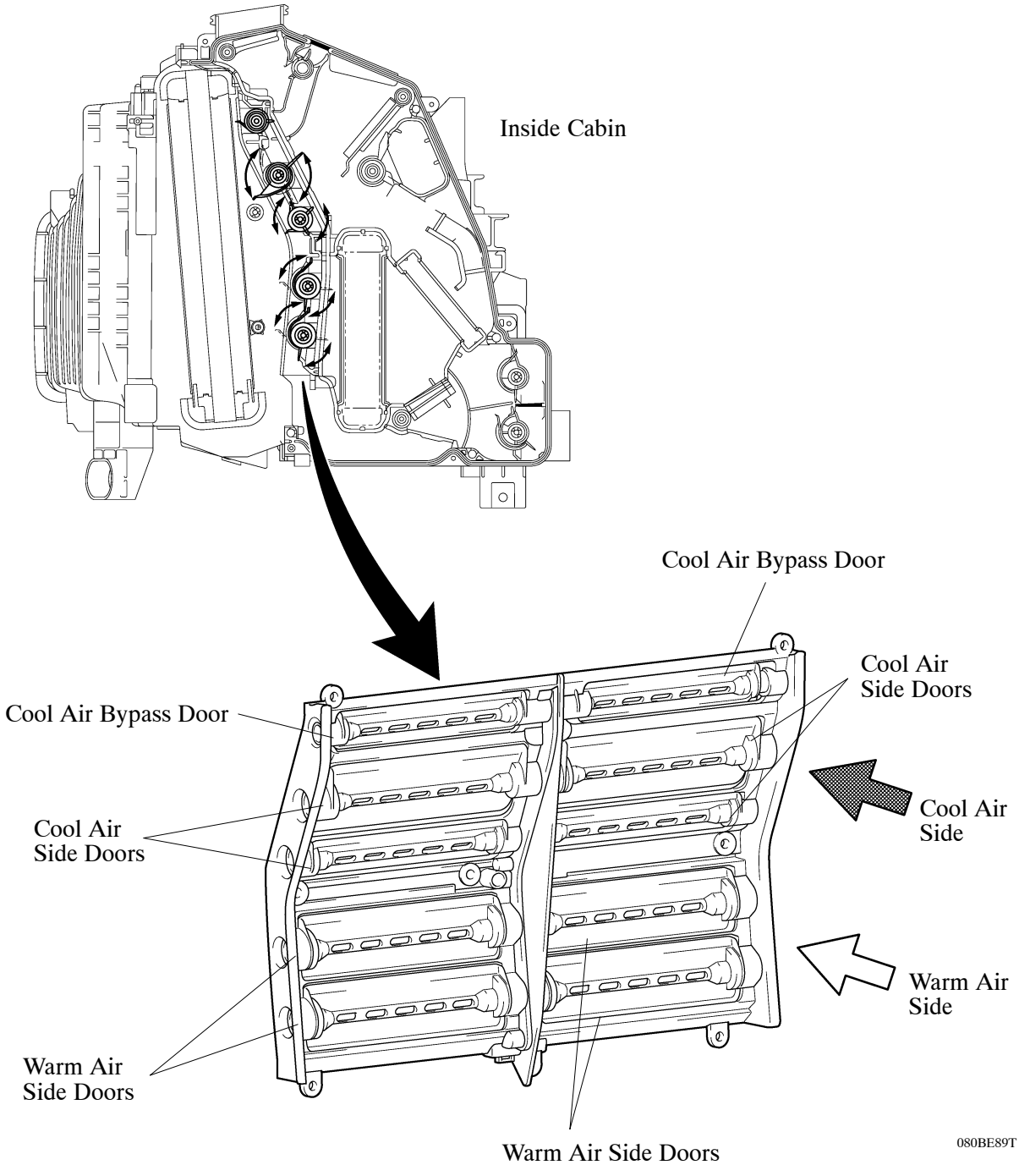
Evaporator temperature sensor detects the temperature of the cooling fin immediately past the evaporator in the form of resistance changes, and outputs it to the air conditioning amplifier assembly.

Blower Motor

The blower motor has an in-built blower controller, and is controlled with the duty control from the air conditioning amplifier assembly.

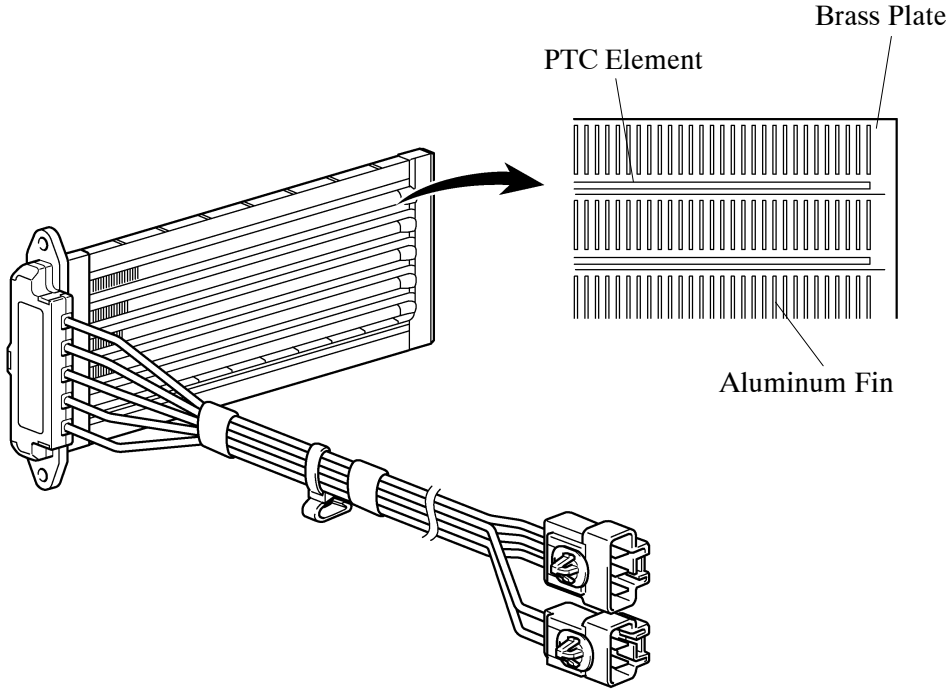
Air Mix Control Door

- A compact rotary air mix door has been provided.
- This door is independently arranged on both the left and right sides of the front air conditioning unit, moreover, 2 sets of doors are individually arranged on the warm and cold air sides. Unlike the conventional open/close type damper, all doors are designed to be openable and closable while rotating, thereby minimizing the operational space and making the front air conditioning unit more compact.



PTC Heater

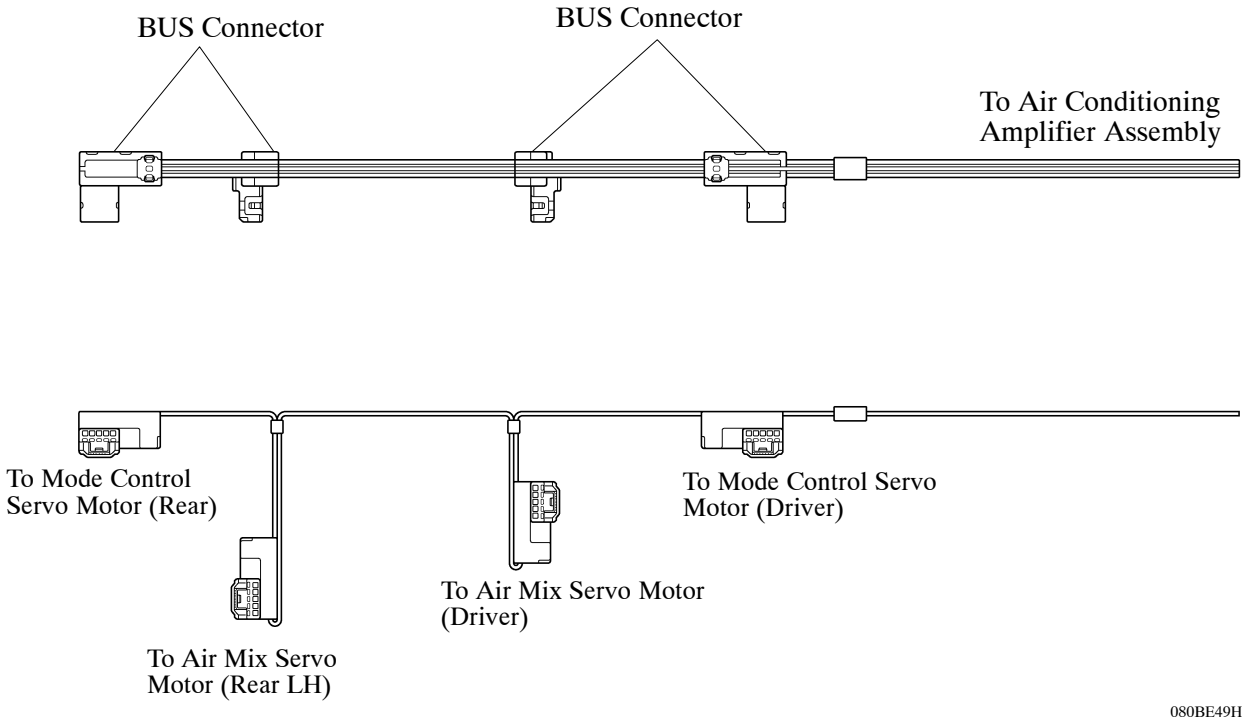
- The PTC heater assembly is located above the heater core in the air conditioning unit.
- The PTC heater consists of a PTC element, aluminum fin, and brass plate. When current is applied to the PTC element, it generates that to warm the air that passes through the unit. For details, PTC heater control on page BE-94.



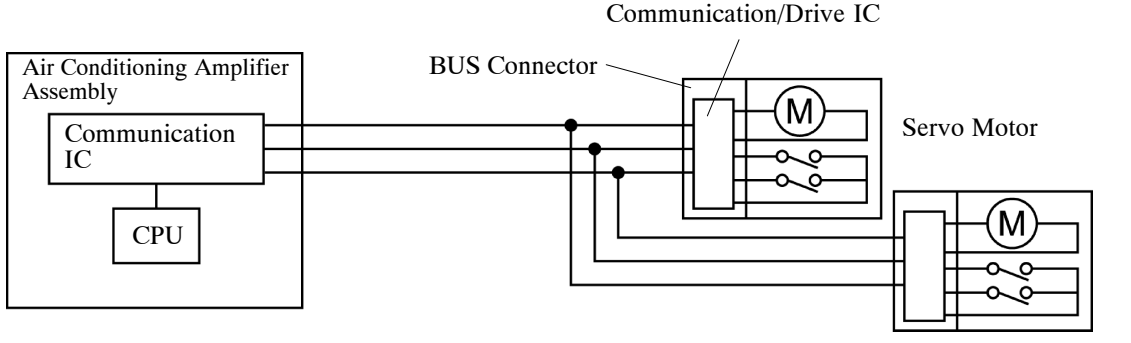
036BE43Y

BUS Connector

- A BUS connector is used in the wire harness connection that connects the servo motor from the air conditioning amplifier assembly.



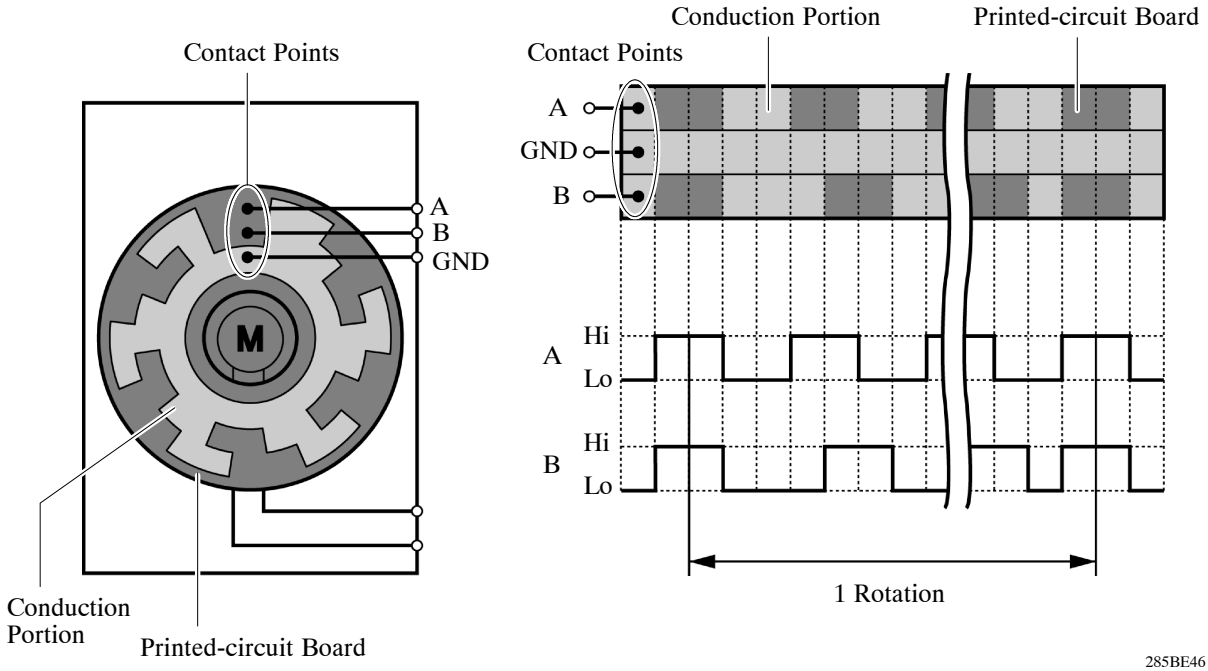
- The BUS connector has a built-in communication IC which communicates with each servo motor connector, actuates the servo motor, and has a position detection function. This enables bus communication for the servo motor wire harness, for a more lightweight construction and a reduced number of wires.



With BUS Connector

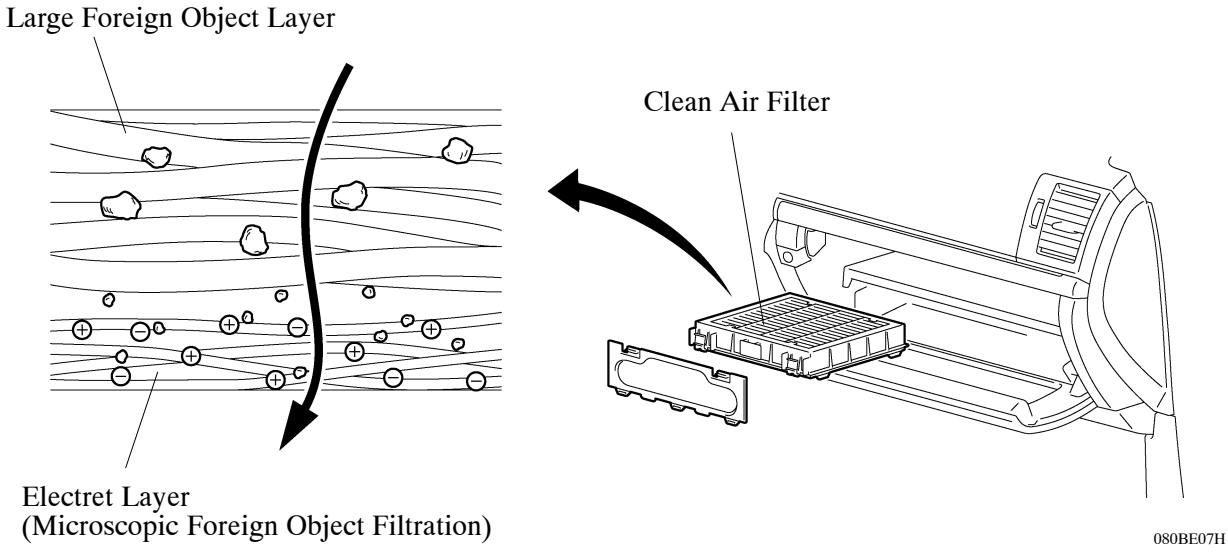
Servo Motor

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 air conditioning amplifier assembly two ON-OFF signals for the difference of the pulse phase. The smart connector detects the damper position and movement direction with this signal.



Clean Air Filter

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



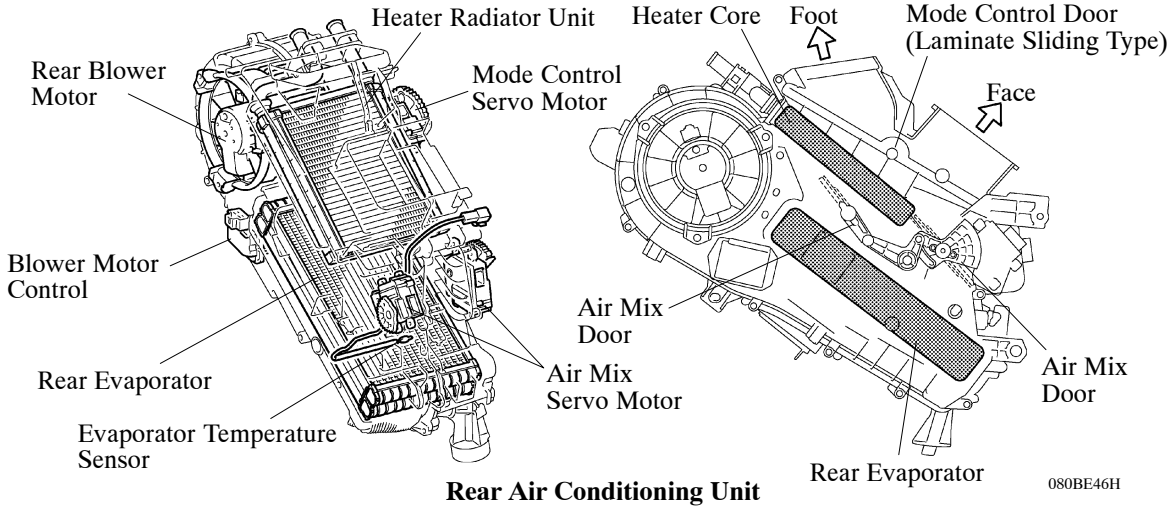
Service Tip

The filter should be changed at 18,000 miles (30,000 km) under normal conditions [cleaning interval: 6,000 miles (10,000 km)]. Under dusty conditions, the filter should be changed at 9,000 miles (1,5000km) [cleaning interval: 3,000 miles (5,000 km)].
However, observation of these guidelines should depend on the usage conditions (or environment).

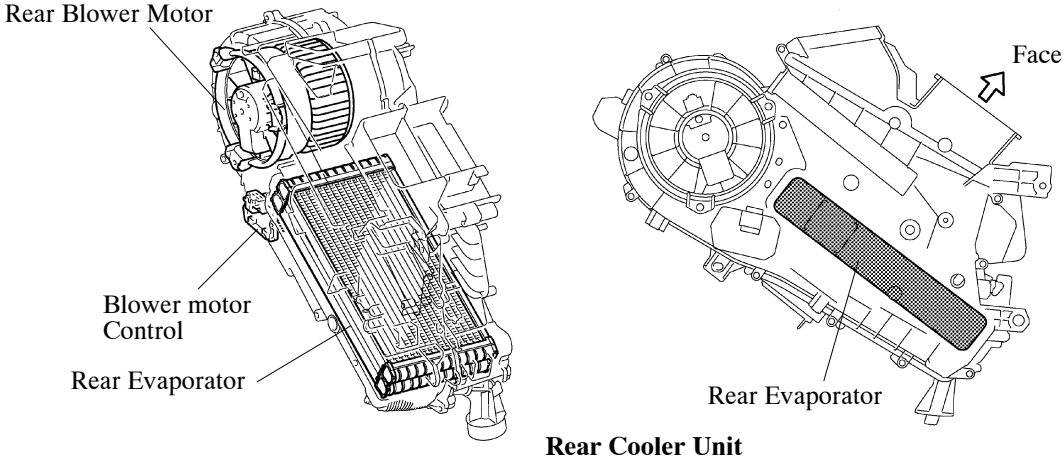
3. Rear Air Conditioning Unit

- The rear air conditioning unit*1/ the rear cooler unit*2 is located the left quarter trim.
- The rear air conditioning unit*1 consists of the rear evaporator, heater core, air mix control servo motor, mode control servo motor, evaporator temperature sensor, blower controller, and rear blower motor.
- The rear cooler unit*2 consists of the rear evaporator, blower controller and rear blower motor.
- The evaporator and heater radiator unit are arranged horizontally to allow the airflow to be directed smoothly upward.
- The mode control servo motor operates the laminate sliding type mode control door, and the air mix control servo motor controls the full air mix type air mix doors.
- The evaporator has the same revolutionary super-slim structure as the front evaporator. For details regarding the evaporator, refer to page BE-79.
- The heater radiator unit has the same SFA (Straight Flow Aluminum)-II type as the front heater radiator unit. For details regarding the heater radiator unit, refer to page BE-78.
- Evaporator temperature sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the air conditioning amplifier assembly.
- As in the front air conditioning unit, the servomotor fitted to the rear air conditioning unit is connected to the air conditioning amplifier assembly with the bus connector due to the lightweight construction and a reduced number of wires. For details regarding the bus connector, refer to page BE-82. Furthermore, the pulse pattern type is used for the both the front and rear air conditioning units. For details regarding the servo motor, refer to page BE-83.
- The porous duct excellent in sound absorption property is provided in the air inlet duct to improve quietness in the cabin. The cross section of the porous duct consists of three layers. The inner polyethyleneterephtalate layer absorbs noises produced by the air conditioning unit, the central layer eliminates the leakage of odor in the cabin and the outer felt holds the duct shape.

*1: Models with the multi-zone automatic climate control system
*2: Models with the automatic air conditioning using left/right independent temperature control



Rear Air Conditioning Unit

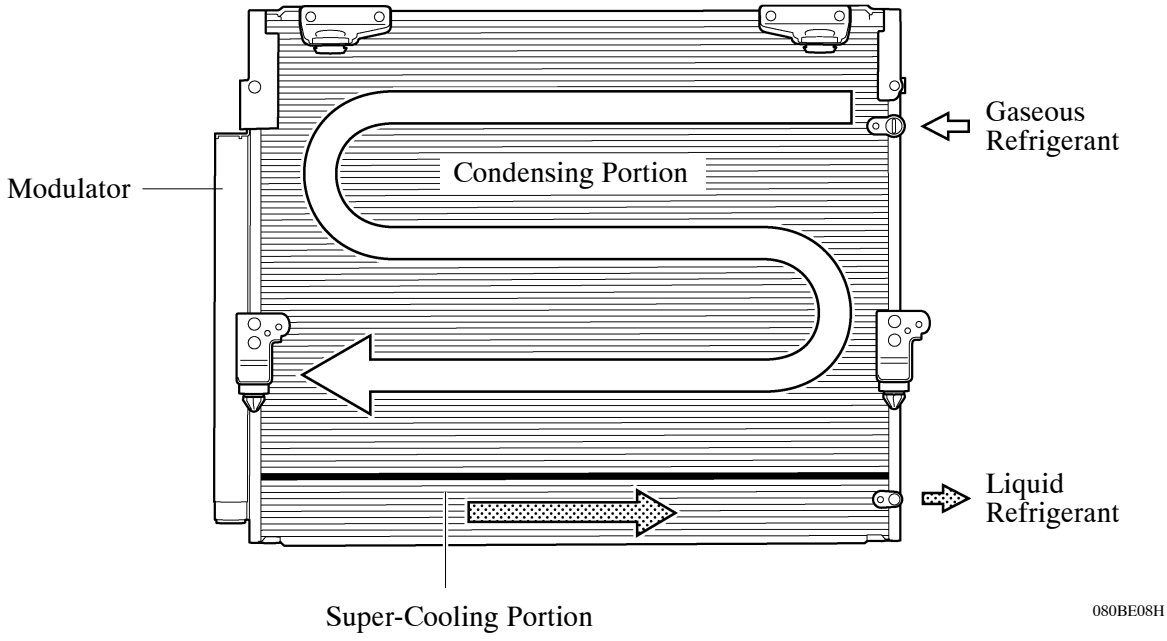


Rear Cooler Unit

BE

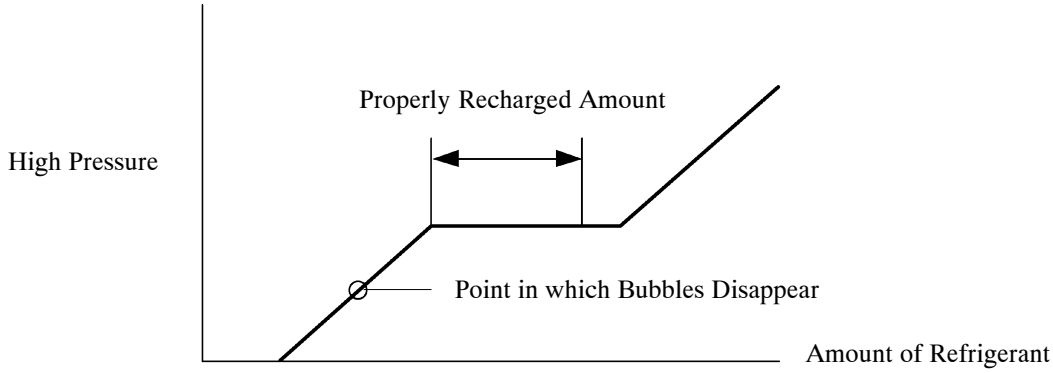
4. Condenser

- A MF (Multi-Flow) type condenser is used. The condenser consists of two cooling portions: a condensing portion and a super-cooling portion, and gas-liquid separator (modulator) are integrated together. This condenser uses a sub-cool cycle that offers excellent heat-exchange performance.
- In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



Service Tip

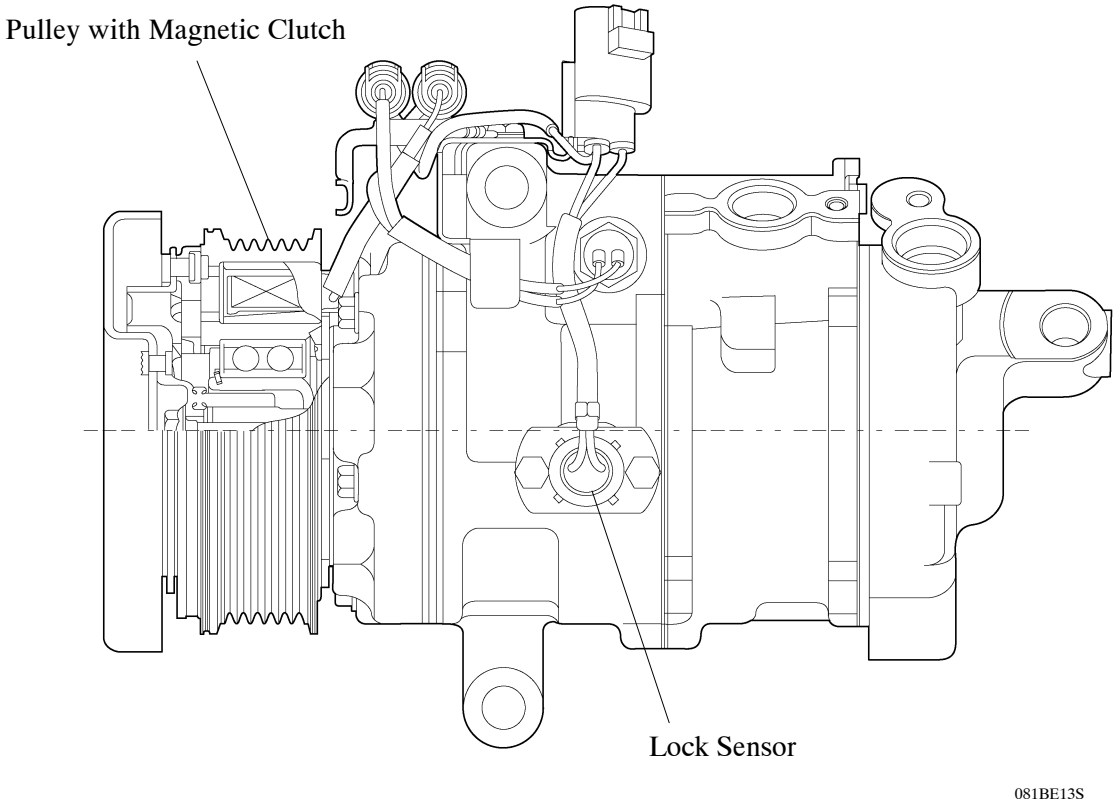
The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a reduced performance.
For the proper method of verifying the amount of the refrigerant and for instructions on how to recharge the system with refrigerant, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).



5. A/C Compressor

General

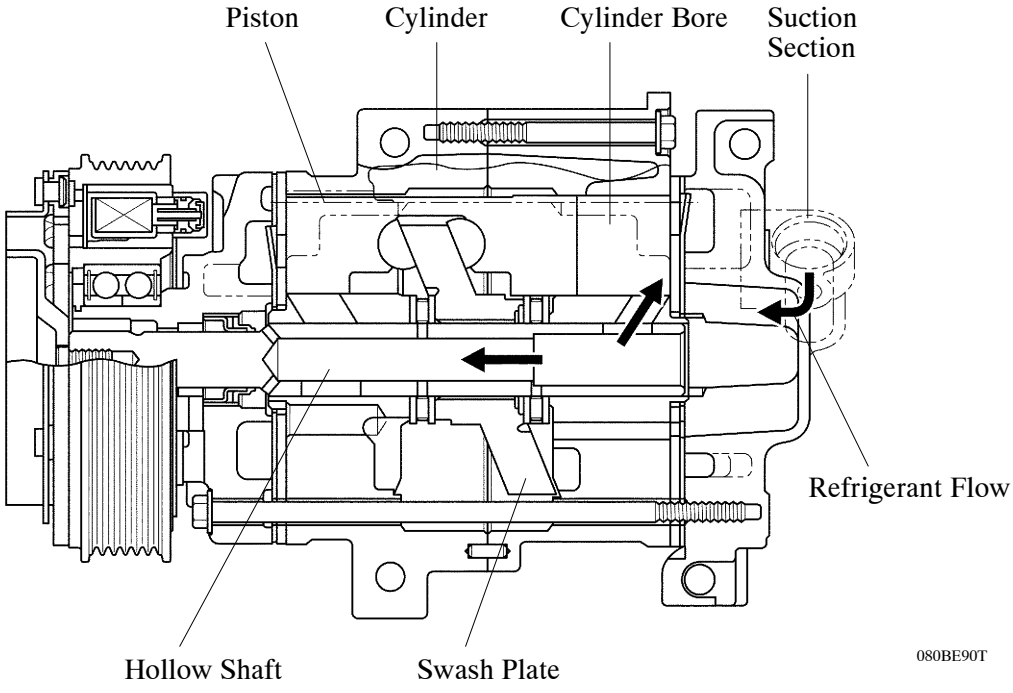
- A 10SR19 A/C compressor has been provided, which features a compact, lightweight and low-noise design.
- This compressor consists of magnetic clutch, shaft, swash plate, piston, shoe, rotary valve, cylinder, and lock sensor.
- The lock sensor sends an A/C compressor speed signal to the air conditioning amplifier assembly. The air conditioning amplifier assembly compares this signal with an engine speed signal sent from the ECM. If the air conditioning amplifier assembly determines that the compressor has locked, the air conditioning amplifier assembly turns the magnetic clutch off.
- A rotary valve, which allows refrigerant to be sucked directly into the cylinder, has been provided.



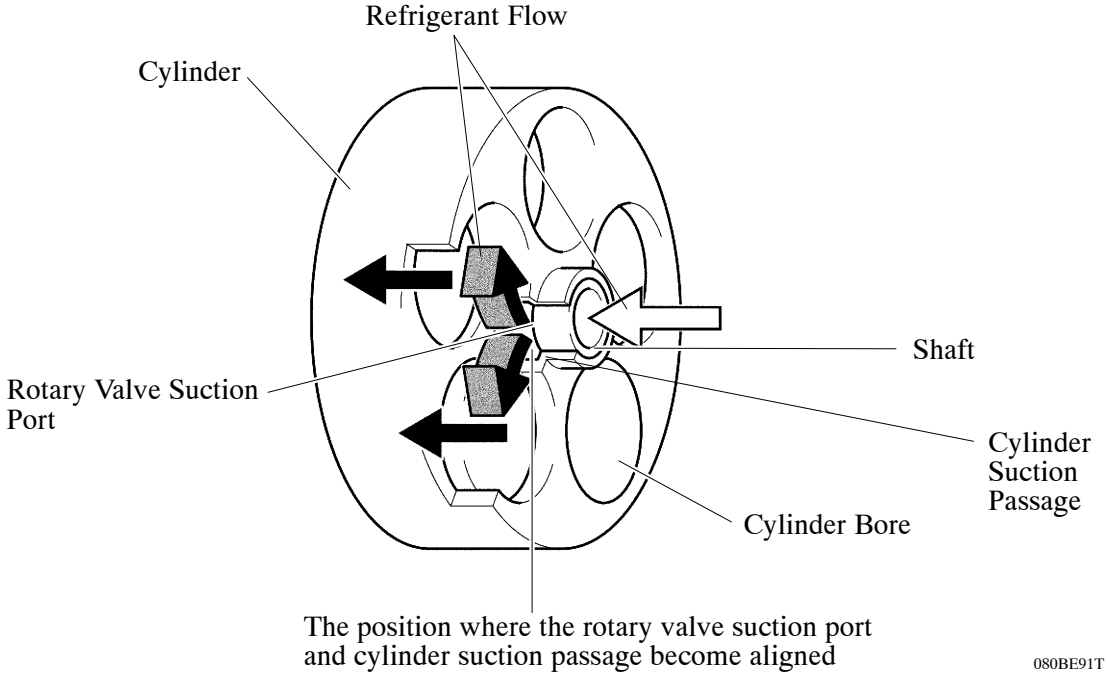
Models with 2UZ-FE engine

Rotary Valve

- In order to reduce suction loss, the rotary valve has been replaced with a conventional suction valve.
- The rotary valve is a hollow shaft, allowing refrigerant to be sucked directly into the cylinder bore through corresponding suction passages on the cylinder.



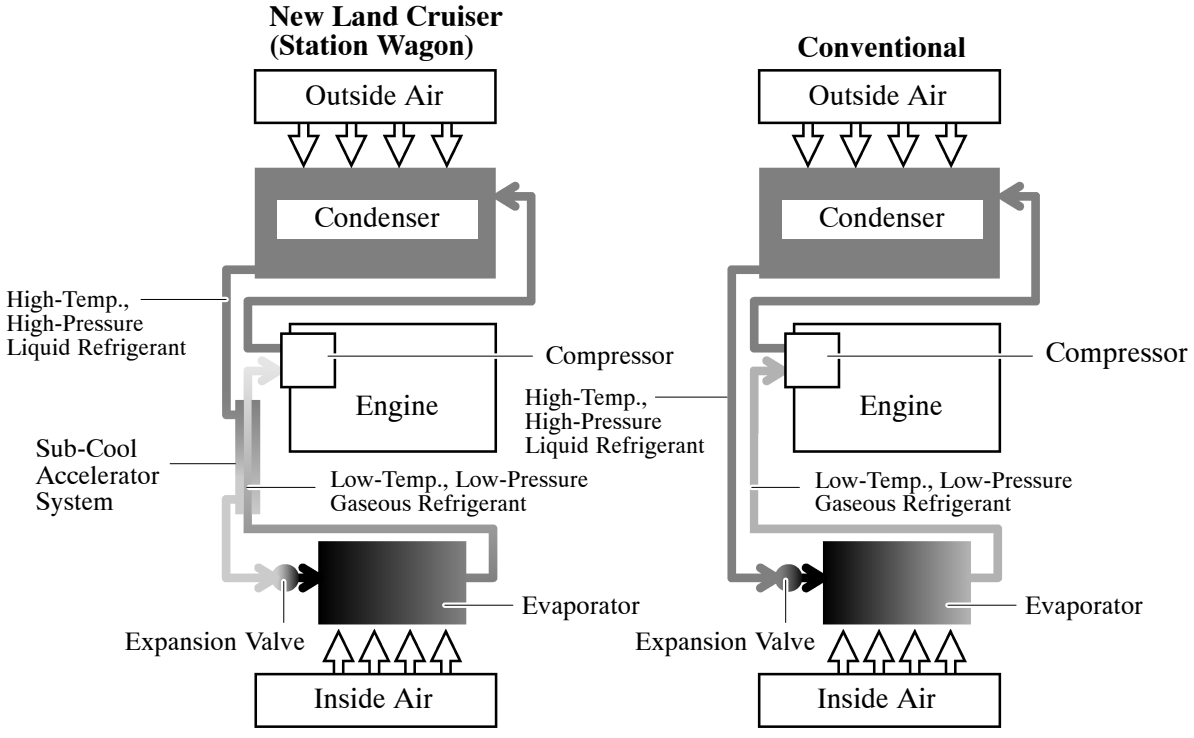
▶ Image of Valve Operational Behavior During Suction ◀



6. Sub-Cool Accelerator (Double-pipe Internal Heat Exchanger) system

General

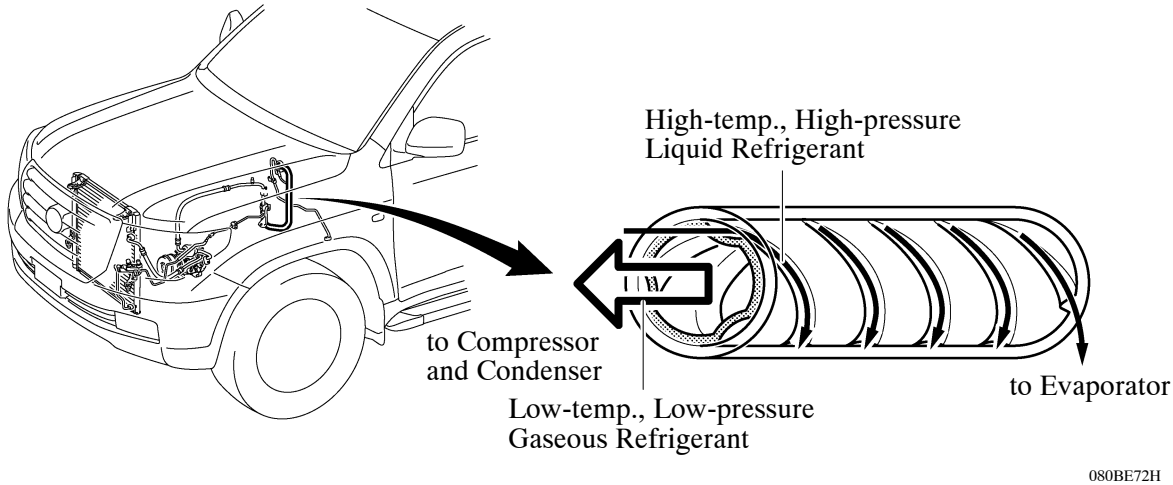
- A sub-cool accelerator system has been provided. This system consists of inner and outer pipes which have been replaced with conventional refrigerant pipes (liquid and gaseous refrigerant pipes).
- The cooling performance can be enhanced by occurring heat exchange by utilizing temperature difference of refrigerant in a refrigeration cycle and further cooling the refrigerant discharged from the condenser.



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Refrigerant Pipe

This pipe consists of inner and outer pipes, and thus heat exchange can occur by utilizing the temperature difference between low-temp., low-pressure gaseous refrigerant flowing inside the inner pipe and high-temp., high-pressure liquid refrigerant flowing between the inner and outer pipes. Furthermore, a spiral groove is formed in the pipe in order to attain further effective heat exchange.



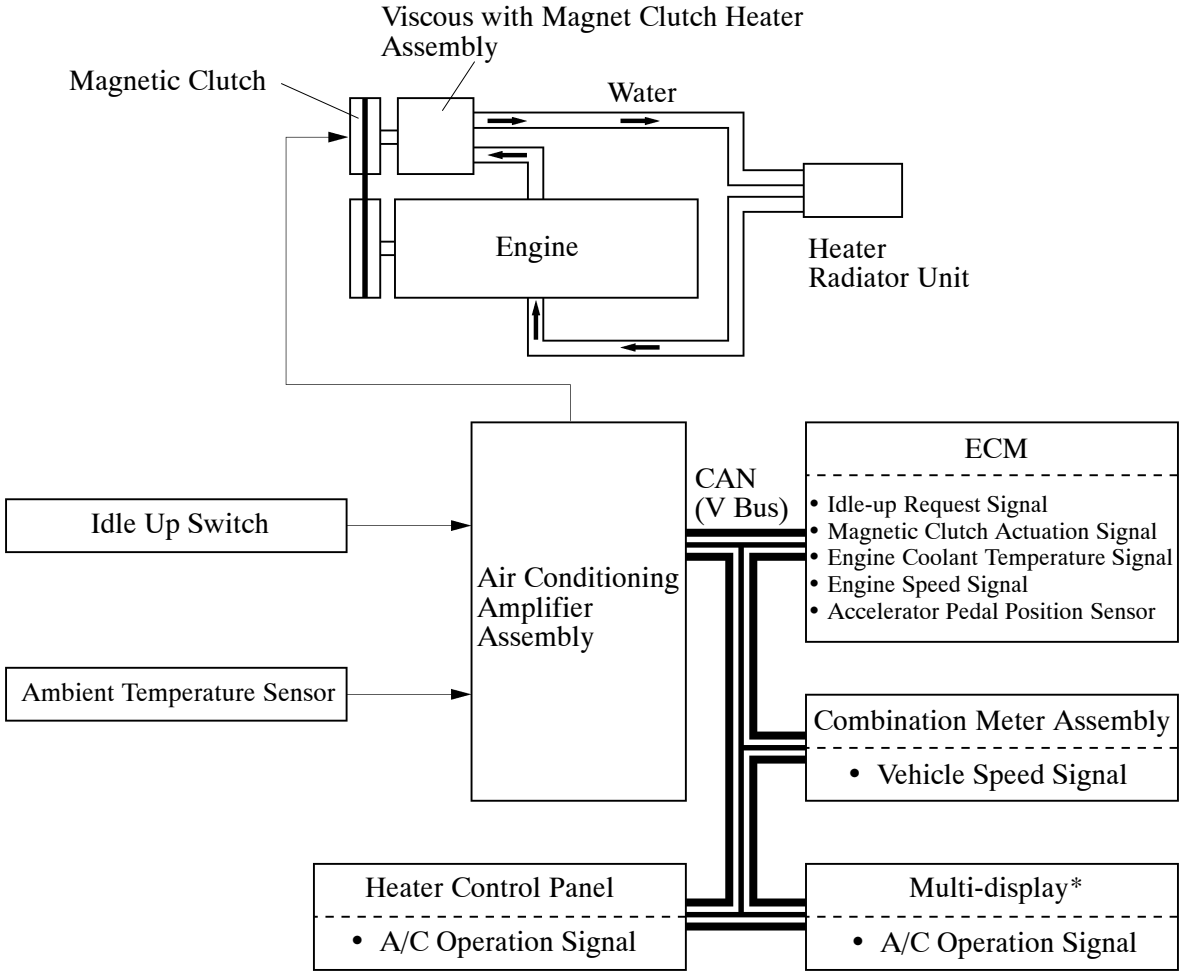
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7. Viscous with Magnet Clutch Heater Assembly

The viscous with magnet clutch heater assembly has been provided on European diesel engine models. The power heater increases the engine coolant temperature by utilizing the shear heat of the silicone oil and by increasing the engine load.

▶ System Diagram ◀



081BE60S

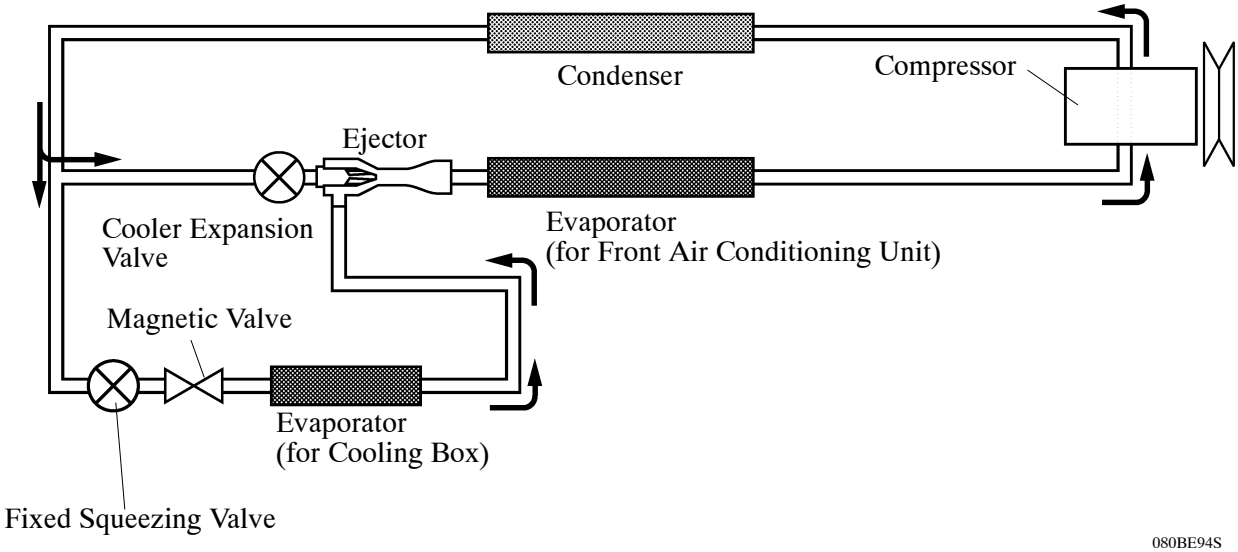
*: Optional Equipment

8. Cooling Box

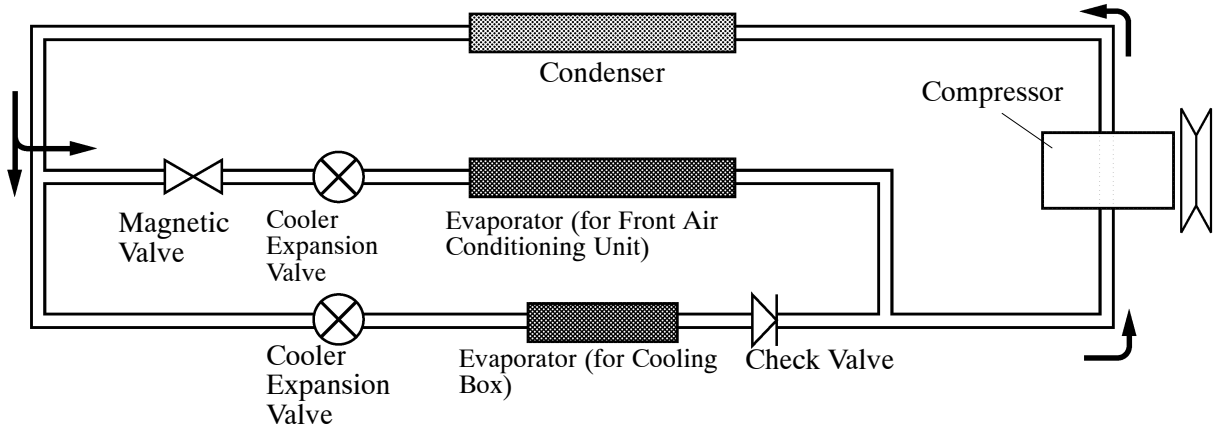
General

- The cooling box is available in the center console box as an option.
- On the previous Land Cruiser (Station Wagon), the cooling box employs a method of intermittent refrigerant flow control, which regulates the refrigerant flow by switching the magnetic valve ON/OFF for both the front air conditioning and cooling box evaporators, in accordance with the operational conditions of the air conditioning system and cooling box. However, on the new Land Cruiser (Station Wagon), the cooling box employs a method of a continuous refrigerant flow control, which regulates the refrigerant flow through the ejector located in the refrigerant pipes, thereby ensuring high air conditioning performance and cooling efficiency.

▶ System Diagram ◀



New Land Cruiser (Station Wagon)

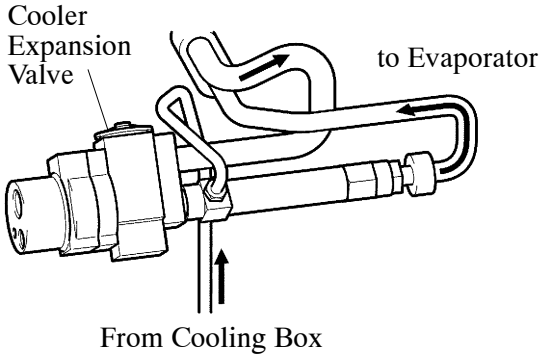


Previous Land Cruiser (Station Wagon)

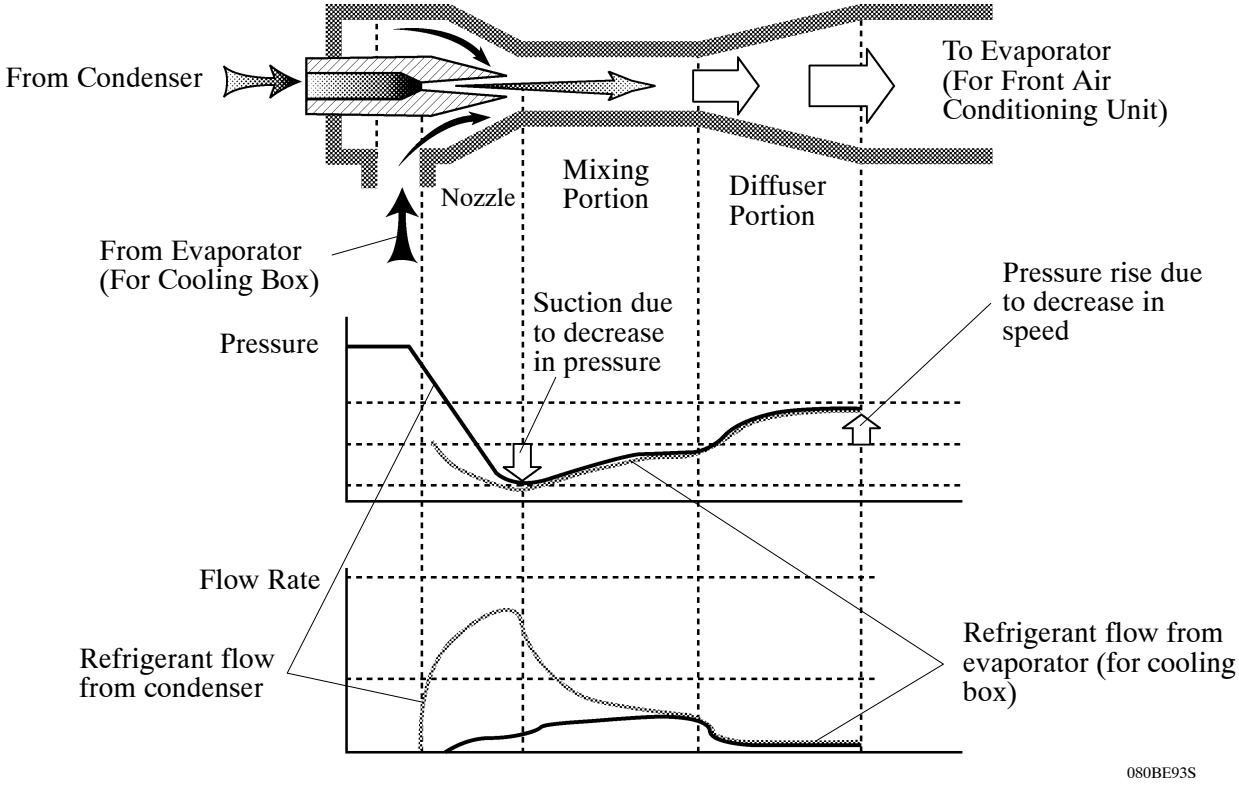
BE

Ejector

- The ejector includes nozzle, mixing and diffuser portions.
- A high temperature, high pressure liquid refrigerant flowing from the condenser is guided into the mixing portion through the nozzle portion at high speed as the nozzle is inwardly tapered. This tapered nozzle allows the refrigerant pressure in the vicinity of the nozzle to decrease while guiding a low temperature, low pressure gaseous refrigerant into the nozzle portion from the evaporator (for cooling box). Thus, both refrigerants are mixed in the mixing portion and then sent to the diffuser portion.
- As the diffuser section is outwardly flared, the refrigerant flow rate in the diffuser decreases and the refrigerant pressure rises.
- Under this operational mechanism, the refrigerant pressure in the cooling box can be kept lower than in the front air conditioning unit even if refrigerant is continuously flowing, moreover, the refrigerant can be kept at a low temperature, thereby achieving high cooling efficiency and air conditioning performance.



▶ Operational concept for Ejector ◀



9. A/C Pressure Sensor

A/C pressure sensor detects the refrigerant pressure and outputs it to the air conditioning amplifier assembly in the form of voltage changes.

10. Room Temperature Sensor and Ambient Temperature Sensor

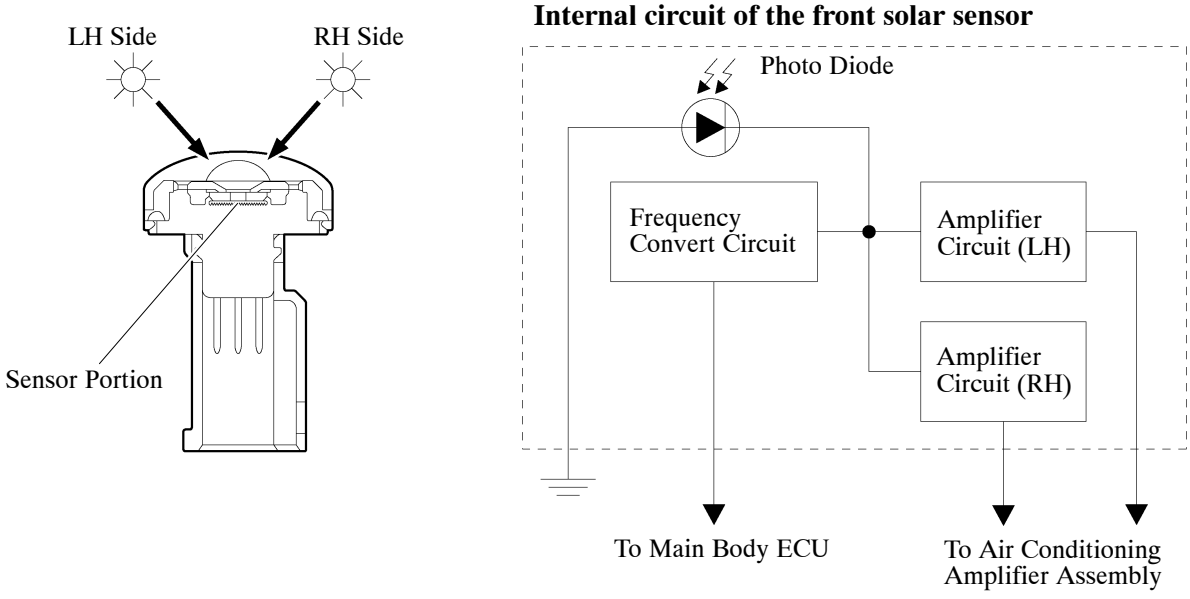
- A room temperature sensor is installed on the instrument panel and right and left quarter trims.
- The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the air conditioning amplifier assembly.
- The ambient temperature sensor detects the ambient temperature based on changes in the resistance of its built-in thermistor and sends a signal to the air conditioning amplifier assembly.

11. Air Duct Sensor

The air duct sensor, fitted to the air duct connected to both left and right rear heater registers, detects the air outlet temperature in accordance with the changes in the resistance of the thermistor built into the sensor and sends the signals to the air conditioning amplifier assembly.

12. Solar Sensor

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



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■SYSTEM CONTROL

1. General

The air conditioning system has the following controls.

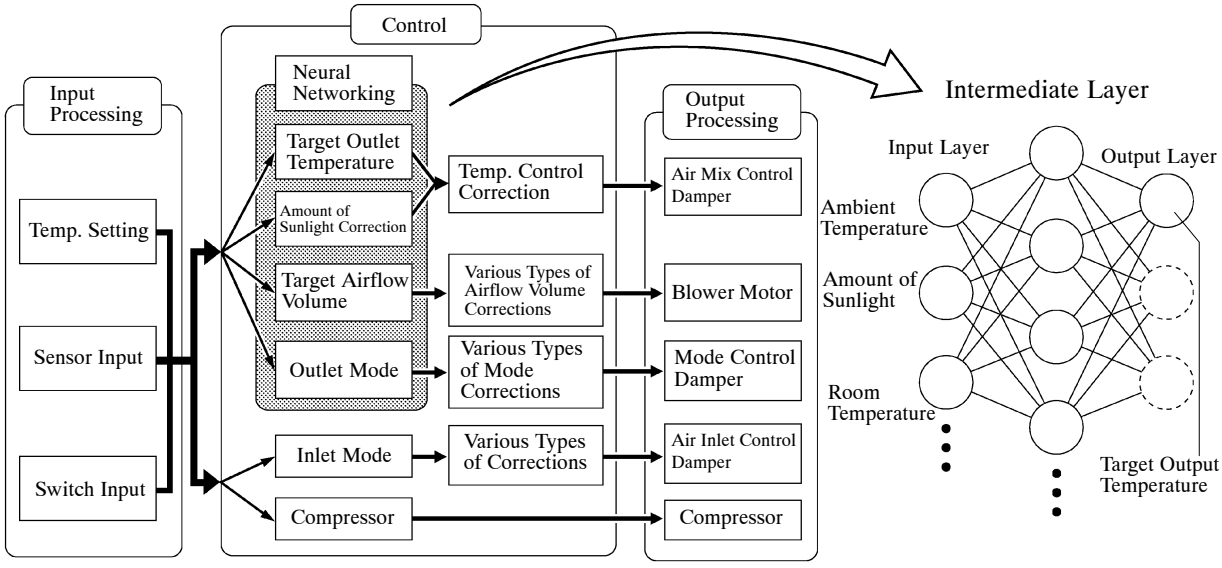
Control	Outline
Neural Network Control (See page BE-96)	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input/output relationship that is similar to a human brain.
Micro Dust and Pollen Filter Mode Control (See page BE-97)	Activated by the micro dust and pollen filter mode switch operation. Switches the air vent to the FACE mode. Sends air which has passed through the clean air filter to the area around the upper part of the bodies of the driver and front passenger. This air is filtered by the clean air filter in order to remove pollen.
Outlet Air Temperature Control	Based on the temperature set at the temperature control switch, the neural network control calculates the outlet air temperature based on the input signals from various sensors.
	The temperature settings for the driver, front passenger, rear passengers are controlled independently in order to provide separate vehicle interior temperatures for the right and left sides of the cabin. Thus, air conditioning that accommodates the occupants' preferences has been realized.
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.
Air Outlet Control	Automatically switches the air outlets in accordance with the outlet mode that has been calculated by the neural network control based on the input signals from various sensors.
	In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower, outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to FOOT / DEF mode to prevent the windows from becoming fogged when the outside air temperature is low.
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated required outlet air temperature.
	Drives the servomotor (for air inlet) according to the operation of the air inlet control switch and moves the dampers to the FRESH or RECIRC position.
Compressor Control	The air conditioning amplifier assembly compares the A/C pulley speed signals, which are transmitted by the lock sensor located on the A/C compressor, with the engine speed signals, which are transmitted by the ECM (crankshaft position sensor). When the air conditioning amplifier assembly determines that the A/C pulley is locked, it turns off the magnetic clutch and the indicator light in the A/C switch simultaneously blinks, thus alerting the driver.
PTC Heater Control	When the power source is ON, and the blower motor is turned ON, the air conditioning amplifier assembly turns ON the PTC heater assembly if the conditions listed below are met. • Engine coolant temperature is below specified temperature. • Ambient temperature is below specified temperature. • Tentative air mix damper opening angle is above the specified value (MAX HOT).

(Continued)

Control	Outline
Rear Window Defogger Control (See page BE-262)	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger button is pressed. Switches them off if the button is pressed again while they are operating.
Ambient Temperature Indication Control	Calculates the ambient temperature using signals transmitted by the ambient temperature sensor. Calculated values are corrected by the air conditioning amplifier assembly and then indicated on the multi-information display and the heater control panel.
Viscous with Magnet Clutch Heater Assembly Control (See page BE-98)	The viscous with magnet clutch heater assembly increases the engine coolant temperature by utilizing the shear heat of the silicone oil and by increasing the engine load.
Self-Diagnosis (See page BE-98)	A DTC (Diagnostic Trouble Code) is stored in the memory when the air conditioning amplifier assembly detects a problem with the air conditioning system.

2. Neural Network Control

- In previous automatic air conditioning systems, the air conditioning amplifier assembly determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors. However, because the senses of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, or extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network is used in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the air conditioning amplifier assembly. The air conditioning amplifier assembly can then effect control to provide enhanced air conditioning comfort.
- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the ambient temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, the air conditioning amplifier assembly controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.

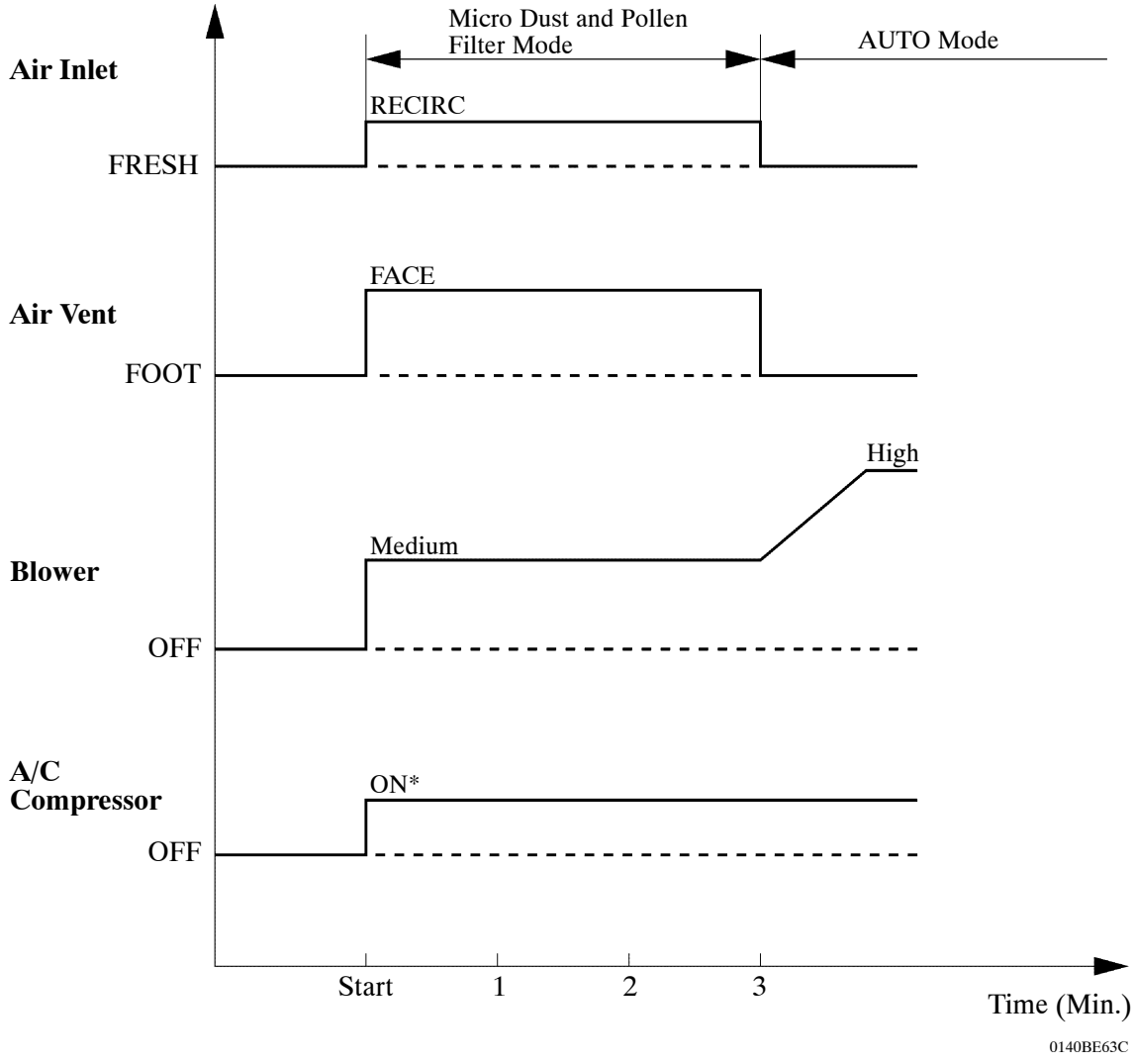


3. Micro Dust and Pollen Filter Mode Control

When the micro dust and pollen filter switch is pressed, the micro dust and pollen filter control is activated. Then, the air vent is switched to the FACE mode and recirculated pollen-free air flows in the area around the upper part of the bodies of the driver and front passenger.

- When the micro dust and pollen filter switch signal is input to the air conditioning amplifier assembly, the air conditioning amplifier assembly controls the A/C compressor, air inlet servo motor, air vent servo motor and blower motor as shown in the timing chart below.
- This control usually operates for approximately 3 minutes. However, when the ambient temperature is low [5 °C (41°F) maximum], it will operate for approximately 1 minute.
- After this control stops operating, the air conditioning amplifier assembly automatically returns to the mode it was in just before the micro dust and pollen filter switch was pressed.

▶ Sample Timing Chart ◀

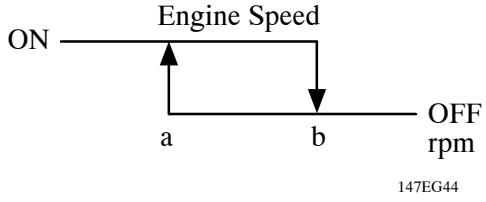


*: The A/C compressor turns ON only when the ambient temperature is low. The A/C compressor remains ON after the micro dust and pollen filter mode has been canceled.

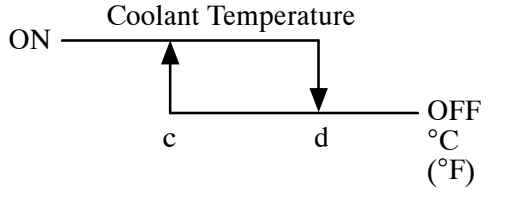
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4. Viscous Type Power Heater Control

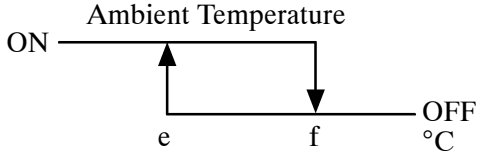
- The viscous with magnet clutch heater assembly, which is located on top of the engine, is driven by a drive belt. Pressing the viscous with magnet clutch heater assembly switch provided in the instrument panel engages the magnetic clutch, causing the rotor in the viscous with magnet clutch heater assembly to rotate and the silicon oil to mix. The shear heat that is thus generated heats the coolant.
- The viscous with magnet clutch heater assembly is controlled in accordance with the engine speed, coolant temperature and ambient temperature as described below. While the power heater is engaged, the engine idling speed is raised to a predetermined value whenever the shift lever is in the N or D position.



147EG44



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5. Self-Diagnosis

- The air conditioning amplifier assembly has a self-diagnosis function. It stores any operation failures in the air conditioning system memory in the form of DTC (Diagnostic Trouble Code).
- There are two methods for reading a DTC. One is to use an intelligent tester II, and the other is to read a DTC indicated on the driver side set temperature display on the heater control panel.
- For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

MULTI-DISPLAY

■ DESCRIPTION

- A multi-display has been provided on the center cluster panel as optional equipment. The display, which consists of a wide 8.0-inch LCD (Liquid Crystal Display) screen with a pressure sensitive touch panel offers improved ease of use.
- The language of the voice recognition function can be selected from English, German* and French*.
- The language of the touch-screen buttons, pop-up messages and voice guidance can be selected from English, German*, French*, Dutch*, Italian*, Danish*, Swedish*, Spanish*, Portuguese* and Norwegian* are available.
- A hands-free function for a Bluetooth-compatible cellular telephone is used.

*: Only for European models

Bluetooth® 001S50Y

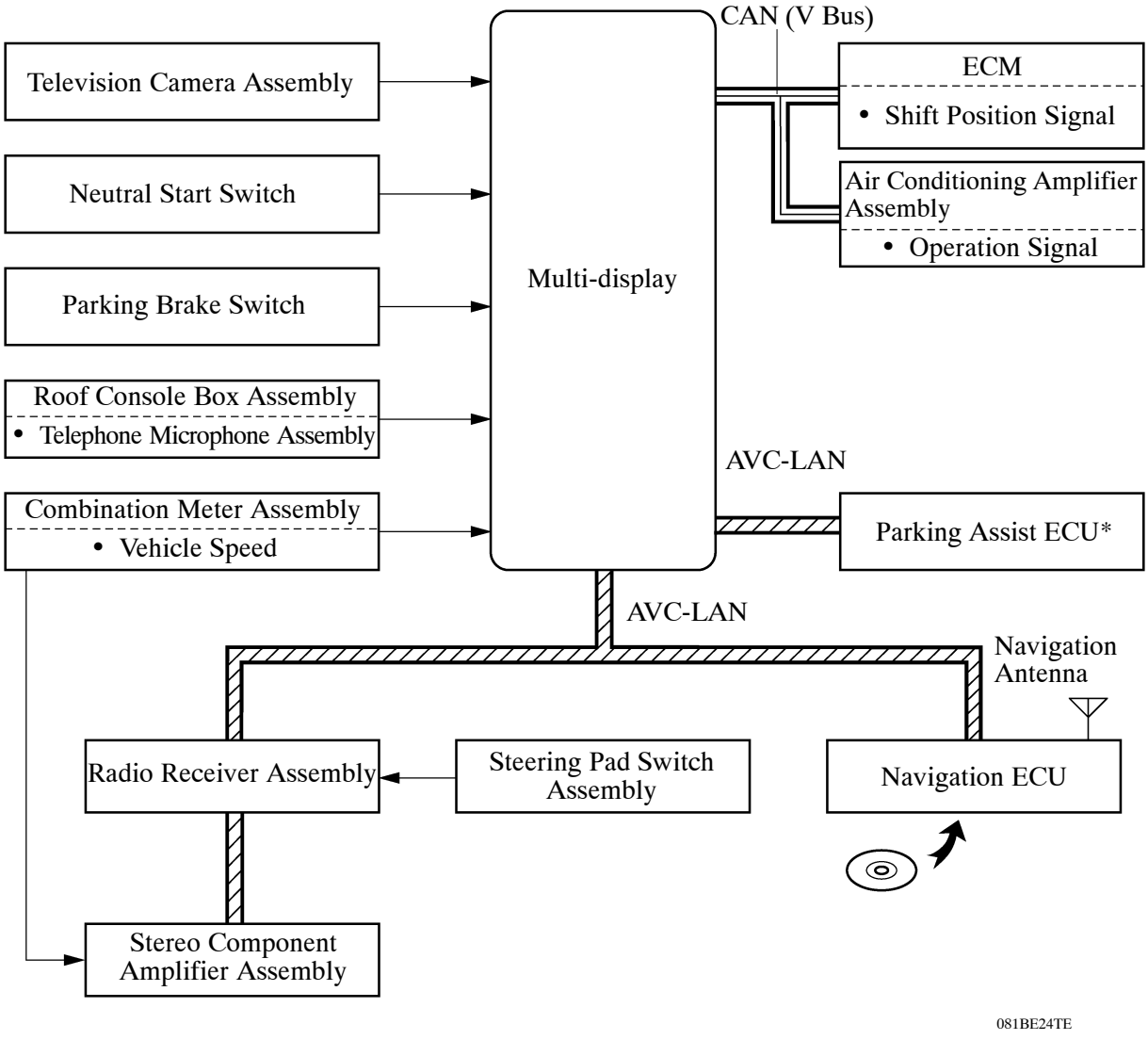
Bluetooth is a trademark owned by Bluetooth SIG, Inc.

▶ Specifications ◀

Component		Outline
Multi-display		• 8.0 inch wide LCD • FUJITSU TEN
	Navigation ECU	AISIN AW
	Gyro Sensor	Piezoelectric Ceramic Piece
Map Data Media		DVD (Digital Versatile Disc)
Navigation ECU*		DENSO

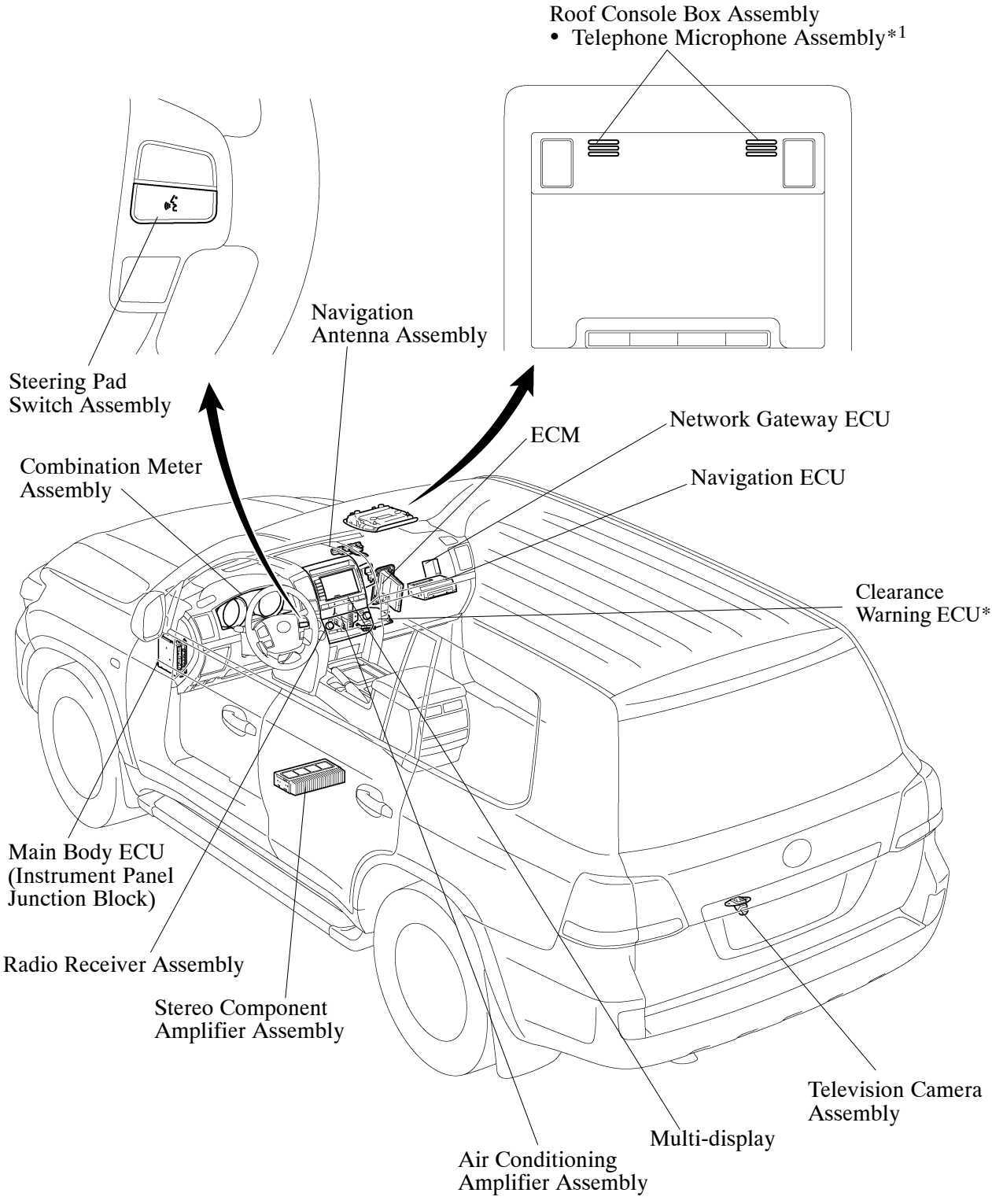
*: The multi-display and the navigation ECU are mounted separately on Chinese and Australian models

■SYSTEM DIAGRAM



*: Only for models with the parking assist monitor system

■ LAYOUT OF MAIN COMPONENTS



LHD Models

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*1: The microphone module equipped with the voice recognition function is available for the driver side only.
*2: Optional Equipment

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■ FUNCTION

1. General

The main functions of the multi-display are shown below.

Main Function		Outline
Navigation Screen (See page BE-104)		Through the use of the GPS (Global Positioning System) and map data which is stored on a DVD, the navigation system analyzes the position of the vehicle and indicates that position on the map that is displayed on this screen.
Audio/ Video System		Displays the following three operations: • Radio Operation • DVD Changer Operation (Different optional setting)
Air Conditioning		The operation and control of the air conditioning system can be effected through the use of the automatic air conditioning display of the multi-display and the touch switch that appears on the display.
Parking Assist Monitor System		Displays the rear view of the vehicle has been captured by the television camera mounted on the back door when the shift lever is moved to the reverse position. For details, see page BE-121.
Clearance Sonar System (Different optional setting)		Detects obstacles and displays the information on the multi-display to inform the driver. For details, see page BE-112.
Others	Hands-Free (See page BE-98)	When a Bluetooth-compatible cellular telephone is registered to the multi-display, the user can make and receive calls or talk hands-free on the cellular telephone by operating the switches on the screen or the steering pad.
	Maintenance Information	Can be used to inform the driver of inspection or replacement timing of the following items based on the calendar function and vehicle speed signal. **Engine Oil:** Replace engine oil **Oil Filter:** Replace engine oil filter **Rotation:** Rotate tires **Tires:** Replace tires **Battery:** Replace battery **Brake** Pad: Replace brake linings **Wipers:** Replace wiper blades **LLC:** Replace engine coolant **Brake Oil:** Replace brake fluid **ATF:** Replace ATF **Service:** Scheduled maintenance **Air Filter:** Replace air filter **Personal:** New information items can be created separately from provided ones.
	Calendar with Memo	It is possible to enter memos for particular dates on the calendar.
	Speech Command System	Operates the navigation, audio, and air conditioning systems based on voice commands. However, only English, German* and French* can be recognized by this function.
	Help Screen	Help screen can see the command list and operation guide on it.
	Screen Adjustment	The brightness or contrast of the screen can be adjusted to suit the brightness of surroundings.

(Continued)

Main Function		Outline
Others	Screen Setting	The following screen settings are available: **Automatic transition:** It enables automatic return to the navigation screen from the audio screen or A/C screen. **Switch Color:** Color of touch-screen button can selected.
	Beep Setting	Beep sound off.
	Select Language	The language used for the touch-screen buttons, pop-up messages and voice guidance can be changed. English, German*, French*, Dutch*, Italian*, Danish*, Swedish*, Spanish*, Portuguese* and Norwegian* are available.
	Delete Personal Data	The following personal data can be deleted or returned to their default settings: • Maintenance conditions • Maintenance information “off” setting • Memory points • Areas to avoid • Previous points • Route trace • User selection settings • Phonebook data • Dialed numbers and received calls • Speed dial • Bluetooth phone data • Security code
Diagnosis		This contains the following four items: • Service Check Menu • Display Check • Navigation Check • Camera Check • Bluetooth TEL Check

*: Only for European models

2. Navigation Screen

The navigation ECU calculates the present position, direction of travel, and distance the vehicle has driven based on the following information sources. This information is displayed on the multi-display.

- DVD map data
- GPS (Global Positioning System) Satellites
- Built-in Gyro Sensor
- Vehicle Speed Signal

The functions of the navigation screen display are shown below.

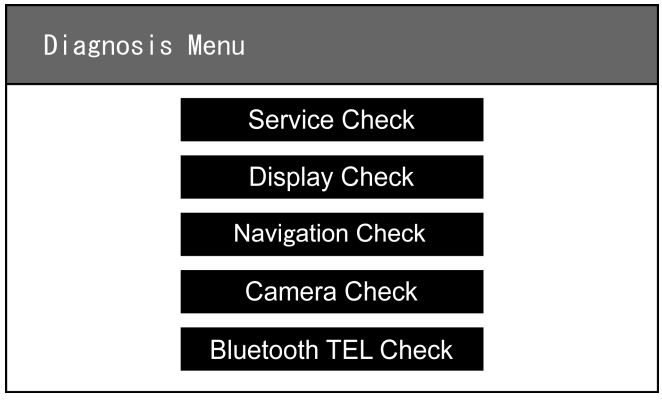
Item		Function
Map Display	Linear Touch Scroll	Enables smooth scrolling by connecting the touch points on the screen.
	On-route Scroll	Scrolls the center of the cursor forward and reverse constantly along the route.
	Heading Up	• Displays the map so that the direction of the route progression heading faces up during route guidance. • Displays a map in the direction of travel of the vehicle in an enlarged form.
	Step-less Scale Display	Changes the scale of the map from the basic 13 steps to an even finer display.
	Direct Scale Change	Directly selects and displays the map scale.
	Multi-step Scale Display	Changes and displays the map scale in 13 stages.
	Split-view Display	Displays different modes on a screen that is split into two views.
	Points-of-Interest Display	Displays selected types of points of interest as marks on the map.
	Taillight-interlocked Map Color Change	Changes the color on the map screen that is displayed when the taillights are turned ON.
	Road Number Sign Board Display	Displays the road number on the map.
	Compass Mode Screen	Displays the direction of travel and detailed data of the present location.
	Map Coverage Information Display	Displays the map area that is recorded on DVD.
	Street Name Indication on Scrolled Map	Displays the street name and the city name even when the map screen is being scrolled.
Destination Search	Last Destination Memory	Stores 20 locations of coordinates, names and times that have been set as destinations in the past.
	Hybrid Points-of-interest Search	Narrows the search by names of the points-of-interest, category, and areas.
	Points-of-interest Pinpoint Display	Pinpoints and displays the position of the point-of-interest.
	House Number Search	Searches for a house number.
	Special Memory Point	Sets a pre-registered point as a destination point while driving.
	Nearest Point-of-interest Search List Display	Searches nearest points-of-interest and displays a list.

(Continued)

Item		Function
Destination Search	Intersection Search	By specifying two streets, the point at which they intersection is set as the destination point.
	Emergency Search	Performs a specific search for hospitals, police stations and dealers.
	Motorway Entrance or Exit Search	Searches for the destination by the name of the street that connects to a motorway entrance or exit.
	Coordinate Search	Searches for a destination by latitude and longitude.
	Telephone Number Search	Searches for a facility by its telephone number.
	POI, brand icon indication	Displays an icon for point of interest.
Route Search	Multiple Destination Setting	Sets multiple destinations. It can also rearrange the sequence of the destinations.
	Route Search	Searches for multiple routes.
	Search Condition Designation	Searches for the recommended, shortest, and other routes.
	Regulated Road Consideration	Performs search which considers regulated roads.
	Avoidance Area	Searches for a route that avoids a designated area.
	Street Address Search	The user can set up the destination by voice input of the city or street name.
	Motorway Mode Screen	Displays information on facilities in the vicinity of the motorway exits and entrances.
Guidance	Destination Direction Arrow Display	Function to display the direction from the current position to the destination in case of being off the route during the guidance.
	Off-Route Arrow Display	Function to display the route ahead on the route guidance line in case of being off the route during the guidance.
	Rotary Guidance	To guide with a special voice phrase in the rotary.
	Right or Left Turn Guidance	Voice guidance to instruct the direction of travel to be taken.
	Motorway Direction of Travel Guidance	Voice guidance to instruct the direction of travel to take on the motorway.
	Distance Display Destination	Displays the distance from the present location to the destination.
	Motorway Branch Type Specimen Guidance	Type specimen for guidance to a motorway branch.
	Intersection Zoom-in Display	Zoom-in display when approaching an intersection.
	Estimated Arrival Time Display	Displays estimated arrival time to a user.
	Route Trace Display	Displays route trace.
	Turn List Display	Displays a turn list on the right side of the two-screen display when approaching an intersection.
	Motorway Mode Screen	Displays the distance to the next junction and exit, or POIs in the vicinity of the motorway exit.
Others	Voice Recognition	Recognize pre-programmed system commands voiced by the user to operate the navigation system.
	Help	This function explains a user what operation can be performed when a “?” on the display is pushed.

3. Diagnosis

The following check menus are included in the diagnosis screen.



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Check Mode	Detail
Service Check Menu	Performs a system check and gathers DTC (Diagnostic Trouble Codes) in memory, and, based on their results, shows the past and present inspection results of the connected devices.
Display Check	Shows a screen for checking a specific portion of the display.
Navigation Check	Shows a screen for checking a specific portion of navigation ECU.
Camera Check	Shows a screen for checking a specific portion of television camera.
Bluetooth TEL Check	Shows a screen for setting the voice quality for a Bluetooth-enabled hands-free phone system.

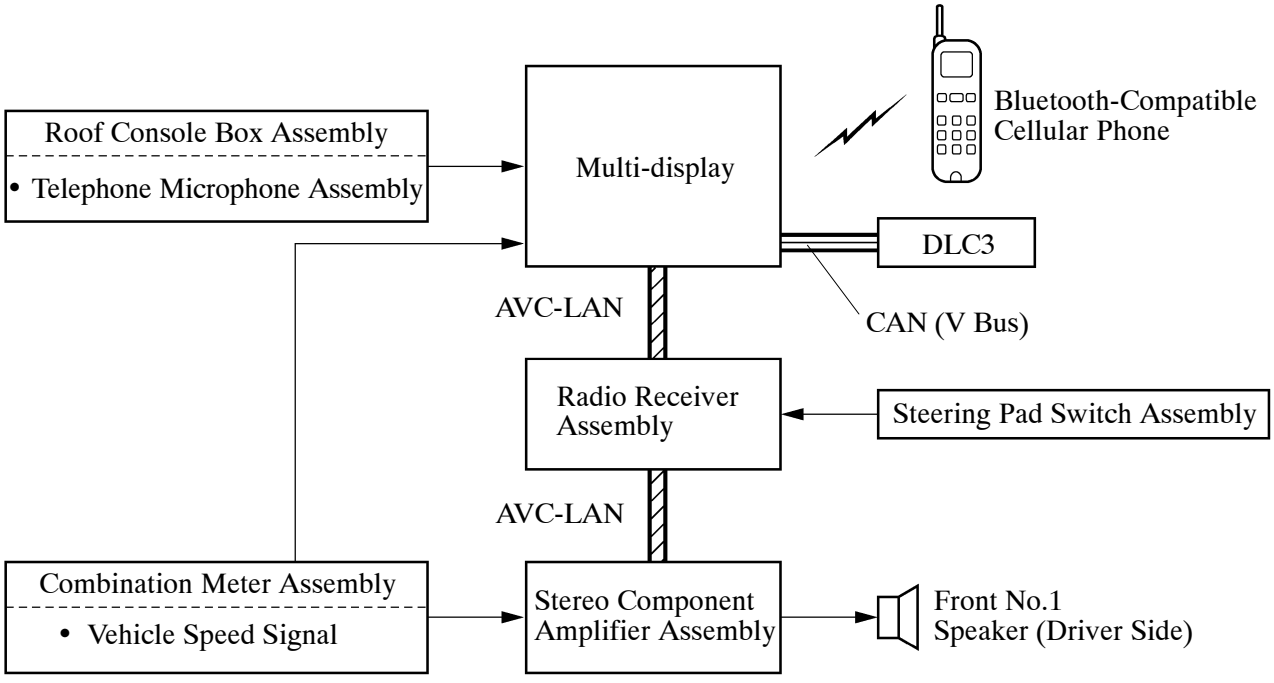
For details on the procedure required to enter the diagnosis menu screen, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

BLUETOOTH HANDS FREE SYSTEM

■ DESCRIPTION

- Bluetooth is a short-distance, high-speed wireless data communication system that uses the 2.4 GHz frequency band prescribed by the Bluetooth SIG (Special Interest Group).
- This system enables drivers to place or receive phone calls using a cellular phone without releasing their hands from the steering wheel.
- This system can be operated by touching icons indicated on the multi-display.

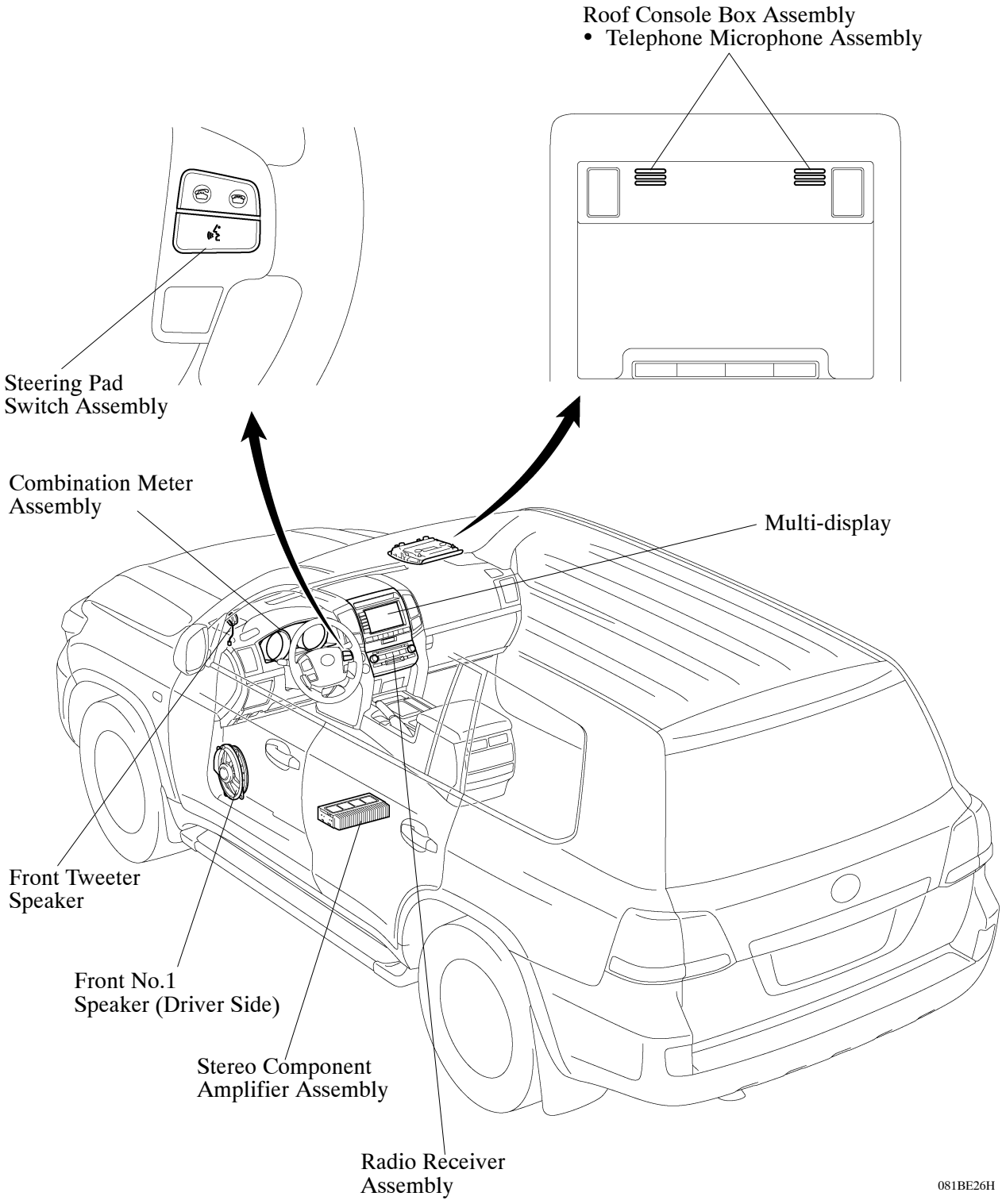
▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS



■HANDS-FREE FUNCTIONS

The Bluetooth hands-free system installed on the models with the multi-display has the following functions. However, for safety, some functions may not be selectable when the vehicle is being driven.

Function		Outline
Call with Bluetooth phone	By dial	The user can call by inputting a telephone number.
	By phonebook	The user can call by using the phonebook data that have been transferred from the user's cellular phone. The user can register up to 1000 numbers in the phonebook.
	By dialed numbers	The user can call by selecting a previously dialed number. The system remembers up to five dialed numbers. If more than five numbers have been dialed, the oldest number will no longer be remembered.
	By received calls	The user can call by selecting the telephone number of a received call. When a call is received, the system will remember the last five numbers. If more than five calls have been received, the oldest number will no longer be remembered.
	By speed dial*	The user can call by using registered telephone numbers that the user selected from the phonebook.
	By voice recognition (Dialing by name)	The user can call by giving a name registered in the phonebook.
	By voice recognition (Dialing by phone number)	The user can call by giving a desired number.
	By POI (Point of Interest) call	The user can call by operating a switch when "Call" is displayed on the screen of the navigation system.
Receive with Bluetooth phone		When a call is received, the receive screen is displayed with an audio signal.
Talk on the Bluetooth phone		While the user is talking on the phone, the talking screen is displayed.
Change the settings of the Bluetooth phone	Registering the speed dial	The user can register the desired telephone number from the phonebook, dialed numbers or received calls. Up to 17 speed dial numbers can be registered.
	Registering the speed tone	The user can register desired tone numbers. Up to 6 speed tone numbers can be registered.
	Setting the volume	The user can set the volume.
		Automatic volume settings for high speed: The user can set the volume one step up when the speed is over 80 km/h (50 mph).
		Initializing the settings: The user can initialize the settings.
	Setting the screen	Receiving call display: The user can select the method of the receiving call display.
		Auto answer: When a call is received, the display automatically changes to the talking screen and the user can start to talk on the phone (without touching any switch) after a preset time.
		The Bluetooth connection status at startup: When the user turns the power source to ACC or IG-ON and the Bluetooth is automatically connected, the connection check is displayed.
		Initializing the settings: The user can initialize the settings.

*: The user can operate it while driving.

(Continued)

Function		Outline
Change the setting of the Bluetooth phone	Setting the phonebook	Registering phone number: The user can register phone numbers in the phonebook.
		Transferring a telephone number: The user can transfer the telephone numbers from the user's Bluetooth phone to the system. Up to 1,000 data (up to 2 numbers per entry) can be registered in the phonebook.
		Registering the phonebook data: The user can register the phonebook data.
		Editing the name: If no name has been inputted, the number is displayed.
		Editing the phone number: The user can register a phone number in "TEL1" and "TEL2" separately. Up to 2 numbers per phonebook entry can be registered.
		Selecting the group: The user can set a group for a contact. It will then be easier for the user to find this contact when needed, by using the grouping display.
		Setting the voice recognition: The user can set the voice recognition. Up to 20 numbers can be registered to allow voice recognition.
		Adding data to the phonebook: The user can add data to the phonebook.
		Editing the data: The user can edit the registered data.
		Deleting the data: The user can delete the data.
		Deleting all the phone data: The user can delete all the phone data.
		Registering a group name: The user can register 20 groups
		Selecting a group icon: The user can select the desired icon.
		Editing a group name: The user can input the name with the software keyboard.
		Deleting a group name: The user can delete the group names individually or all at once.
		Deleting the log data: The user can delete the log data individually or all at once.
Change the settings of the Bluetooth phone	Setting the security	By setting the security, the user can prevent people from using some functions of the hands-free system. It is useful when the user leave their car with a hotel or valet parking or the user doesn't want others to see the data that the user has registered.
		Changing the security code: The security code is 4 digits and the default is "0000". Choose a new code that is hard for other people to guess.
		Phone book lock: The user sets the phonebook lock.
		Initializing the security code: The user can initialize the settings.

(Continued)

Function		Outline
Set a Bluetooth phone	Enter the Bluetooth phone	In order to use hands-free function of a Bluetooth phone, it is necessary to register it in the multi-display. Once a phone is registered, the hands-free function becomes available automatically. The user can register up to 6 the Bluetooth phones.
	Select the Bluetooth phone	When two or more registered Bluetooth phones are in the cabin, it is necessary to select which phone to use to prevent the lines from being crossed. Only the selected phone is available for use as a hands-free phone. The phone registered last is automatically selected.
	Indicate and change Bluetooth information	The user can set, change and initialize the information of the Bluetooth phone displayed on the screen.
	Deleting a Bluetooth phone	A registered Bluetooth phone can be unregistered from the multi-display.
	Displaying the information of the Bluetooth phone user delete	The user can display the information of the Bluetooth phone before he/she deletes it and he/she can ensure that the telephone that he/she will delete is correct one.

CLEARANCE SONAR SYSTEM

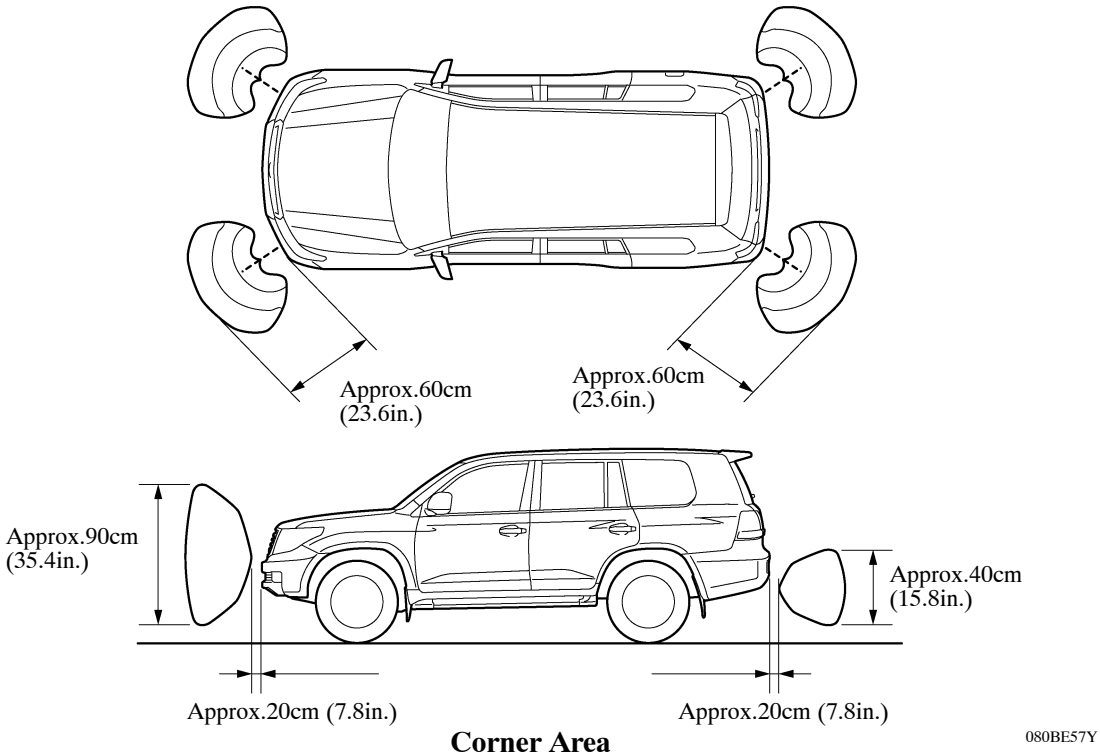
■ DESCRIPTION

- The clearance sonar system is optional equipment.
- The clearance sonar system uses ultrasonic sensors to detect any obstacles at the corners, or the rear of the vehicle.
- The clearance sonar system then informs the driver of the approximate distance between the sensors and the obstacles as well as their positions by displaying them on the multi-information display in the combination meter or the multi-display* and by sounding a clearance warning buzzer.
- The clearance sonar system is controlled by the clearance warning ECU.
- The operating condition of each clearance sonar system differs according to its installed position as shown in the table below:

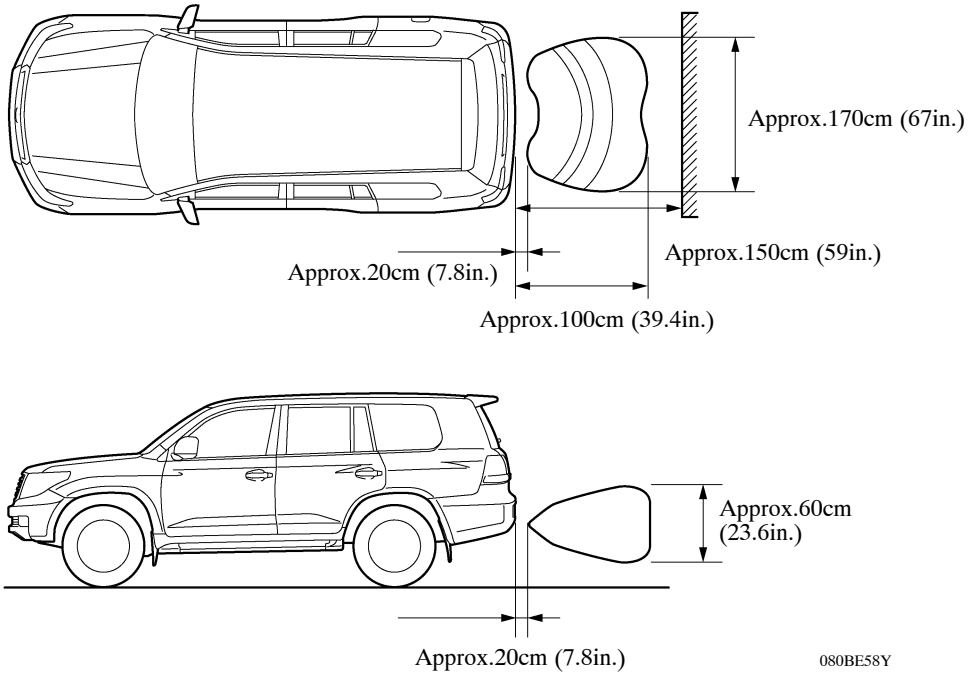
Installation Position	Operating Condition
Ultrasonic Sensor (Front Corner LH and RH)	• Power source is IG-ON. • Shift position is in any position other than P. • Vehicle speed is approximately 10km/h (6 mph) or less. The sensor stops operating when the vehicle speed is 13 km/h (8mph) or more, and starts operating when the vehicle speed decreases to below 9km/h (5.6 mph).
Ultrasonic Sensor (Rear Corner LH and RH) Ultrasonic Sensor (Rear Center LH and RH)	• Power source is IG-ON • Shift position is R. • Back sonar or clearance sonar switch is ON.

*: Optional Equipment

■DETECTION AREA



Corner Area

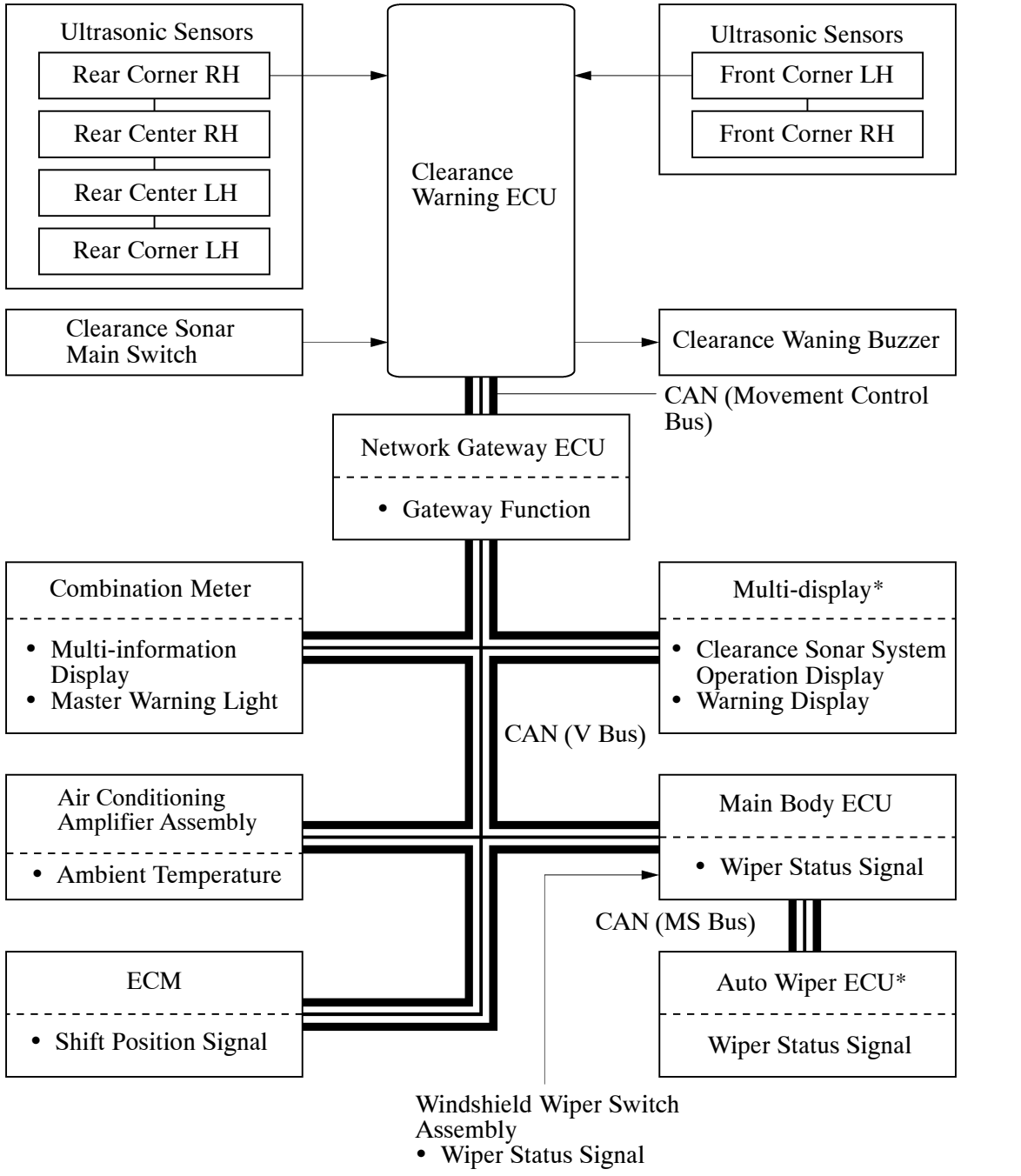


Rear Center Area

◆ : These detection ranges are applicable when positioning a 60mm (0.2ft.) diameter pole parallel or perpendicular to the ground. The ranges vary depending on the measuring method and type of obstacle.

BE

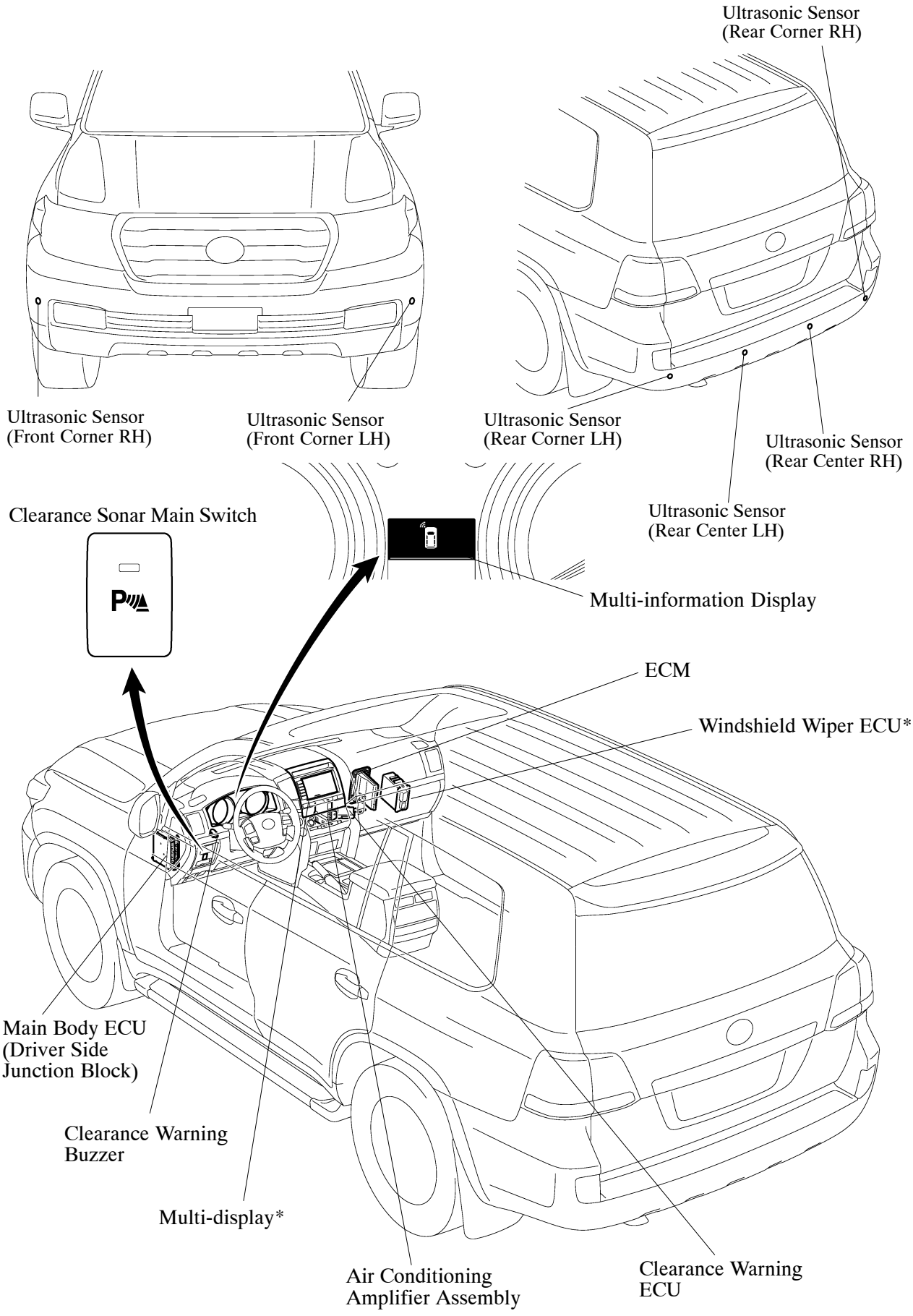
■SYSTEM DIAGRAM



081BE83S

*: Optional Equipment

■LAYOUT OF MAIN COMPONENTS



*: Optional Equipment

081BE84S

BE

■ FUNCTION OF MAIN COMPONENTS

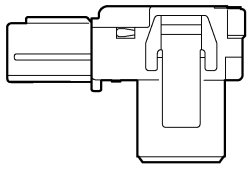
Component		Function
Ultrasonic Sensors		Detects the distance between the vehicle and the obstacle.
Clearance Warning Buzzer		Sounds a buzzer to inform the driver according to the distance to the obstacle.
Combination Meter		Transmits the vehicle speed signal to the clearance warning ECU.
	Multi-information Display	• Displays the location of the obstacle and the approximate distance between the vehicle and the obstacle. • Informs the driver if the ultrasonic sensors malfunction, or if they freeze or become dirty.
	Master Warning Light	Illuminates when the multi-information display indicates that the ultrasonic sensors are malfunctioning or frozen.
Multi-display*		• Displays the location of the obstacle and the approximate distance between the vehicle and the obstacle. • The sound volume, distance required to sound the buzzer and distance required to trigger the display can be chosen on the setup screen for the clearance sonar system.
Clearance Warning ECU		Judges the approximate distance between the vehicle and an obstacle based on signals from the ultrasonic sensors. Output signals are sent to the multi-information display and/or multi-display.
ECM		Transmits the shift position signal to the clearance warning ECU.
Air Conditioning Amplifier Assembly		Transmits the outside temperature to the clearance warning ECU.
Windshield Wiper ECU*		Transmits the wiper status signal to the main body ECU.
Main Body ECU		Transmits the wiper status signal and dimmer signal to the clearance warning ECU.
Clearance Sonar Main Switch		Operating this switch allows the operation of clearance sonar system to be enabled or disabled.

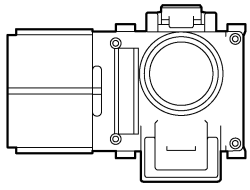
*: Optional Equipment

■CONSTRUCTION AND OPERATION

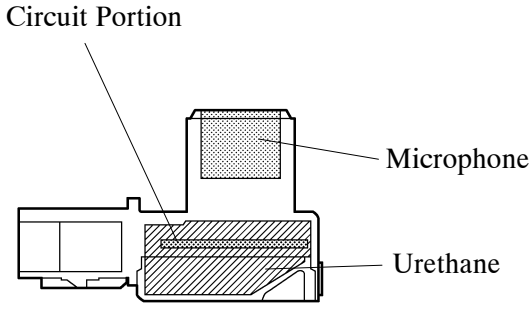
1. Ultrasonic Sensor

- The ultrasonic sensor consists of the microphone that transmits and receives ultrasonic wave and circuit portion.
- The circuit portion is filled with silicone or urethane to prevent water from entering.

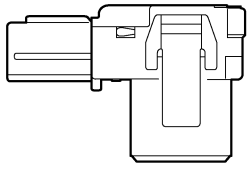


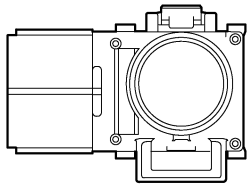


Ultrasonic Sensor
(Front Corner LH and RH)



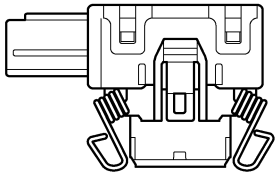
Cross Section

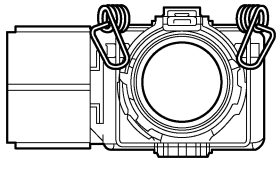


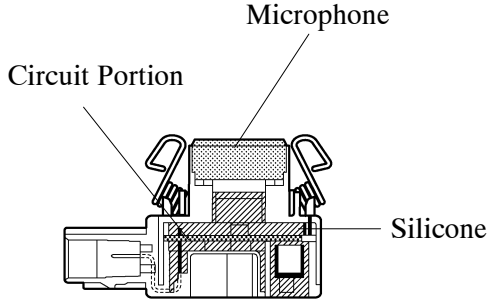


Ultrasonic Sensor
(Rear Corner LH and RH)

080BE60Y







Cross Section

Ultrasonic Sensor
(Rear Center LH and RH)

080BE61Y

BE

2. Clearance Warning Buzzer

- Depending on the detection distance and the detection area, the sound pattern of the clearance warning buzzer will vary.

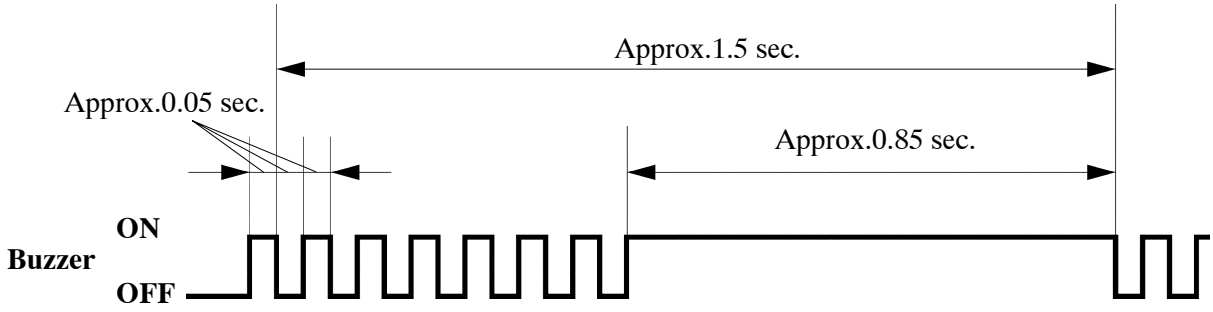
Detection Area	Detection Distance	cm (in.)	Buzzer Sound Pattern ON/ OFF Time (msec.)
Front Corner	Long	60 ± 6 to 47.5 ± 5 (23.6 ± 2.4 to 18.7 ± 2)	150 / 150
	Middle	47.5 ± 5 to 35 ± 4 (18.7 ± 2 to 13.8 ± 1.6)	75 / 75
	Short	35 ± 4 or less (13.8 ± 1.6 or less)	Continuous Sound
Rear Corner	Long	60 ± 6 to 37.5 ± 4 (23.6 ± 2.4 to 14.8 ± 1.6)	150 / 150
	Middle	37.5 ± 4 to 30 ± 3 (14.8 ± 1.6 to 12 ± 1.2)	75 / 75
	Short	30 ± 3 or less (12 ± 1.2 or less)	Continuous Sound
Rear Center	Longest	150 ± 15 to 60 ± 6 (59 ± 5.9 to 23.6 ± 2.4)	150 / 650
	Long	60 ± 6 to 45 ± 5 (23.6 ± 2.4 to 17.7 ± 2)	150 / 150
	Middle	45 ± 5 to 35 ± 4 (17.7 ± 2 to 13.8 ± 1.6)	75 / 75
	Short	35 ± 4 or less (13.8 ± 1.6 or less)	Continuous Sound

- When the front and rear sensors detect obstacles at the same time, the buzzer sounds as follows.

ON/OFF Time (msec.)

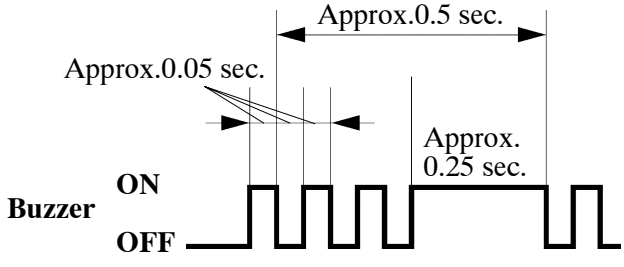
Rear \ Front	Short	Middle	Long	Not Detected
Short	Buzzer Timing 2	Buzzer Timing 1	Buzzer Timing 1	Continues Sound
Middle	Buzzer Timing 1	75/ 75	75/ 75	75/ 75
Long	Buzzer Timing 1	75/ 75	150/ 150	150/ 150
Longest	Buzzer Timing 1	75/ 75	150/ 150	400/ 400
Not Detected	Continues Sound	75/ 75	150/ 150	None

▶ Buzzer Timing 1 ◀



0140BE77C

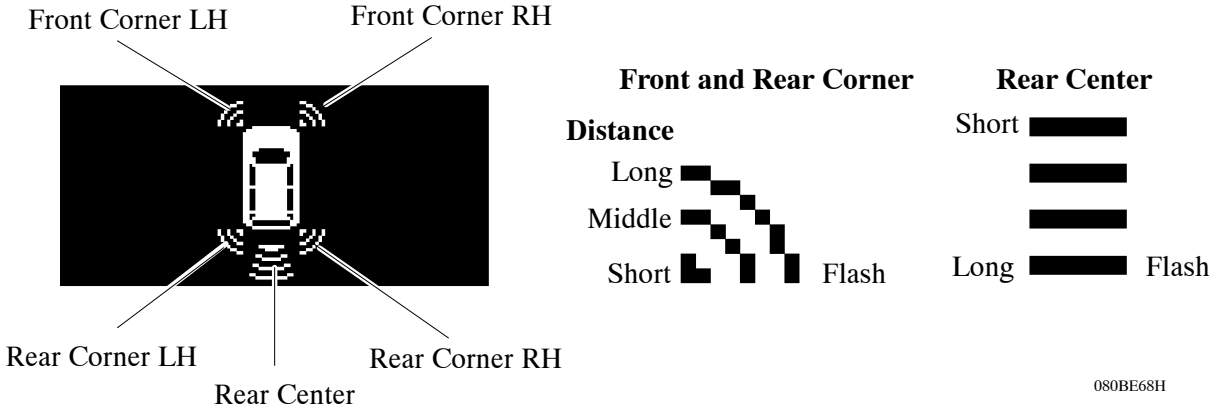
▶ Buzzer Timing 2 ◀



0140BE76C

3. Multi-information Display

- The items displayed by the multi-information display are the location of the obstacle, the approximate distance between the vehicle and the obstacle, and warning messages relating to sensor malfunction, sensor freezing, or presence of dirt on the sensor. When any warning messages are displayed, the master warning light illuminates and the clearance warning buzzer sounds.
- The number of lines shown on the display changes based on the actual distance and flashes when the distance is short.



▶ Warning Message ◀



Ultrasonic Sensor Malfunction Warning* **Ultrasonic Sensor Freeze/Contamination Warning***

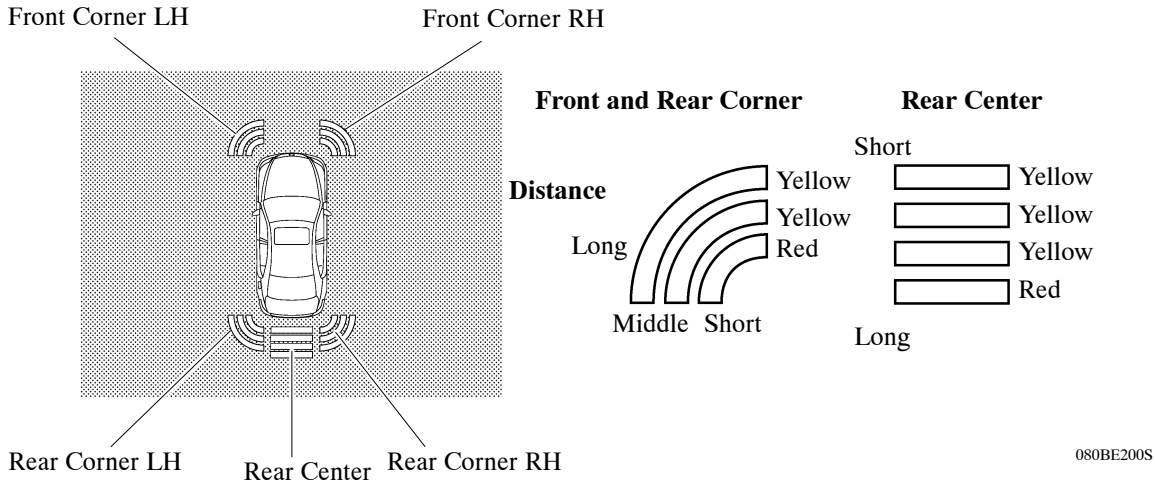
080BE69S

*: Although all areas with the sensors are marked in the illustrations, only the area with a malfunctioning sensor will be indicated by the mark in the actual condition.

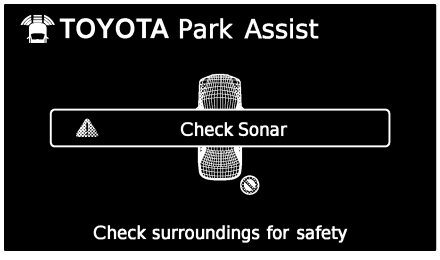
BE

4. Multi Display

- The items displayed by the multi-display are the location of the obstacle and the approximate distance between the vehicle and the obstacle, warning messages relating to sensor malfunction, sensor freezing, or presence of dirt on the sensor. When any warning messages are displayed, the master warning light illuminates and the clearance warning buzzer sounds.
- The distance is displayed by the number of lines and color based on the actual distance. The display usually illuminates in yellow. When the distance is short, it illuminates in red.



▶ Warning Message ◀



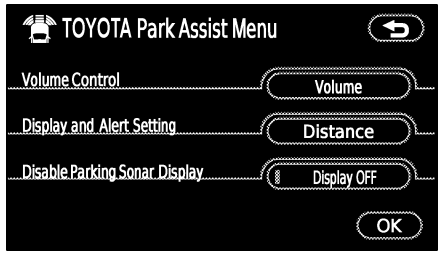
Ultrasonic Sensor Malfunction Warning



Ultrasonic Sensor Freeze/Contamination Warning

080BE198Y

- The display timing and detection distance on the multi-display can be customized.



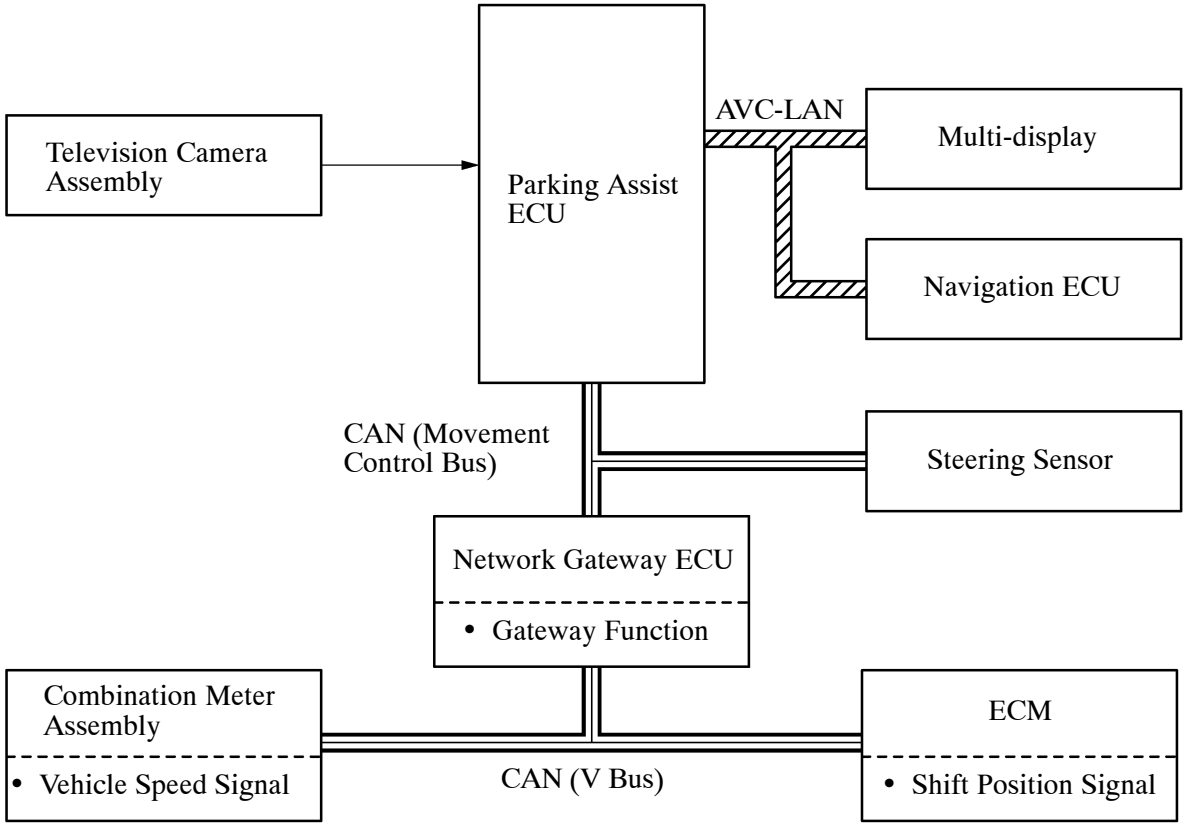
080BE199Y

PARKING ASSIST MONITOR SYSTEM

■ DESCRIPTION

- The parking assist monitor system consists of the rear view and parking guide lines to assist the driver in parking the vehicle. The parking assist monitor system has a television camera mounted on the back door to display a view of the area behind the vehicle on the multi display.
- A package consisting of the parking assist monitor system and the multi-display is available.
- This system consists of the television camera assembly, parking assist ECU, multi-display, steering sensor, navigation ECU, combination meter assembly, air conditioning amplifier assembly, ECM and main body ECU.
- This system operates when all the conditions given below have been met:
  - Power source is IG-ON.
  - The shift lever is shifted to reverse.
- If the driver moves the shift lever to a position other than reverse, or switches the modes on the multi-display, the rear view display will stop and change to the display of another mode.

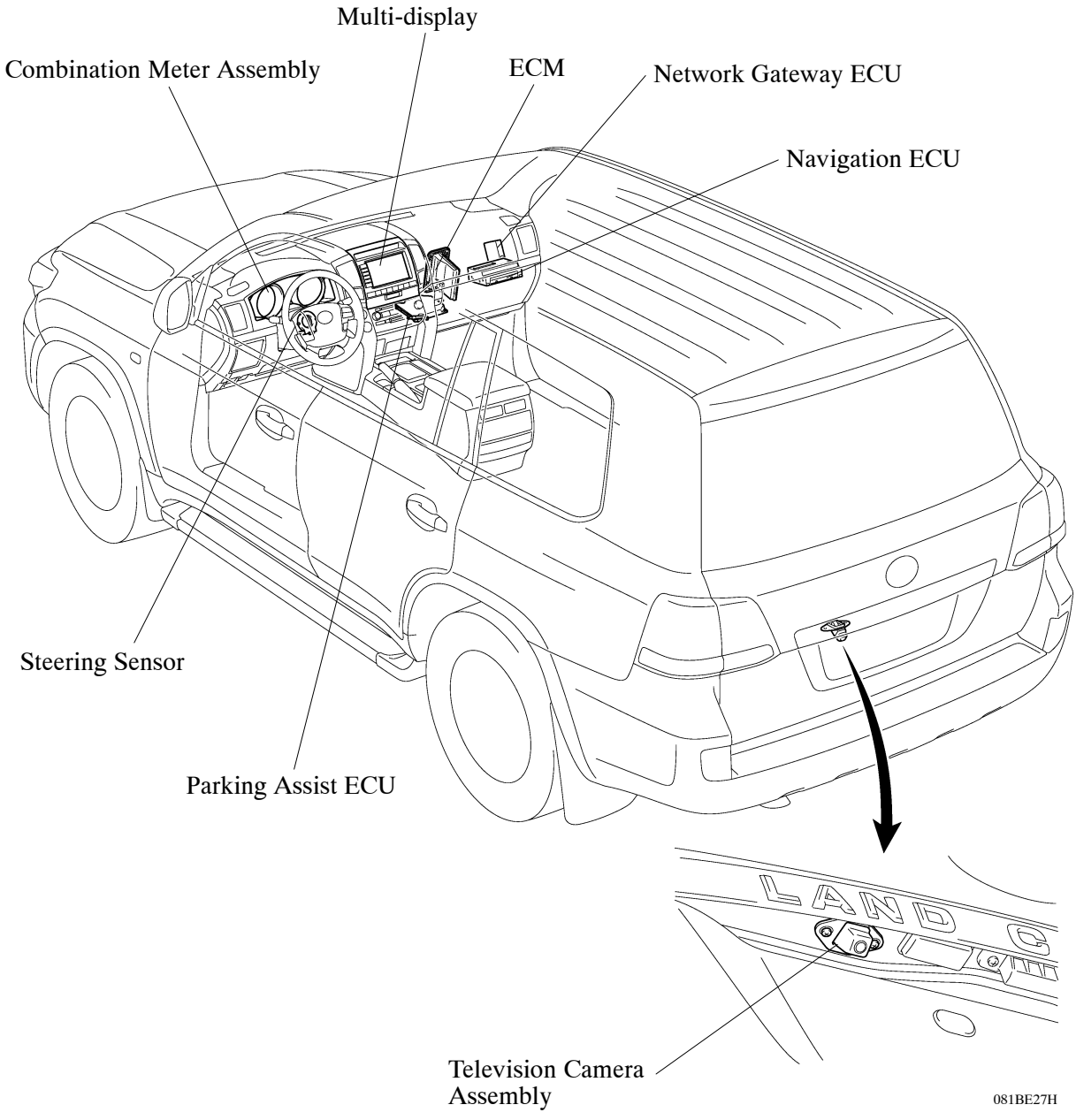
▶ System Diagram ◀



CAUTION

- Do not rely entirely on the parking assist monitor system. Use caution, just as you would when backing up any vehicle.
- Never back up while looking only at the screen. The image on the screen may differ from actual conditions. If you back up while looking only at the screen, you may hit an object or have an accident. When backing up, be sure to check by looking behind and all around the vehicle, both directly and using the mirrors, before reversing.

■ LAYOUT OF MAIN COMPONENT

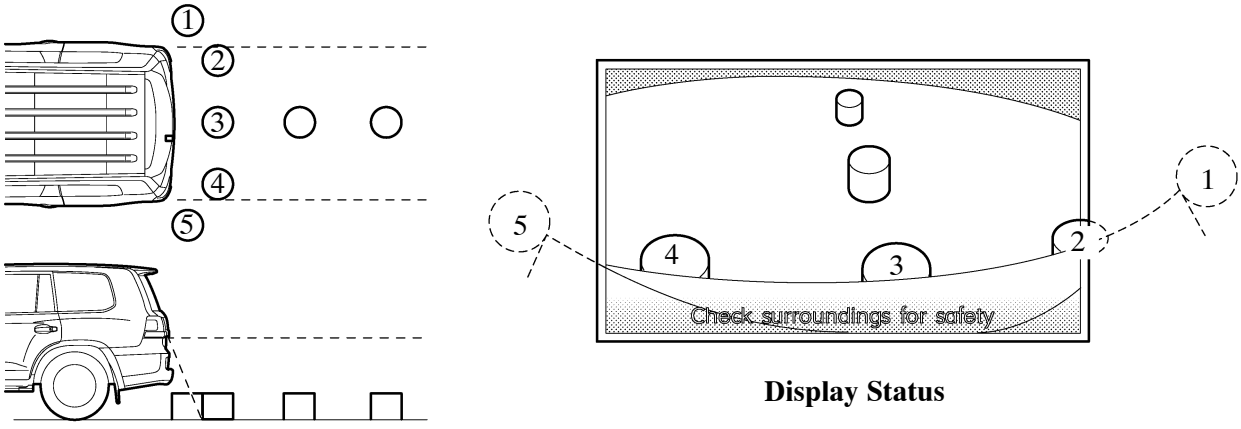


■FUNCTION OF MAIN COMPONENTS

Component	Function
Television Camera Assembly	Transmits a view of the area behind the vehicle to the parking assist ECU.
Parking Assist ECU	• Transmits visual signals, which are composed of a view of the area behind the vehicle taken with the television camera and parking assist guide lines, to the multi display. Furthermore, it effects overall control of the system based on signals received from the sensors and the navigation ECU. • The parking assist ECU sets a warning message or guide message of the parking assist monitor system using the same language selected for the multi-display.
Multi-display	Receives video signals composed of the area behind the vehicle with parking assist guide lines overlaid from the parking assist ECU, and displays them on the display panel.
Navigation ECU	• Transmits the movement of the vehicle to the parking assist ECU. • Transmits the current language settings to the parking assist ECU. These settings were selected using the language select function of the multi-display.
Steering Sensor	Detects the angle of the steering wheel, and transmits the signal to the parking assist ECU.
Combination Meter Assembly	Transmits the vehicle speed signal to the parking assist ECU.
ECM	Transmits the reverse signal to the parking assist ECU.
Network Gateway ECU	Transmits the signal received from the combination meter assembly and the ECM to the parking assist ECU.

■AREA DISPLAYED ON SCREEN

- On the multi-display, objects on the right of the vehicle appear on the right side of the display panel, and objects on the left of the vehicle appear on the left side of the display panel.
- The television camera uses a wide-angle lens. The perceived distance from images that appear on the screen will differ from the actual distance.



Display Status

081BE28TE

NOTE:

- The area displayed on screen may vary according to vehicle status or road conditions.
- The area covered by the television camera is limited. The television camera does not show objects close to either corner of the bumper or show the area under the bumper.

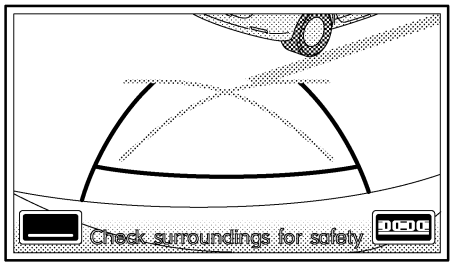
■DESCRIPTION OF DISPLAY

1. General

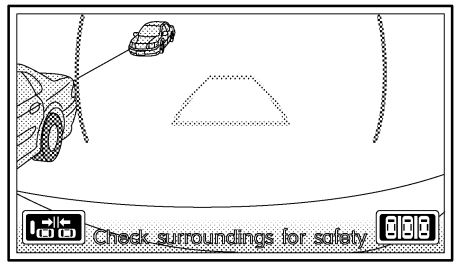
The parking assist monitor system displays in the manual assist and the parallel parking assist:

- The manual assist used for parking the vehicle in a garage or parking space.
- The parallel parking assist should be used for parallel parking the vehicle.

These assists can be changed by pressing the touch switch. The initial (default) setting is set to parallel parking assist.



Manual Assist 037BE36TE



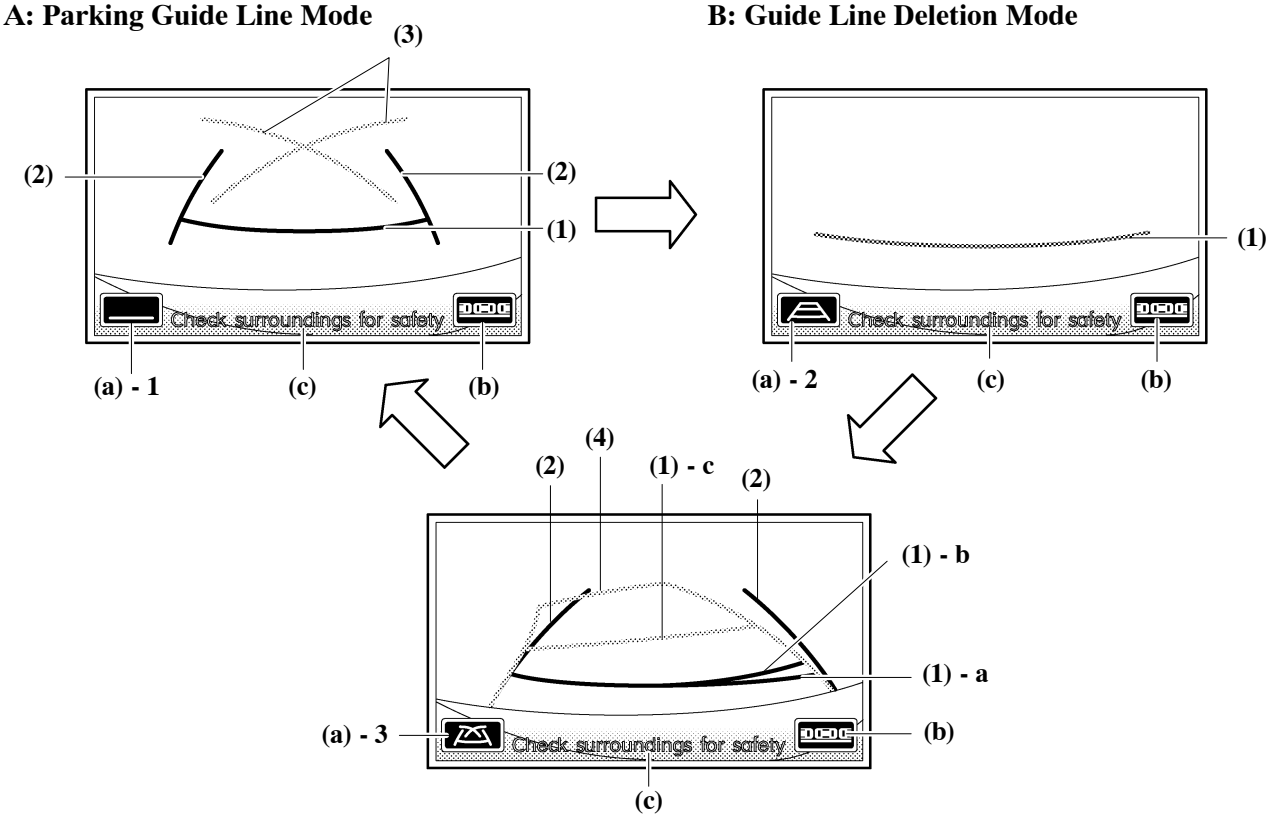
Parallel Parking Assist 037BE37TE

2. Manual Assist

Three different manual assist modes can be selected from, A: parking guide line mode, B: guide deletion mode, and C: estimated guide line mode. The initial (default) setting for manual assist is the parking guide line mode.

- The mode can be changed by touching the button located at the lower-left corner of the screen.
- When the manual assist mode is operating, fixed guide lines appear superimposed on a view of the area behind the vehicle. These guide lines can be used to assist the driver while backing the vehicle.

A: Parking Guide Line Mode **B: Guide Line Deletion Mode**



C: Estimated Guide Line Mode

05BBE27TE

Item		Mode			Outline
		A	B	C	
(1) or (1) - b	Distance Guide Line (Red)	○	○	○	The guide line indicates a position on the ground about 0.5 m (1.5 ft) behind the rear bumper.
(1) - a	Distance Guide Line (Green)	—	—	○	The guide line moves, together with estimated guide lines, in sync with the steering wheel. The center of the line indicates a position on the ground about 0.5 m (1.5 ft) behind the rear bumper.
(1) - c	Distance Guide Line (Yellow)	—	—	○	The guide line moves, together with estimated guide lines, in sync with the steering wheel. The center of the line indicates a position on the ground about 1.0 m (3.0 ft) behind the rear bumper.
(2)	Vehicle Width Extension Guide Line	○	—	○	These guide lines indicate the estimated vehicle width extension.

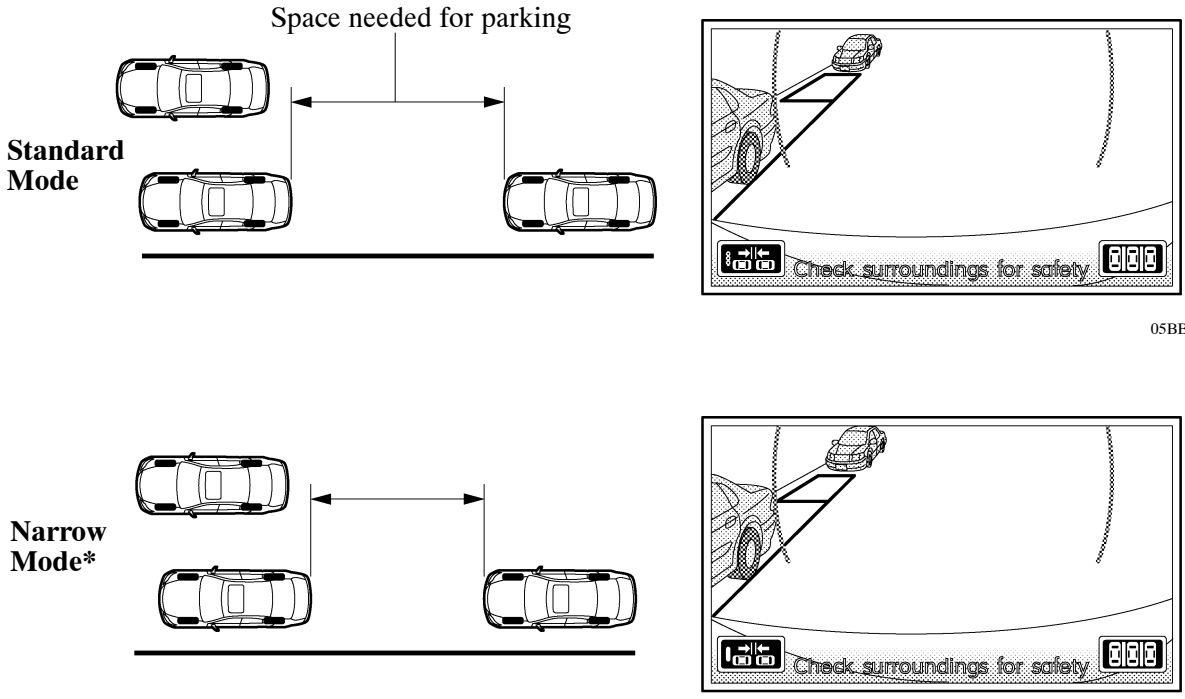
(Continued)

Item		Mode			Outline
		A	B	C	
(3)	Parking Assist Guide Line	○	—	—	These guide lines the points at which driver should turn the steering wheel fully.
(4)	Estimated Guide Line	—	—	○	These guide lines indicate the estimated course in which the vehicle moves backward. The guide lines move in sync with the steering wheel.
(a) - 1	Guide Line Deletion Mode Touch Button	○	—	—	Touching this button turns guide line deletion mode on.
(a) - 2	Estimated Guide Line Mode Touch Button	—	○	—	Touching this button turns estimated guide line mode on.
(a) - 3	Parking Guide Line Mode Touch Button	—	—	○	Touching this button turns parking guide line mode on.
(b)	Parallel Parking Assist Mode Touch Button	○	○	○	Touching this button turns parallel parking assist mode on.
(c)	Warning Message Display Area	○	○	○	Display a warning message.

3. Parallel Parking Assist

The parallel parking assist can select the following two display modes: Standard Mode and Narrow Mode*.

- The mode can be changed by touching the button located at the lower-left corner of the screen.
- The narrow mode is designed for situations in which the parking space is narrower than the standard mode.
- Initial (default) parallel parking assist is standard mode.



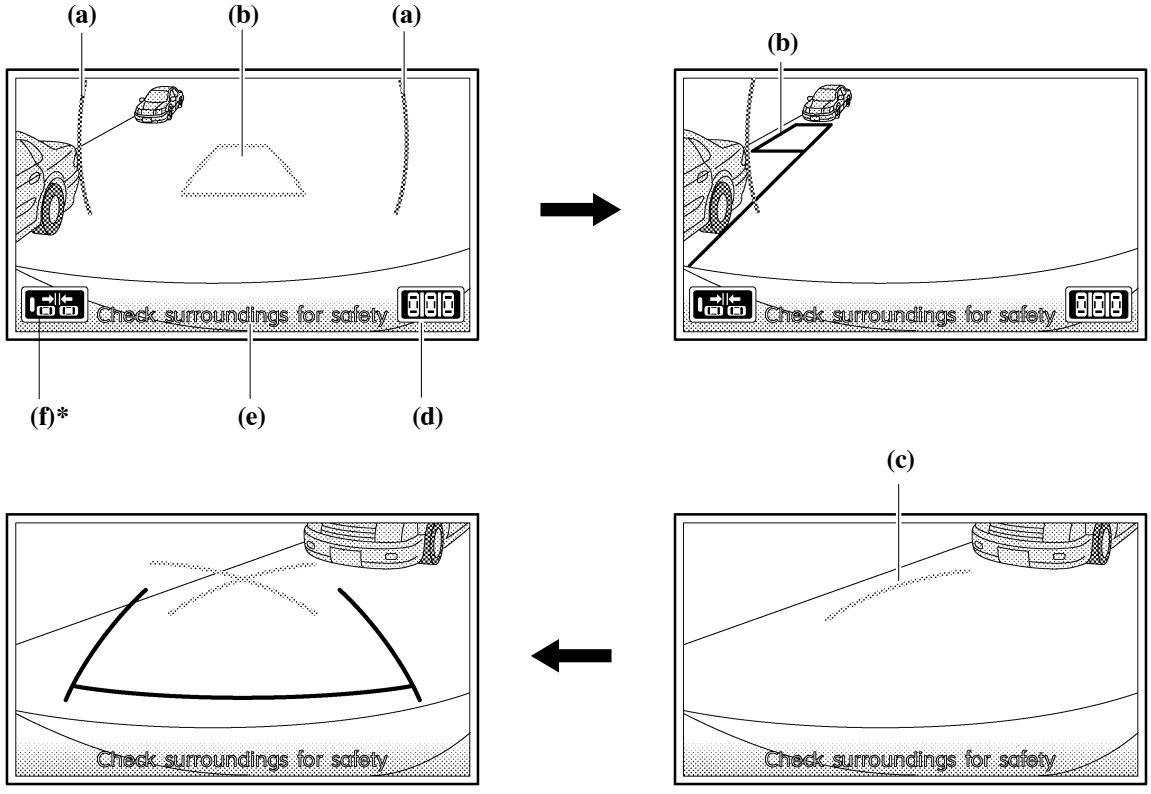
05BBE28TE

Display Status

037BE40TE

*: Only for European and Australian models

The guide lines displayed for the parallel parking assist mode change in accordance with the parking maneuvers of the vehicle. This provides the driver with an appropriate steering angle and timing during parallel parking.



Same guide lines are shown as in manual assist

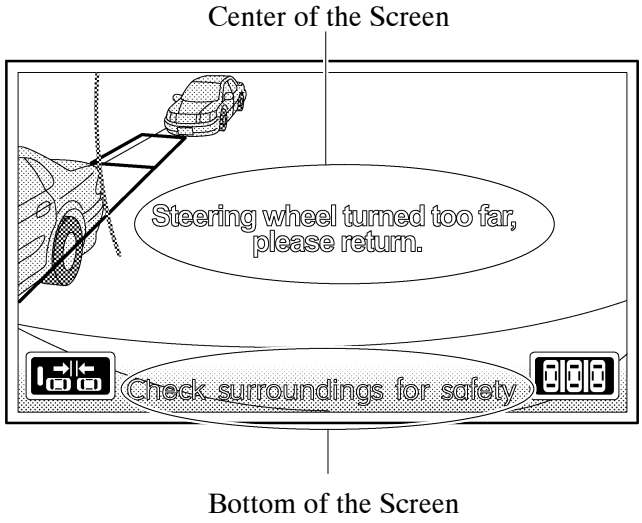
037BE41TE

Item			Outline
(a)	Green Vertical Line		A guide line that serves as a reference position for starting parallel parking.
(b)	Green Outline		A guide line that serves as a reference position for completing the intended parking. This guide line disappears once the vehicle starts moving backward.
(c)	Parking Guide Line		A guide line indicating part of the prospective outer path of the vehicle when the steering is turned fully to the right or left side. This guide line appears only after the guide lines (a) and (b) disappear.
(d)	Touch Switch	Manual Assist Mode Switch	This switch changes between parallel parking assist mode and manual assist mode.
(e)	Warning Message Display Area		Displays a warning message.
(f)*	Mode Select Switch		Changes between standard and narrow modes.

*: Only for European and Australian models

4. Warning Message

A warning message appears at the bottom or the center of the screen under the conditions listed below, regardless of whether the system is in the manual or parallel parking assist mode.
The warning message appears in the same language that has been selected by the language selector of the multi display (from among English, Danish, Dutch, French, German, Italian, Spanish, Swedish, Norwegian, and Portuguese).



▶ Warning Message appearing in the center of the Screen ◀

Warning Message	Outline
System not ready	This message appears if the system is started without initializing after a part is replaced.
Steering wheel turned too far, please return	This message is displayed when the system cannot perform the assist operation under the following situations: • When the vehicle starts in the parallel parking assist mode, the distance between own vehicle and the other parked vehicles is not approximately 1 m (3.2 ft.) (too far). • The steering wheel is turned too far.

▶ Warning Message appearing at the bottom of the Screen ◀

Warning Message	Outline
Checks surroundings for safety	This message always appears during system operation.
System Initializing	This message appears when the system is restarted if the parking assist ECU detects that a battery terminal has been disconnected and subsequently reconnected.
Guidance Unavailable	• This message is displayed when the vehicle is moved back furthermore, even through a message, “Steering wheel turned too far, please return”, is displayed in the center of the display and also the system judges it is impossible to perform the assist operation. • This message is displayed when an error in the steering sensor or a gyro signal error of the navigation ECU occurs.

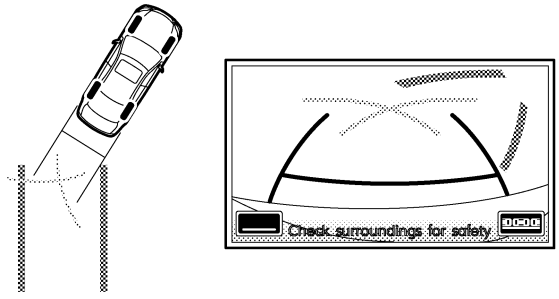
■ SYSTEM OPERATION

1. Manual Assist

Parking Guide Line Mode

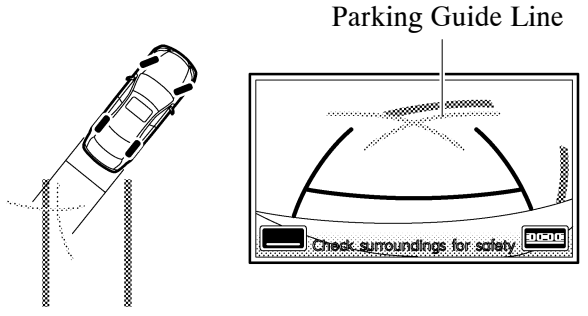
To use the parking guide line mode for manual assist to park the vehicle in the parking space illustrated on the left, perform the following procedure:

- Move the shift lever to reverse.
- The manual assist mode is selected.
- An image appears on the display panel as illustrated on the right.



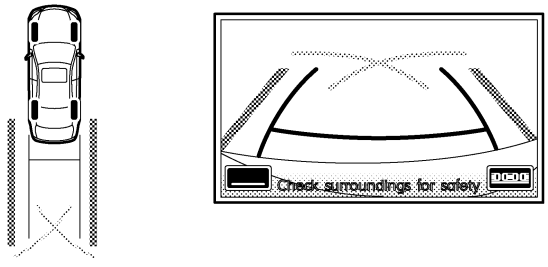
037BE43TE

- Back the vehicle and stop at the position in which the parking guide line comes in contact with the left side of the intended parking position.
- Turn the steering wheel fully to the right and back the vehicle.



037BE44TE

- Continue backing the vehicle until the vehicle is parallel to the plotted lines.
- Once the vehicle is parallel, aim the steering wheel straight ahead and back the vehicle to the target stop position.

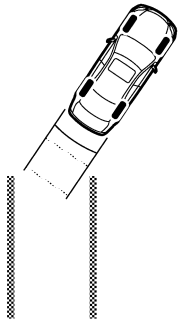


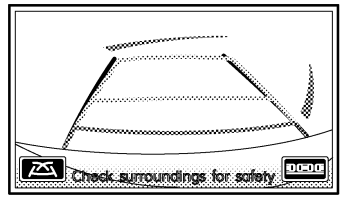
037BE45TE

Estimated Guide Line Mode

To use the estimated guide line mode for manual assist to park the vehicle in the parking space illustrated on the left, perform the following procedure:

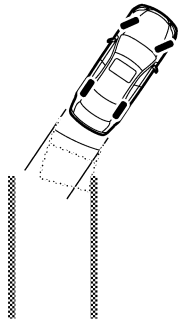
- Move the shift lever to reverse.
- The manual assist mode is selected.
- The estimated guide line mode is selected.
- An image appears on the display panel as illustrated on the right.

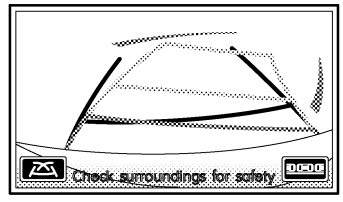




037BE46TE

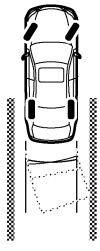
- Turn the steering wheel so that the estimated guide lines are within the parking space, and back up carefully.

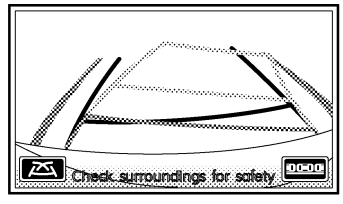




05BBE29TE

- When the rear of the vehicle is within the parking space, turn the steering wheel in order to equalize the left and right intervals between the vehicle width extension lines and the parking space sidelines.
- When the vehicle width extension guide lines and the parking space sidelines are parallel, straighten the steering wheel and then carefully back up until the entire vehicle is within the parking space.



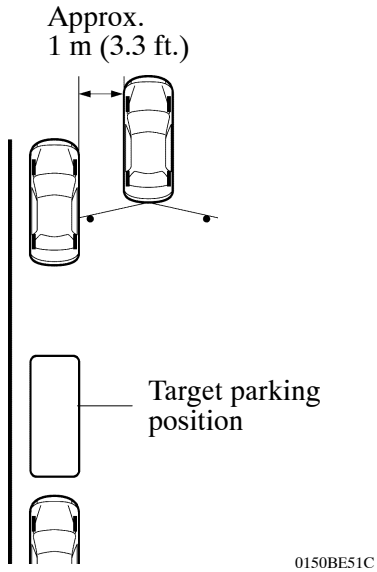


037BE48TE

2. Parallel Parking Assist Mode

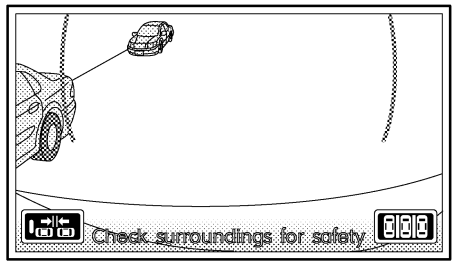
To use the parallel parking assist mode to park the vehicle in the parking space illustrated on the left, perform the following procedure:

- Stop the vehicle parallel to the road or the curb, at a side-to-side clearance of about 1 m (3.3 ft.) from the parked vehicle, approximately one-half car length forward of the parked vehicle.



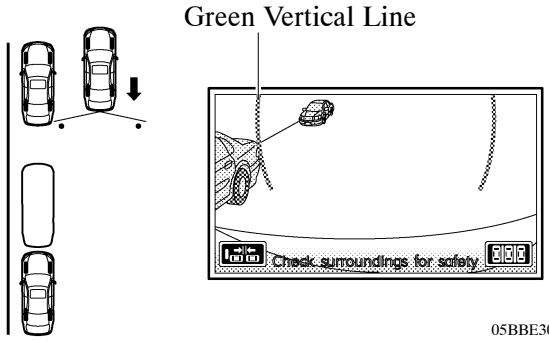
0150BE51C

- Aim the steering wheel straight ahead and move the shift lever to reverse.
- The parallel parking assist mode is selected.
- An image shows on the display panel as illustratedon the right.



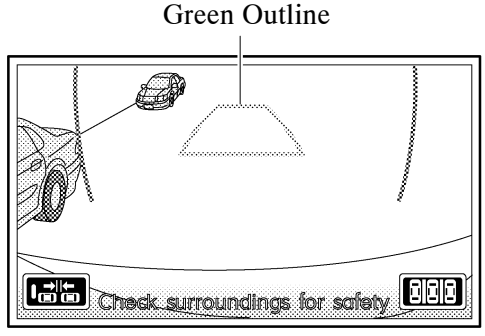
037BE49TE

- Drive the vehicle straight back and stop when the green vertical line of the target parking position is aligned with the rear end of the parked vehicle.



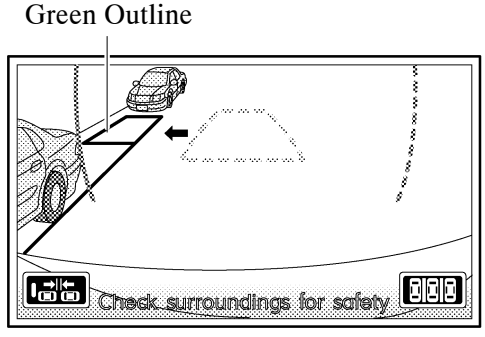
05BBE30TE

- When the steering wheel is turned, the green outline will appear.



037BE51TE

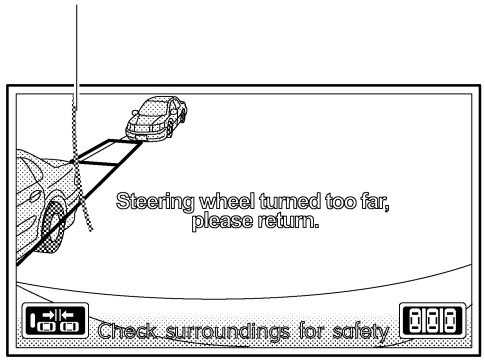
- Continue turning the steering wheel, and the green outline will move in the direction of the target parking position, while the outline changes into a shape as illustrated on the right.
  Keep turning the steering wheel until the green outline reaches the target parking position.
  At this time, the green vertical line opposite to the target parking position will disappear when the steering wheel is turned more than 90 degrees.



05BBE31TE

- However, if the steering wheel is turned too much, the message as shown in the right illustration is displayed and the green outline will change to red to inform the driver that the assist operation is not possible.
  Also, when your vehicle is away from the shoulders too much, the same condition will occur even adjusting the green outline at the normal position.

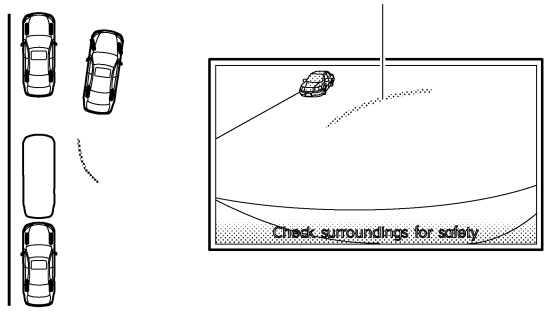
The green outline changes to red



037BE53TE

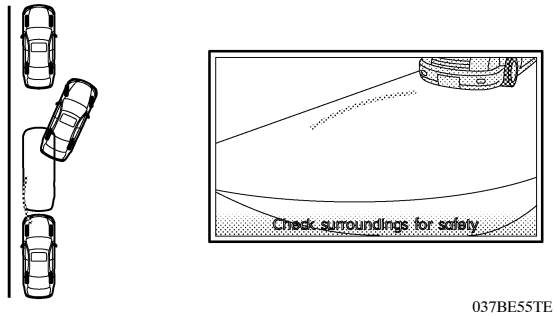
- Keep the steering wheel in the same position and start backing up. Then, the green vertical line and green outline disappear, and a parking guide line appears in the direction of the target parking position.

Parking Guide Line



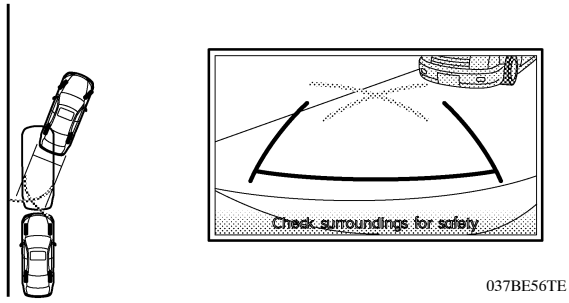
037BE54TE

- Keep the steering wheel in the same position and back up. Stop when the parking guide line reaches the left end of the target parking position.



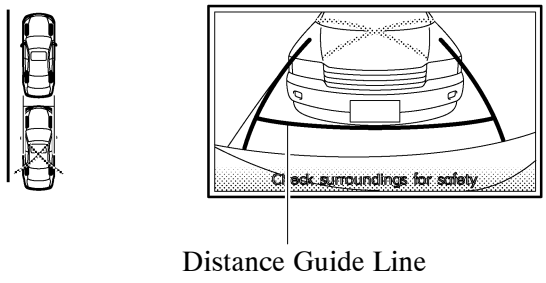
037BE55TE

- With the vehicle at a standstill, fully turn the steering wheel in the opposite direction. Then, as illustrated on the right, the same guide line appears as in the manual assist.
- The same screen displays as those in the manual assist mode will appear in future steps. Therefore, the guide line mode (parking guide line, guide line deletion, estimated guide line) is the mode set for manual assist.



037BE56TE

- Using the distance guide line slowly back the vehicle until the vehicle is parallel to the road or curb, while paying attention to the vehicles in front and in back. The parking maneuver is completed once the vehicle is parallel.



037BE57TE

Service Tip

If a battery terminal is disconnected, the assist function will not operate properly. This is because the present neutral steering point that is detected by the steering sensor does not match the neutral steering point that is stored in the memory of the parking assist ECU.
Therefore, if the parking assist ECU detects that a battery terminal has been disconnected and the system is operated again after reconnecting the battery terminal, a “System Initializing” warning message appears at the bottom of the screen. When this occurs, take one of the following corrective actions:

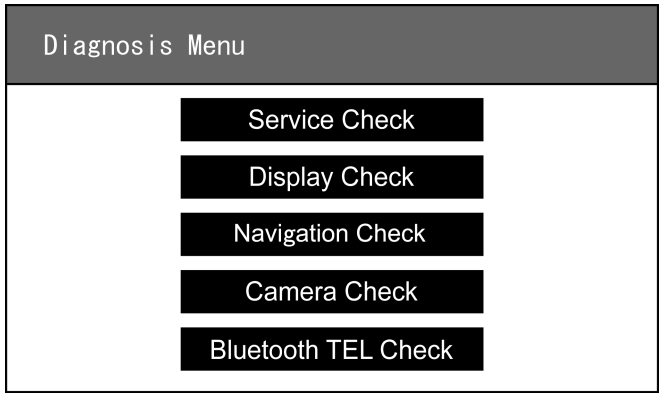
- With the power source IG-ON and the vehicle at a standstill, fully turn the steering wheel to the right, then fully turn it to the left (this procedure can be started either with a right or left turn).
- Drive the vehicle at a speed of approximately 20km/h (12 mph) for 5 minutes or more, on a road with a minmal number of curves.

■INITIALIZE FUNCTION DURING PART REPLACEMENT

The initialize function must always be performed whenever one of the conditions indicated in the table below occurs.

Parts Name	Condition	Initialize Item
Television Camera Assembly	• Camera position has shifted. • Removal and reassembly • Replacement • Deformation due to the mount area having been struck.	Camera position adjustment - Vertical position - Horizontal position - Roll angle, pan angle, tilt angle
Parking Assist ECU	Replacement	• Neutral steering point in memory • Maximum side-to-side steering angle in memory • Camera position adjustment - Vertical position - Horizontal position - Roll angle, pan angle, tilt angle
Steering Sensor	• Replacement • Removal and reassembly	• Neutral steering point in memory • Maximum side-to-side steering angle in memory

- The initialize function described above is performed on the diagnosis menu screen.
- The method for displaying the diagnosis menu screen is the same as for the multi-display.
- For details, see the Land Cruiser Repair (Station Wagon) Manual (Pub. No. RM0810E).



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■FAIL-SAFE FUNCTION

The table below indicates the conditions of detecting malfunctions in the sensors and ECU in this system.

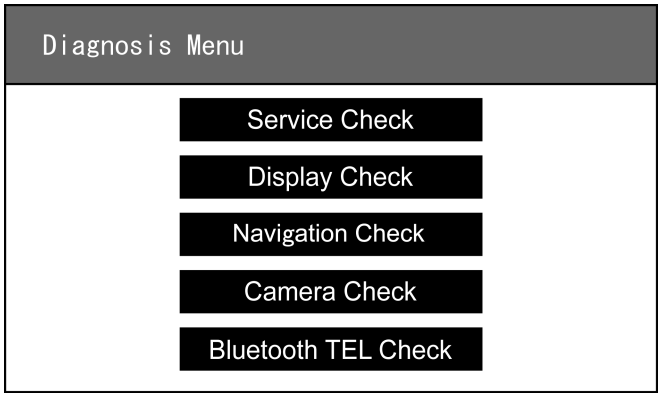
Malfunction Parts	Detection Item	Assist	
		Manual Assist	Parallel Parking Assist
Steering Sensor	• Transmission of sensor malfunction signal • Open circuit in sensor signal	Displays "Guidance Unavailable"*	Displays "Guidance Unavailable"
	Transmission of signal to indicate that neutral steering point correction is incomplete	Displays "System initializing."*	
	Communication malfunction between the steering sensor and parking assist ECU	Displays "Guidance Unavailable"*	
Television Camera Assembly	Transmission of television camera malfunction signal	Stop signal reception and displays a dark screen	
Parking Assist ECU	Malfunction of parking assist ECU.	Stops system operation	
Navigation ECU	• No response from navigation ECU • Transmission of navigation ECU malfunction signal	—	Displays "Guidance Unavailable"

*: Only during estimated guide line mode

■DIAGNOSIS

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The parking assist monitor system is equipped with a self-diagnosis system and can display the diagnosis menus shown on the below.
The diagnosis menu that pertains to this system contains the following three items:
a) Service Check
b) Display Check
c) Camera Check

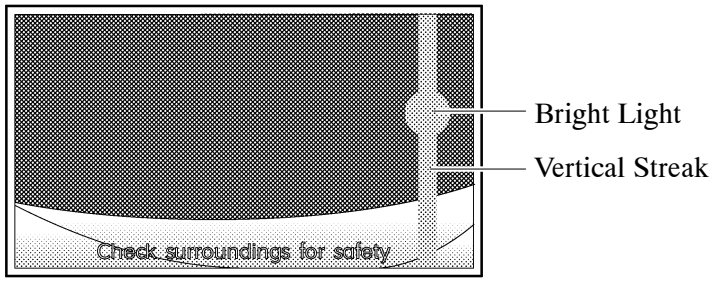


0150BE91C

- The method for displaying the diagnosis menu screen is the same as for the multi-display.
- For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

■ PRECAUTION FOR PARKING ASSIST MONITOR SYSTEM OPERATION

- In the following cases, it may become difficult to see items in the image on the screen, but this does not indicate a malfunction.
  - In the dark (for example, at night)
  - When the temperature near the lens is very high or low
  - When water droplets are present on the television camera, or when humidity is high. (for example, when it rains)
  - When foreign matter (for example, mud or salt) is present on the television camera lens
  - When the sun or the beam of headlights is shining directly into the television camera lens
- If a bright light (for example, sunlight reflected off the vehicle body) is picked up by the television camera, the smear effect*, peculiar to a CCD camera, may occur.



Smear Effect 036BE39TE

— REFERENCE —

**: Smear effect*

A phenomenon that occurs when a bright light is received up by the television camera; and transmitted to the screen, the light source will appear to have a vertical streak above and below it.

POWER WINDOW SYSTEM

■ DESCRIPTION

- The power window regulator motor assembly of the new Land Cruiser contains an ECU and Hall IC. The ECU effects power window control, and the Hall IC detects the position and the direction of the motor.
- The power window system has the following functions:

Function	Outline
Manual up-and-down (All Doors)	This function causes the window to open or close while the power window regulator switch is being pulled halfway up or pushed halfway down. The window stops as soon as the switch is released.
One touch auto up-and-down (All Doors)	The one touch auto up-and-down function enables the window to be fully opened or closed with a single touch of the power window regulator switch.
Variable speed control	This control minimizes the occurrence of noise during the power window open/close operation by changing the operating speed of the power window motor.
Jam protection (All Doors)	The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the window during one touch auto up operation or manual up operation.
Remote control (All Doors)	The multiplex network master switch assembly can control the up-and-down operations of the windows.
Window lock	Power window operation of the 3 passenger windows is disabled when the window lock switch is pressed.
Key off operation	This function enables the power window to be operated within approximately 43 seconds of the engine switch being turned off. However, if either the driver door or front passenger door is opened within this 43 seconds, the power window operation will be disabled. If the one touch auto up-and-down function is currently operating when the 43 seconds have elapsed, the power window will continue to move until it is fully open or closed.
Transmitter linked up-and-down*	When a lock/unlock signal is transmitted by the key (electronic key) for longer than 2.4 seconds to the certification ECU, the certification ECU transmits the window close/open signal to the main body ECU. Power window ECUs activate all the power window motors in accordance with the signals from the main body ECU to open or close all the windows.
Lock switch linked up*	All the windows are closed when the lock switch on the outside door handle is pressed for 3 seconds or more with the key in the detection area and all the doors locked. This function can be performed using the door lock switch of any door.
Mechanical key linked up-and-down*	When the key (electronic key) is not in the interior detection area, the driver door is locked, and the key (mechanical key) in the driver door key cylinder is turned and maintained in the lock direction for 1.5 seconds or more, the main body ECU activates the power window motor to close all the door windows while the key (mechanical key) is turned. Similarly, when the driver door is unlocked, turning and maintaining the key (mechanical key) in the driver door key cylinder in the unlock direction for 1.5 seconds or more will cause all the door windows to be opened.
Diagnosis	When any power window ECU detects either of the following conditions, the self-diagnosis function switches the ECU to fail-safe mode. • An abnormality in the Hall IC that detects the position, speed, and direction of the window. • An error in the window detection position and the upper limit position recorded in the power window ECU.

(Continued)

Function	Outline
Fail-safe	If the Hall IC in the power window motor malfunctions, some power window functions will be prohibited by the fail-safe mode: • Each power window operates when the corresponding power window regulator switch is fully pushed down or pulled up and held in that position.

*: These functions are only for VX grade models. The setting function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-17.

Service Tip

The power window regulator motor assembly stores the initial position of each door window. The memory is not cleared if battery terminals, fuses or power window motor connectors are disconnected. However, the power window regulator motor assembly needs to be initialized if it is replaced with a new one or it is reinstalled with the power window regulator sub-assembly. When necessary, perform the initialization as follows:

Initialization after Reinstallation of the Power Window Regulator Motor Assembly

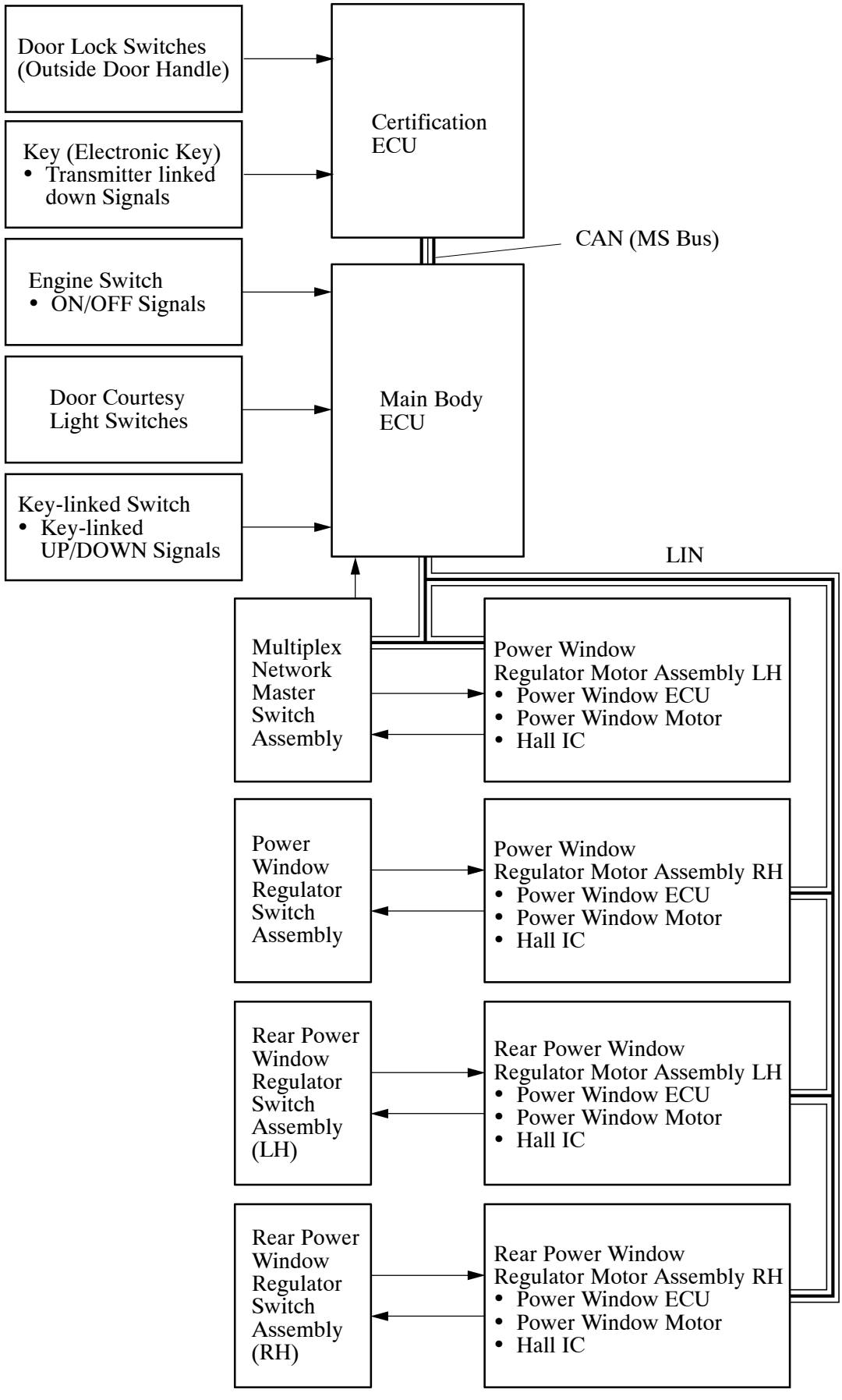
- Connect the battery and turn the engine switch on (IG).
- Pull up the power window regulator switch to the AUTO UP position and hold it until the window is fully closed.
- Hold the power window regulator switch in the AUTO UP position for at least 6 seconds after the window is fully closed.
- Push down the power window regulator switch until the window is fully opened.
- Hold the power window regulator switch for at least 1 second after the window is fully opened.
- Release the switch once, push down the power window regulator switch again and hold it for at least 4 seconds.
- Pull up the power window regulator switch to the AUTO UP position and hold it until the window is fully closed.
- Hold the power window regulator switch in the AUTO UP position for at least 1 second after the window is fully closed.
- Check that the power window regulator switch illumination has changed from flashing to being illuminated.
- Make sure that the window opens and closes automatically using the one touch function.

Initialization after Replacement of the Power Window Regulator Motor Assembly

- Connect the battery and turn the engine switch on (IG).
- Check that the power window regulator switch illumination blinks after the power source is turned on.
- Push down the power window regulator switch until the window is fully opened.
- Hold the power window regulator switch for at least 1 second after the window is fully opened.
- Pull up the power window switch to the AUTO UP position and hold it until the window is fully closed.
- Hold the power window regulator switch in the AUTO UP position for at least 1 second after the window is fully closed.
- Check that the power window regulator switch illumination has changed from flashing to being illuminated.
- Make sure that the window opens and closes automatically using the one touch function.

For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

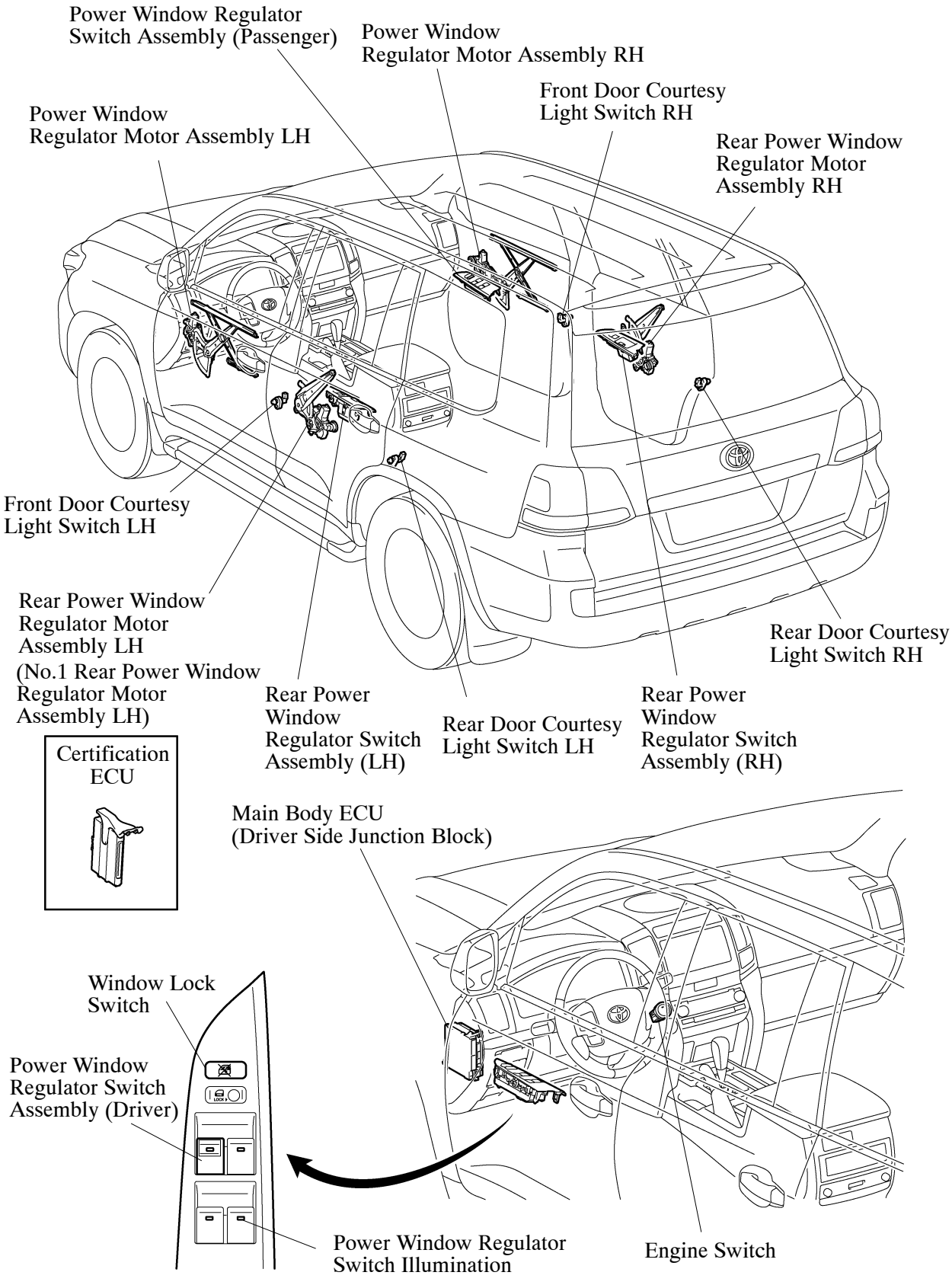
▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS



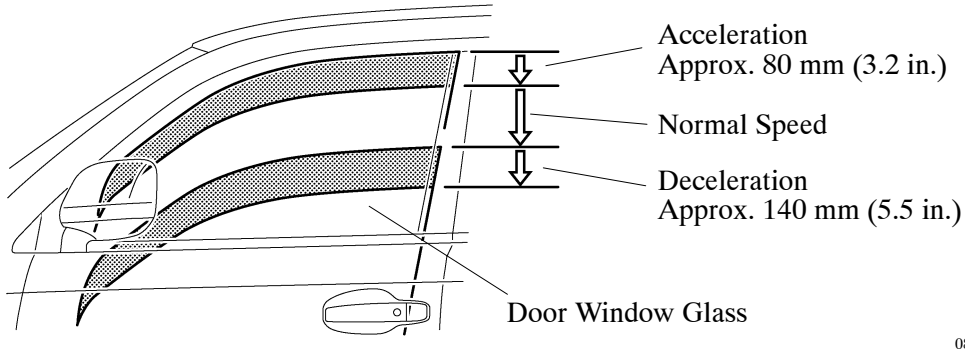
Multiplex Network Master Switch Assembly

081BE123S

■VARIABLE SPEED CONTROL

1. Opening Power Window

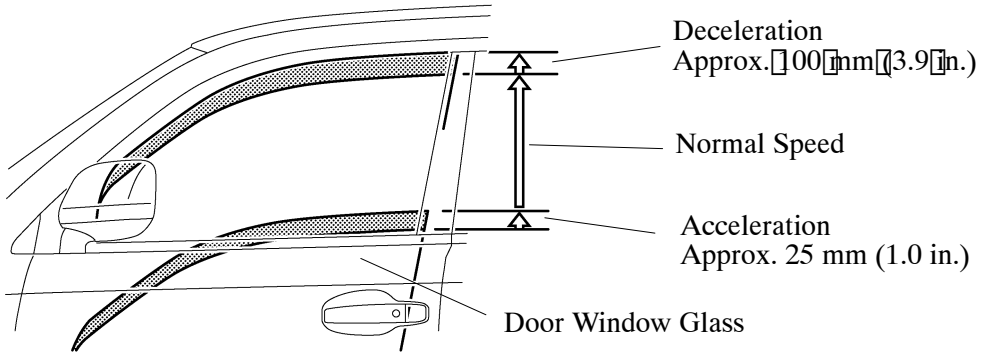
- In order to minimize the noise when the power window open function starts operating, the power window ECU accelerates the window opening speed within approximately 80 mm (3.2 in.) of the window fully closed position.
- In order to minimize the noise when the power window is opened fully, the power window ECU decelerates the window opening speed within approximately 140 mm (5.5 in.) of the window fully open position.



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2. Closing Power Window

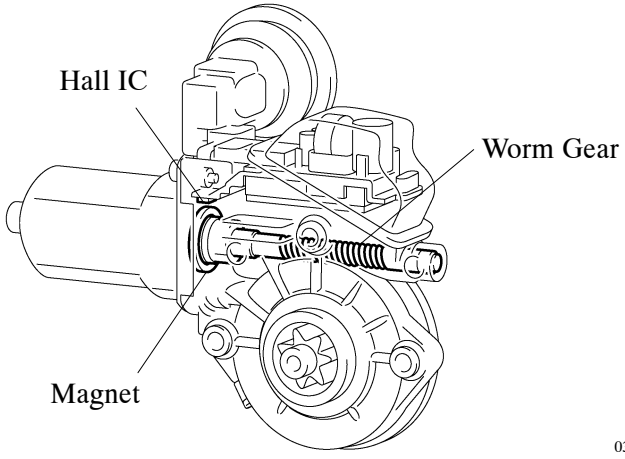
- In order to minimize the noise when the power window close function starts operating, the power window ECU accelerates the window closing speed within approximately 25 mm (1.0 in.) of the window fully open position.
- In order to minimize the noise when the power window is closed fully, the power window ECU decelerates the window closing speed within approximately 100 mm (3.9 in.) of the window fully closed position.



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■ JAM PROTECTION FUNCTION

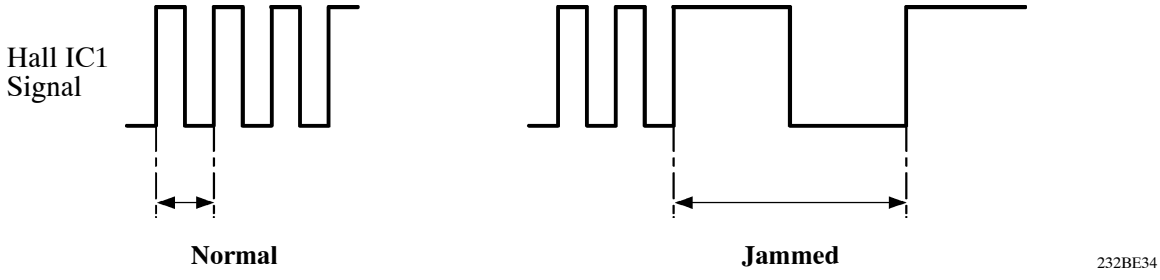
- The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the window during one touch auto up operation or manual up operation.
- The reverse-direction conditions and amount of down movement after jam detection are as follows:
  - The jam protection function operates and lowers the window approximately 125 mm (4.9 in.) or until 2.5 second has elapsed.
  - After this, if the amount (space) that the window is open has not reached approximately 200 mm (7.9 in.), the jam protection function will continue to lower the window until the space is approximately 200 mm (7.9 in.) or 5 seconds have elapsed.
  - If the window reaches the fully open position before the initial 125 mm (4.9 in.) lowering of the door glass is reached, the jam protection function will stop at that time.
- The magnet and Hall IC in the power window regulator motor assembly are used to enable the power window jam protection.



036BE206TE

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the magnet into pulse signals and outputs them to the power window ECU.
- To control the jam protection function, the ECU determines the amount of movement and jamming of the window glass based on the pulse signals from the Hall IC.

▶ Judgment of Movement and Jamming ◀



232BE34

DOOR LOCK CONTROL SYSTEM

■ DESCRIPTION

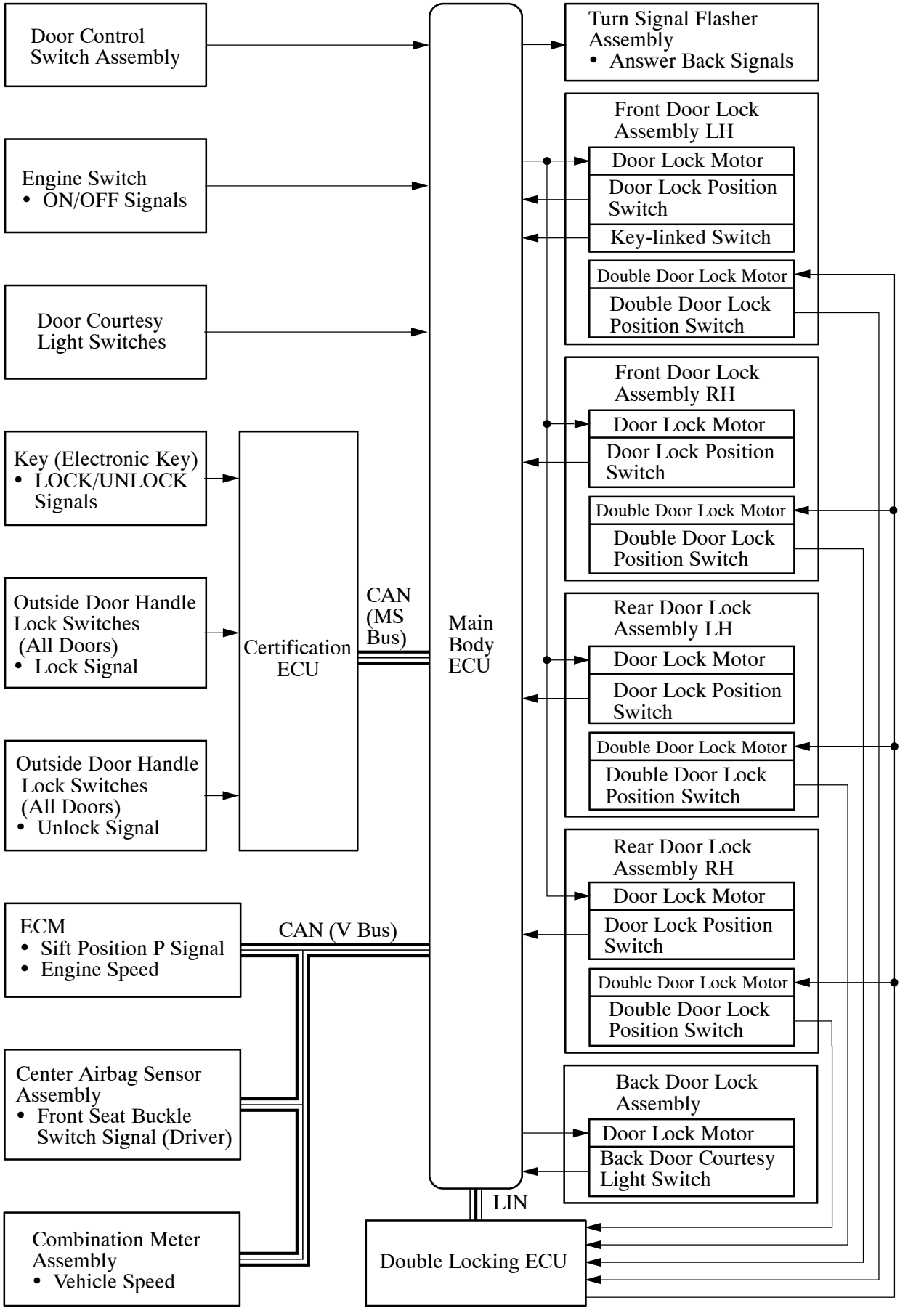
- The door lock control system consists of the main body ECU, door control switch, key-linked switch, door lock assemblies and door courtesy switches, and is predominantly controlled by the main body ECU.
- The double locking function is provided as standard on European models other than package models for South Africa, New Caledonia and Central America.
- The door lock control system has the following functions:

Function	Outline
Manual lock and unlock	This function can lock or unlock all doors by the door control switch operation.
Manual unlock prohibition	Performing a door lock operation using a key (electronic or mechanical key) or the outside door handle lock switches will prohibit unlock operations using the door control switch assembly on the driver door.
Key linked lock and unlock	This function, which is linked with the driver door key cylinder, can lock or unlock all the doors when a lock or unlock operation is effected using the key (mechanical key). However, the function is not activated when the engine switch is on (IG) and the driver seat belt is fastened.
Key confine prevention	When the key is in the interior detection area with the driver's door open and if you perform the door lock operation, all the doors will be unlocked.
2-step unlock*1	• When the key (mechanical key) is inserted into the door lock cylinder and is turned once, the driver door is unlocked. Then, the key is turned again, the rest of the doors are unlocked. • When the UNLOCK switch of the key (electronic key) is pressed once, the driver door is unlocked. Then, the switch is pressed again, the rest of the doors are unlocked.
Double locking*2	The double locking function prevents the doors from being opened through the operation of the inside door knobs and also from the outside of the vehicle. This function can be activated or cancelled by conducting either of the following operations. • To lock the doors with this function, press the LOCK switch on the key (electronic key), then press it again within 5 seconds. • To lock the doors with this function, a person who is carrying the key (electronic key) must press the lock switch on the outside door handle twice within 3 seconds. • To unlock the doors, press the UNLOCK switch on the key (electronic key) once or touch the touch sensor on the backside of the outside door handle while carrying the key (electronic key). **CAUTION:** Never activate the double locking system when there are people in the vehicle because the doors cannot be opened from the inside of the vehicle. Under emergency conditions, such as if the power has been cut, this function can be cancelled by inserting the key (mechanical key) into the driver door key cylinder and turning it to the unlock side.

*1: The setting function can be changed using the customized body electronics system. For details, refer to Customized Body Electronics System section on page BE-17.

*2: Except package models for South Africa, New Caledonia and Central America

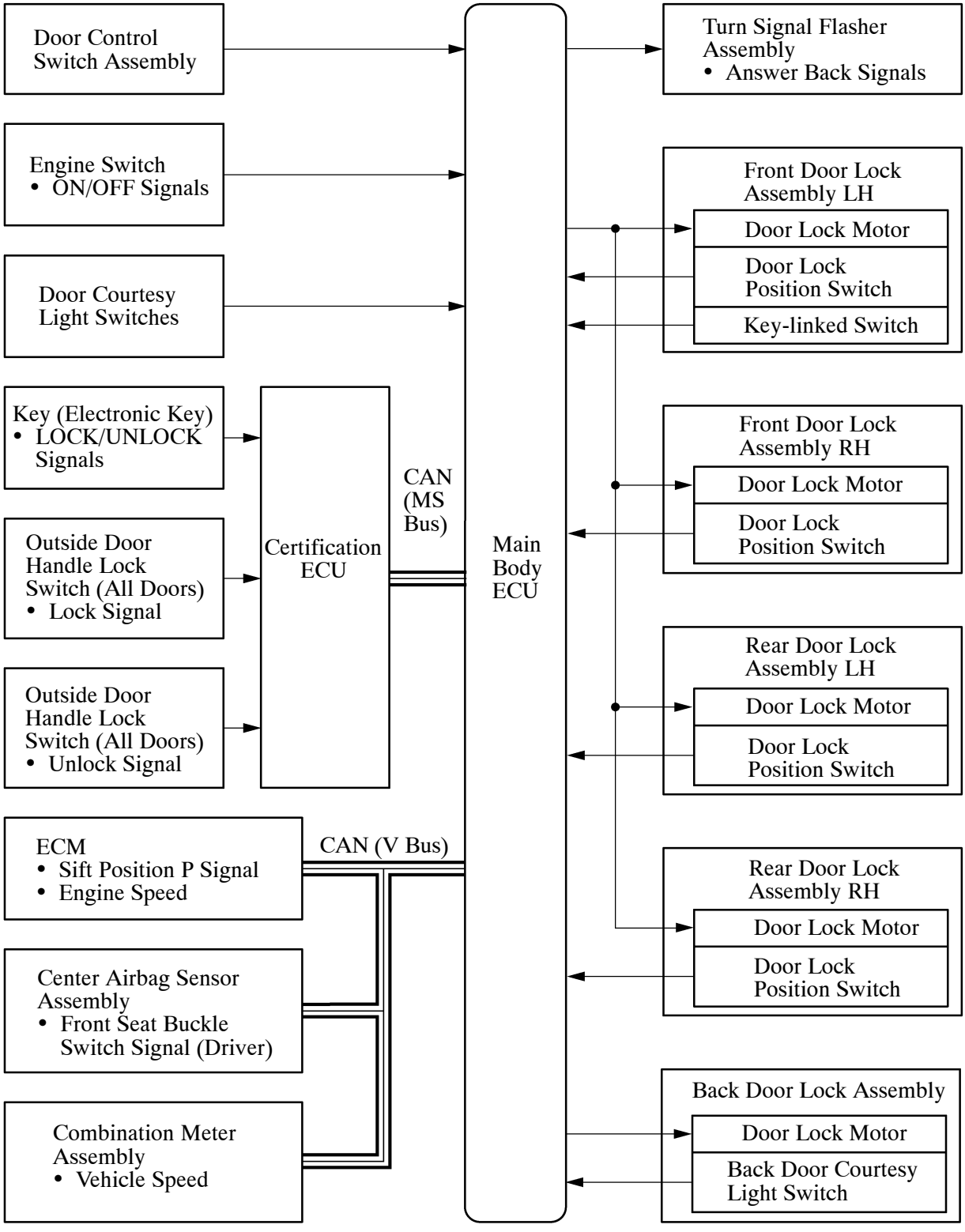
▶ System Diagram ◀



LHD Models with Double Locking Function

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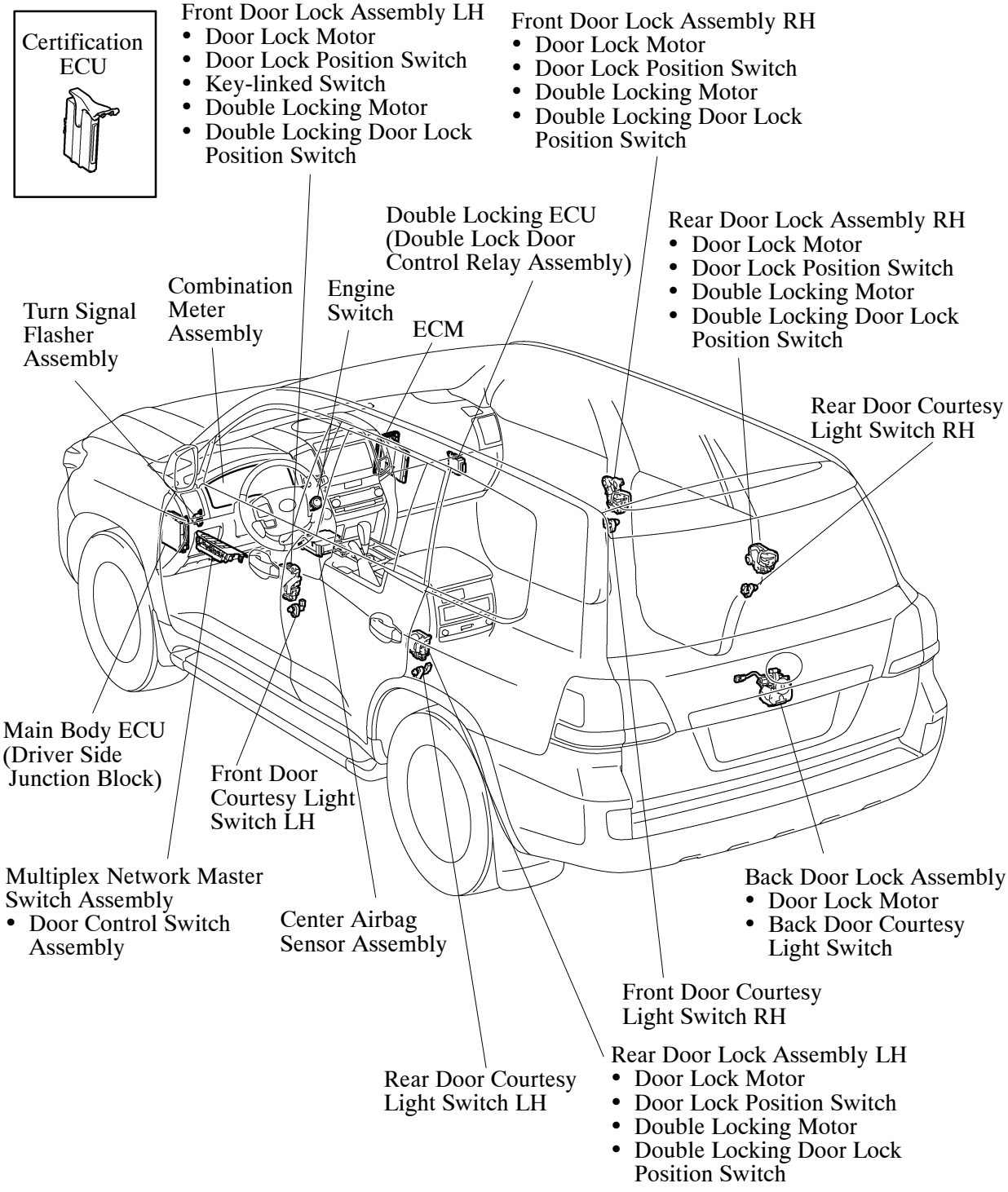
▶ System Diagram ◀



LHD Models without Double Locking Function 081BE127S

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■ LAYOUT OF MAIN COMPONENTS



European LHD Models with Double Locking Function*

081BE108TE

*: Except package models for South Africa, New Caledonia and Central America

ENTRY AND START SYSTEM

■ DESCRIPTION

The entry and start system not only has a wireless door lock remote control function and engine immobiliser function, but simply by carrying the key, the following functions (entry function and push button start function) are also possible without having to actually use the key or transmitter button. It is an extremely convenient system.

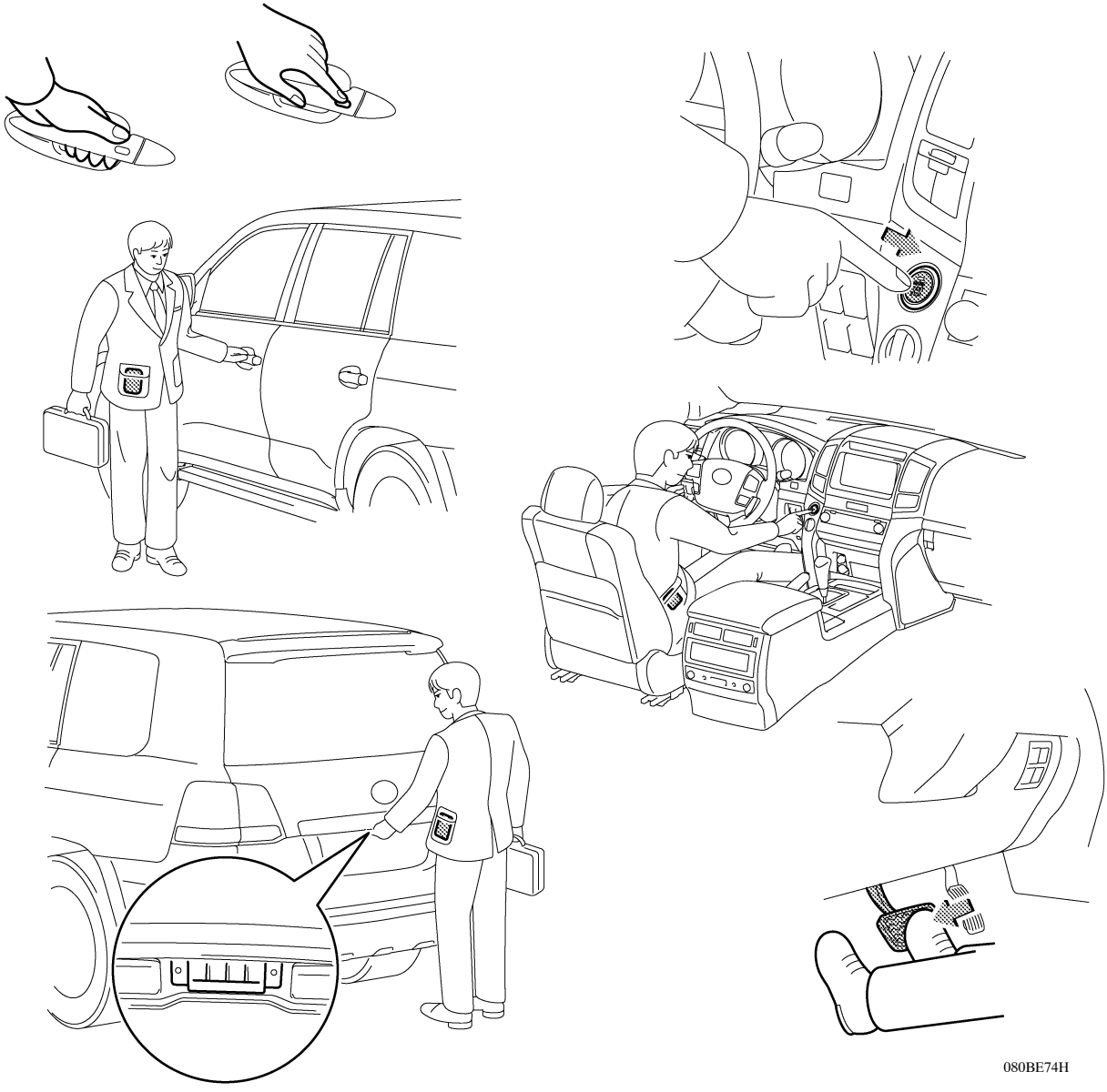
- Door unlock/lock (Entry Unlock/Entry Lock Functions)
- The engine can be started simply by pushing the engine switch while depressing the brake pedal*1 or clutch pedal*2 (Start Function)
- The back door can be opened (Back Door Open Function)
- Wireless door lock control function.

This system is standard equipment.

*1: Models with automatic transmission
*2: Models with manual transmission

Entry Lock/Unlock Functions

Start Function



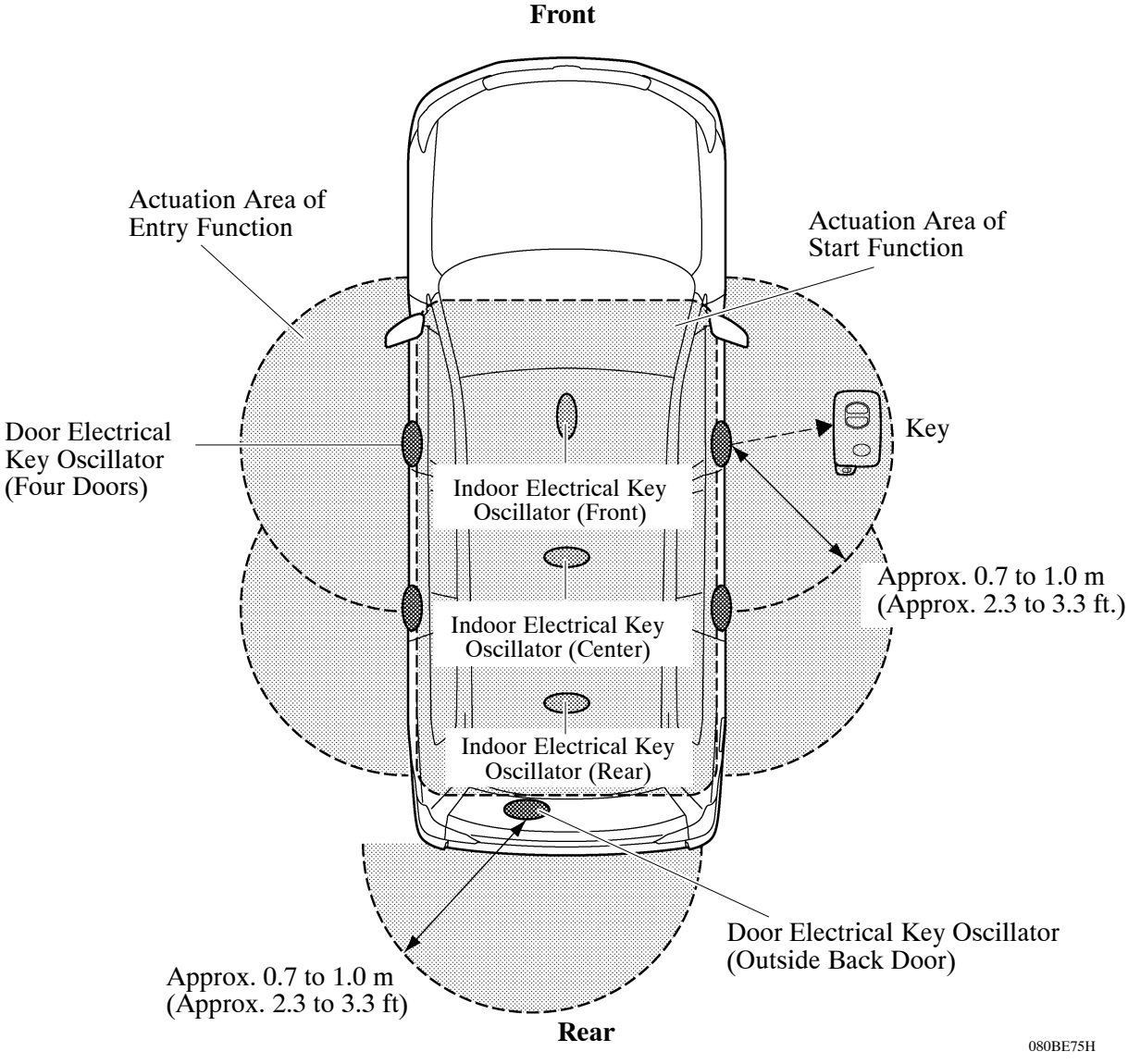
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Back Door Open Function

■ ACTUATION AREA

The special functions of the entry and start system only work when the key is in the actuation area formed by the eight oscillators.

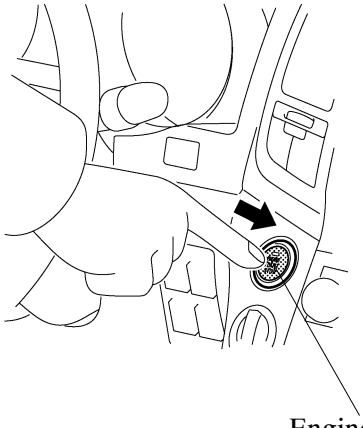
- The in door electrical key oscillators (front, center and rear) form the actuation area of the push button start function.
- The door electrical key oscillators (four doors and outside back door) form the actuation area of the entry function.



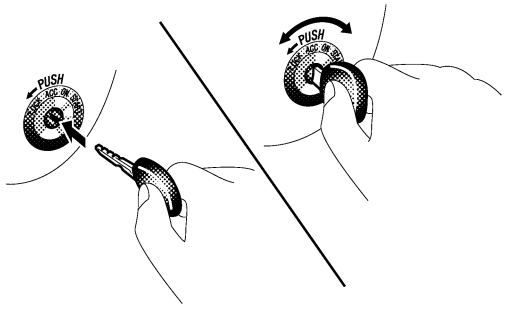
■START FUNCTION

1. General

- While an ignition key must be inserted into the ignition key cylinder and turned from OFF to ACC, IG ON or START position to start the engine of the previous Land Cruiser (Station Wagon), the new Land Cruiser (Station Wagon) uses the entry and start system, which starts the engine when the push-type engine switch is pressed while the brake pedal is depressed and a key is carried by the driver.
- This function has different power source control patterns to suit the state of the brake pedal and shift lever position. For details, see page BE-158.
- Along with the adoption of the start function, an engine cranking hold function is used. For details, see page EG-70.



New Land Cruiser (Station Wagon)

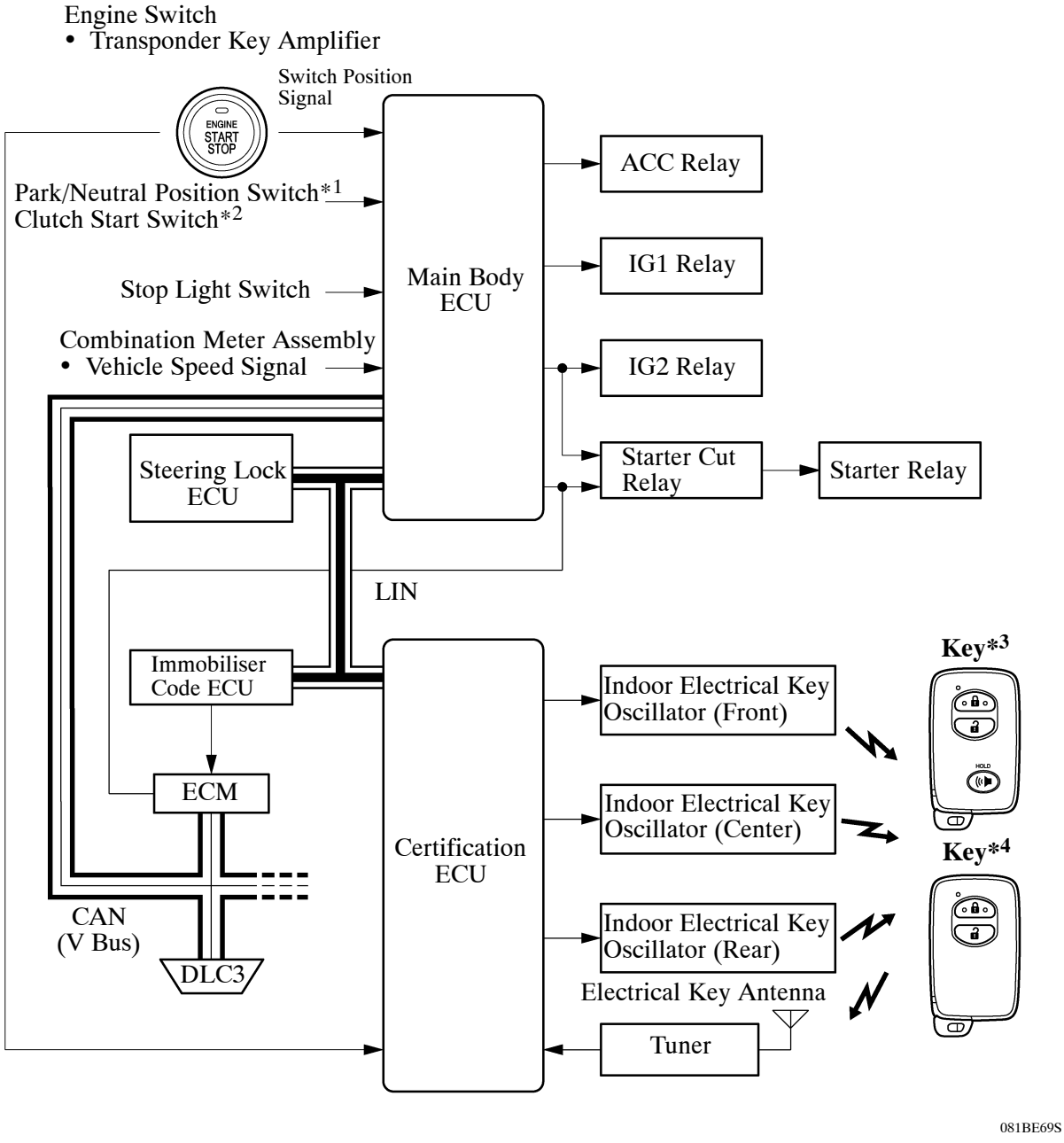


Previous Land Cruiser (Station Wagon)

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2. System Diagram

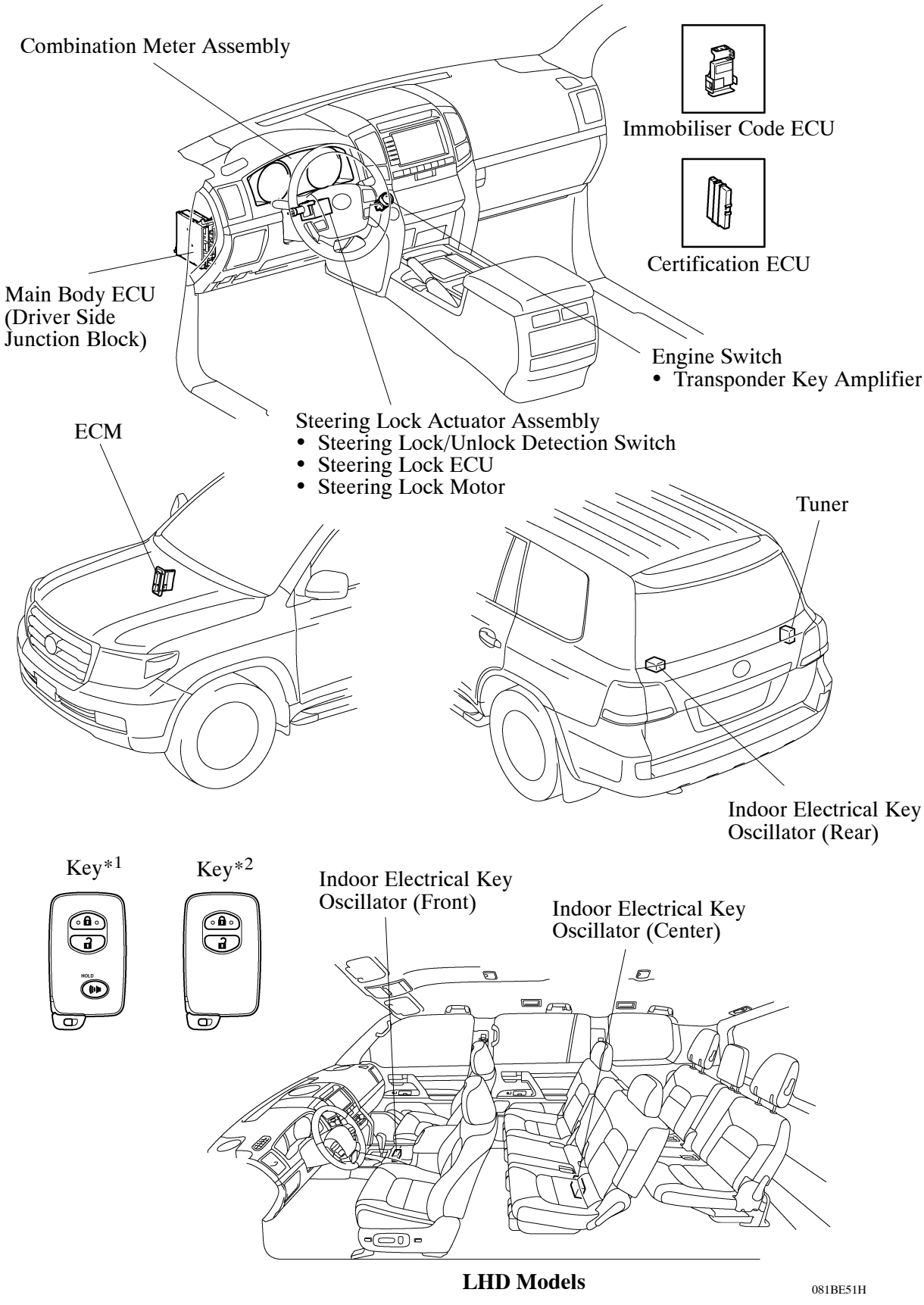
The main body ECU controls the push button start function. The system diagram below shows the components that relate to this function.



081BE69S

*1: Models with automatic transmission
*2: Models with manual transmission
*3: Models with the PANIC control
*4: Models without the PANIC control

3. Layout of Main Components



LHD Models

081BE51H

*1: Models with the PANIC control
*2: Models without the PANIC control

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4. Function of Main Components

Component	Function
Engine Switch • Transponder Key Amplifier	• Transmits the engine switch signal to the main body ECU. • Informs the driver of any power source or system abnormality through the illumination stage of the indicator light. • Receives the ID code and transmits it to the certification ECU when the key battery is too weak to respond to the tuner based on the room oscillators.
Key	Receives the signals from the oscillators and returns the ID code to the tuner.
Indoor Electrical Key Oscillators • Front, Center and Rear	Receives a request signal from the certification ECU and forms the actuation area in the vehicle interior.
Tuner	Receives the ID code from the key and transmits it to certification ECU.
Main Body ECU	• Switches the power source among four modes (OFF, ACC, IG-ON, START) in accordance with the shift position and the state of the stop light switch*1 or clutch start switch*2. • Controls the entry and start system in accordance with the signals received from the switches and each ECU.
Certification ECU	Certifies the ID code received from the tuner and transmits the certification results to the immobiliser code ECU and steering lock ECU.
Stop Light Switch*1	Outputs the state of the brake pedal to main body ECU.
Clutch Start Switch*2	Outputs the state of the clutch pedal to the main body ECU.
Immobiliser Code ECU	Receives the steering unlock or engine immobilizer disengage signals from the certification ECU, certifies them, and transmits each disengage signal to the steering lock ECU or ECM.
Steering Lock ECU	Receives the steering lock/unlock signal from immobilizer code ECU, and activates the steering lock motor.
ECM	• Receives the engine start request signal from the main body ECU, and starts the engine. • Receives the engine immobiliser disengage/engage signal from the immobiliser code ECU, and disengages or engages the engine immobiliser.
Shift Position Sensor*1	Detects the shift position and transmits a shift position signal to the ECM.
Combination Meter Assembly	Transmits the vehicle speed signal to the main body ECU.

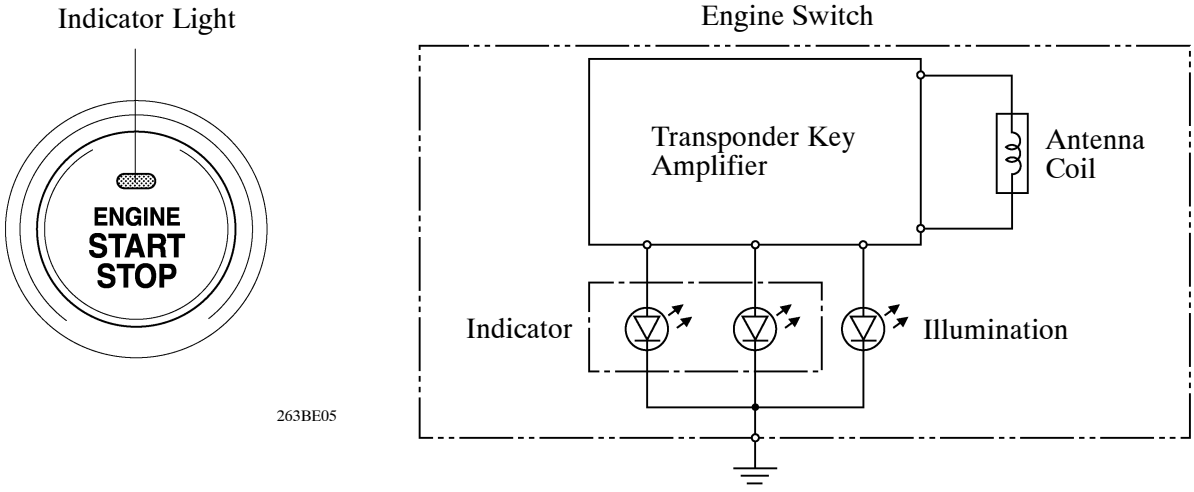
*1: Models with automatic transmission
*2: Models with manual transmission

5. Construction and Operation

Engine Switch

The engine switch consists of a momentary type switch, two color (Amber, Green) LEDs, and transponder key amplifier.

- The amber and green LEDs are for the indicator light.
- The driver can determine the present power source and check whether the engine can start or not in accordance with the illumination state of the indicator light.
- When the main body ECU detects an abnormality with the entry and start system, it makes the amber indicator light flash. If the engine is stopped in this state, it might not be possible to restart it.



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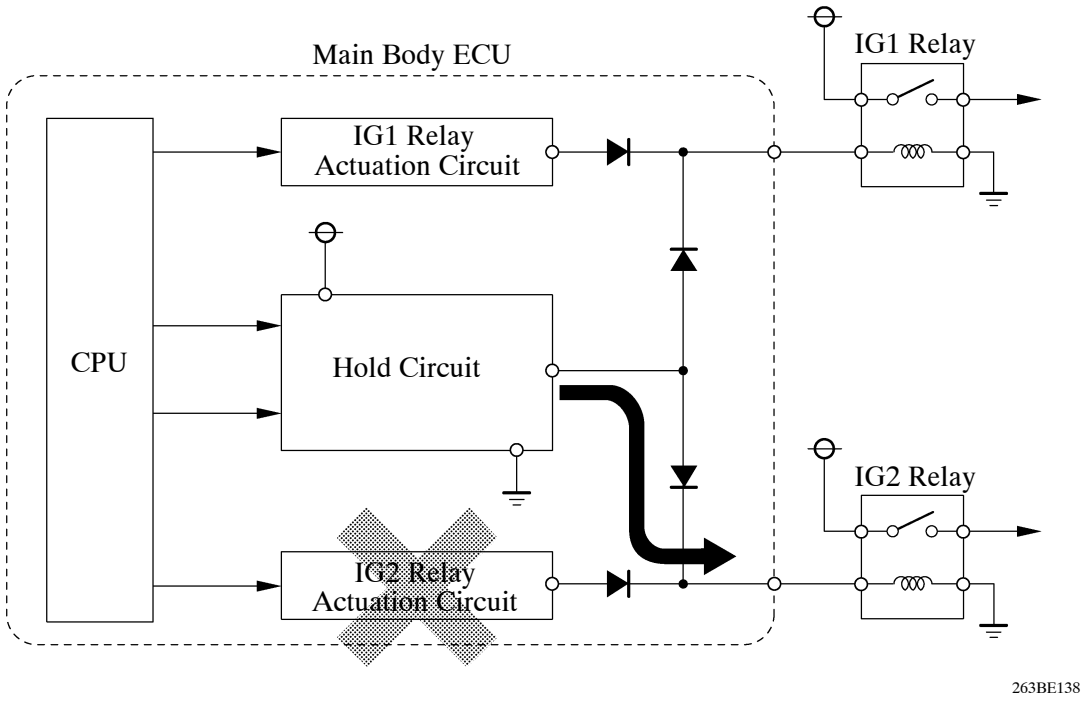
▶ Indicator Light Condition ◀

Power Source Condition	Indicator Light Condition	
	Brake pedal not depressed*1 or clutch pedal not depressed*2	Brake pedal depressed with shift lever in P or N*1 or Clutch pedal depressed*2
OFF	OFF	ON (Green)
ACC, IG-ON	ON (Amber)	ON (Green)
START	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 30 seconds	Flashes (Green) for 30 seconds
Entry and Start System Malfunction	Flashes (Amber) for 15 seconds	Flashes (Amber) for 15 seconds

*1: Models with automatic transmission
*2: Models with manual transmission

Main Body ECU

- The main body ECU consists of the IG relay No.1 and No.2 actuation circuits, CPU, and hold circuit.
- The hold circuit is installed to prevent the power supply to the relays from being cut off when an abnormality occurs in IG relay No.1 or No.2 actuation circuits while driving.



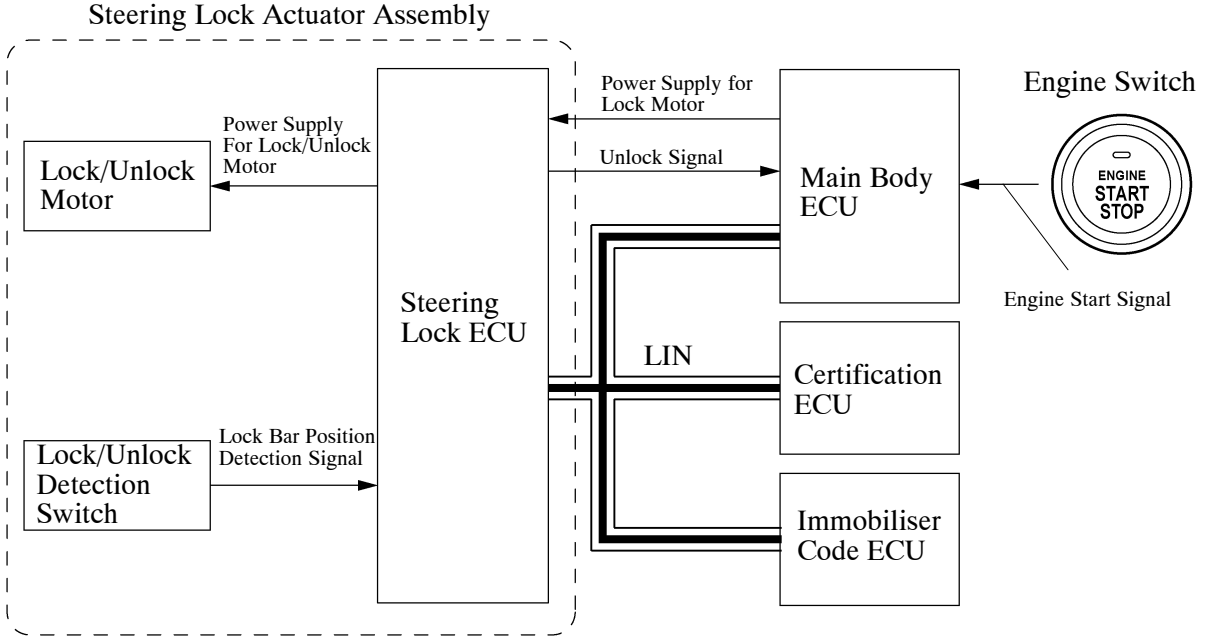
Service Tip

The main body ECU constantly stores the present power source state in its memory. Therefore, if the power to main body ECU is interrupted due to the removal of the battery, the main body ECU restores the power source after the battery is reconnected.
For this reason, if the battery is removed when the power switch is in a state other than OFF, the power will be restored to the vehicle at the same time the power is restored to main body ECU (by reconnecting the battery).
Therefore, before removing the battery, be sure to turn the power switch OFF.

Steering Lock System

- According with the use of the entry and start system, a steering lock system which uses a lock/unlock motor to lock and unlock the steering wheel is used. This system consists primarily of the steering lock actuator assembly, main body ECU, certification ECU and immobiliser code ECU.
- The steering lock ECU is integrated in the steering lock actuator assembly, and it controls the lock bar operation in the steering lock assembly through the lock/unlock motor.
- The steering lock ECU detects the position (lock/unlock) of the lock bar and transmits this information to the main body ECU and certification ECU.
- In this system, the certification ECU determines whether to lock or unlock the steering based on communication with the main body ECU. Then, the certification ECU sends lock or unlock command signals to the steering lock ECU through the immobiliser code ECU. Upon receiving the signals, the steering lock ECU operates the lock/unlock motor to lock or unlock the steering wheel.

▶ System Diagram ◀



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Service Tip

It is not possible to replace only the steering lock ECU in the steering lock actuator assembly. Therefore, if a malfunction occurs in the ECU, the entire steering lock actuator assembly must be replaced.

6. Start Function Operation

General

The start function has different power source patterns to suit the brake pedal state and shift lever position.

Pattern	Brake*1 or Clutch*2 Pedal	Shift Lever*1	Power Source Pattern
A	Depressed	P or N Position	When the engine switch is pushed once: OFF → IG-ON (after engine is started)
B	Not Depressed	P Position	The power source mode changes repeatedly in the following sequence when the engine switch is pushed: OFF → ACC → IG-ON → OFF
C*1		Except P Position	The power source mode changes repeatedly in the following sequence when the engine switch is pushed: OFF → ACC → IG-ON → ACC
D	—	P Position	When the engine switch is pushed in the IG-ON condition: IG-ON (engine is started or not started) → OFF
E*1	—	Except P Position	When the engine switch is pushed in the IG-ON condition: IG-ON (engine is started or not started) → ACC

*1: Models with automatic transmission
*2: Models with manual transmission

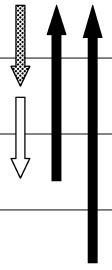
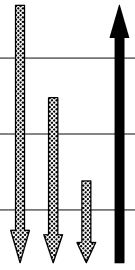
▶ Transition of Power Source (Models with Automatic Transmission) ◀

Shift Position		**P**				**N**			**Any position other than P or N**	
Pattern		B or D		A or D	-	C or E		A or E	C or E	-
Engine Switch		Push		Push	-	Push		Push	Push	Push
Brake Pedal		-		Depressed	-	-		Depressed	-	Depressed
Hour		-	Depress for 15 sec.	-	After 1 hour	-	Depress for 15 sec.	-	-	-
Power Source	OFF									
	ACC									
	IG-ON									
	START									

⇦ : Transition
⇦ : Only when the key certification is OK
⇦ : Only when the vehicle is stopped

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▶ Transition of Power Source (Models with Manual Transmission) ◀

Pattern		B or D	A or D	-
Engine Switch		Push	Push	-
Clutch Pedal		-	Depressed	-
Hour		-	-	After 1 hour
Power Source	OFF			
	ACC			
	IG-ON			
	START			

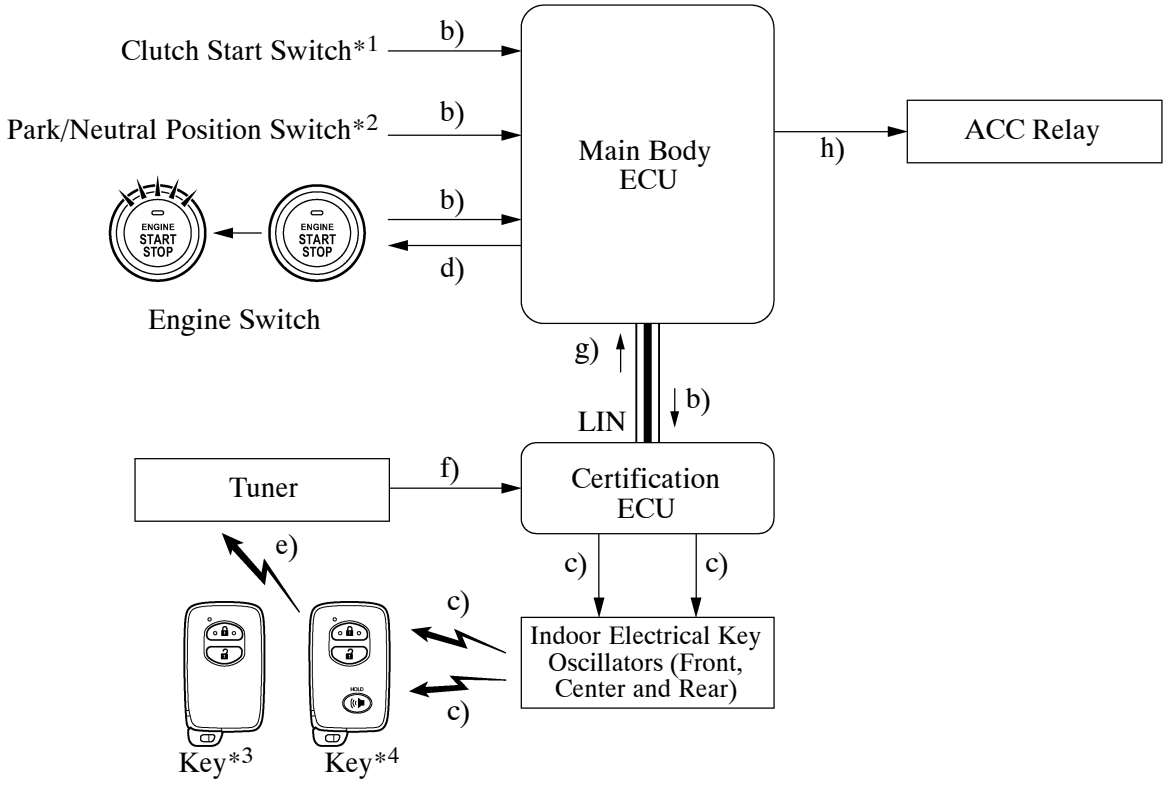
⇦ : Transition
⇦ : Only when the key certification OK
⇦ : Only when the vehicle is stopped

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NOTE:
- Normally, the operation of the engine switch is disabled while the vehicle is being driven. However, in an emergency, the driver can stop the engine while the vehicle is in motion by pressing the engine switch for approximately 3 seconds or more to turn the power source from IG-ON to ACC.
- If no signals are transmitted to the main body ECU due to malfunctions in the stop light switch, the engine may not start when the engine switch is pressed with the brake pedal depressed. In such cases, performing the following procedure may enable the engine to start: 1) press the engine switch to turn the power source from OFF to ACC, and 2) press the engine switch again and hold it for 15 seconds or more.
- The above two operations must be applied only in emergency situations. Under normal conditions, the engine must not be stopped by pressing the engine switch during driving or started without depressing the brake pedal when the shift lever is in any position other than P or N.

Pattern A: OFF → IG-ON (after the engine is started)

Step	System Operation
a)	The driver holds the key and enters the vehicle.
b)	When the driver presses the engine switch once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and transmits the key certification request to the certification ECU. • Clutch pedal depressed. *1 • Shift position is P or N. *2 • Brake pedal depressed. *2 • Engine switch is OFF.
c)	The certification ECU receives the certification request signal and transmits a request signal to the indoor electrical key oscillators. These oscillators then transmit the request signal.
d)	The brake pedal*2 or the clutch pedal*1 is depressed, so the main body ECU turns ON the green indicator light in the engine switch.
e)	The moment the key receives the request signal, it transmits its ID code to the tuner. The signal includes the response code.
f)	The tuner receives this code and transmits it to the certification ECU.
g)	The certification ECU judges and certifies the ID code, and transmits a key certification OK signal to the main body ECU.
h)	After receiving the key certification OK signal, the main body ECU turns ON the ACC relay.

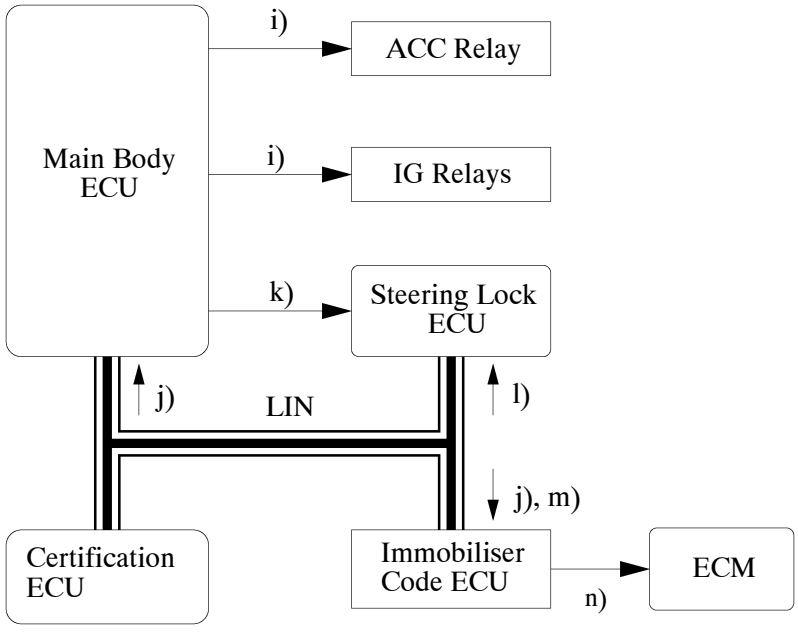


*1: Models with manual transmission
*2: Models with automatic transmission
*3: Models without PANIC control
*4: Models with PANIC control

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(Continued)

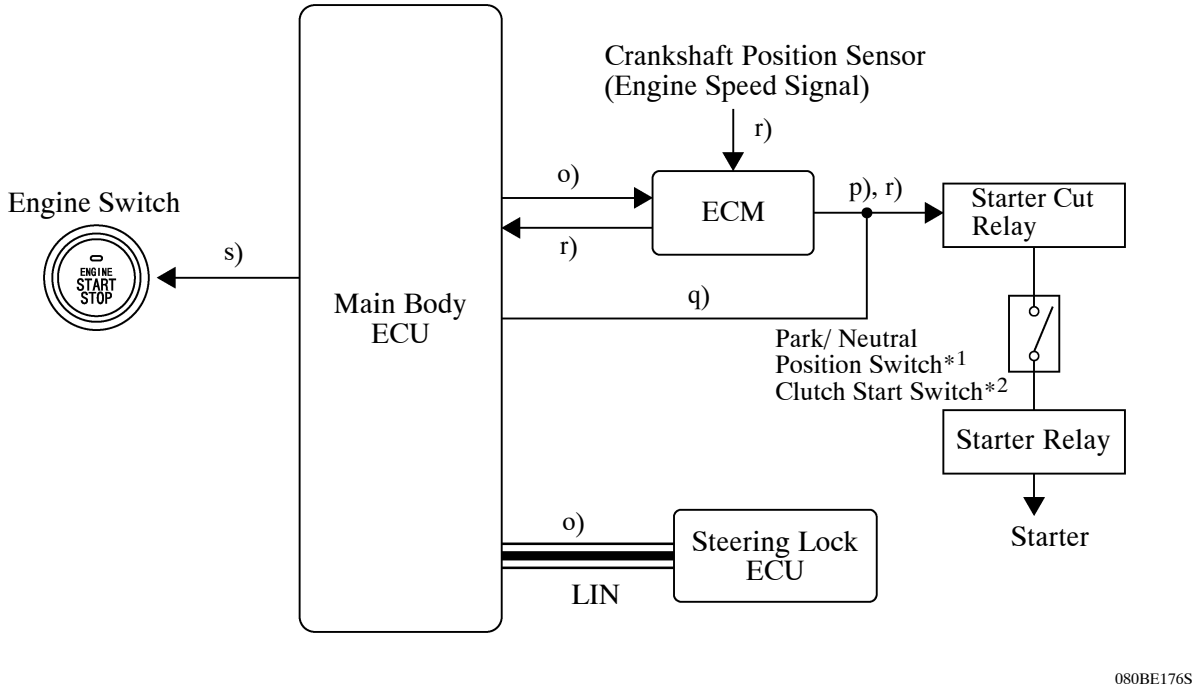
Step	System Operation
i)	The main body ECU turns ON the ACC relay, and then turns ON the IG relays.
j)	The certification ECU checks that the engine switch has switched from OFF to IG-ON, and transmits a steering unlock signal to the main body ECU and immobiliser code ECU.
k)	The main body ECU receives this signal and supplies power to the steering lock ECU.
l)	The steering lock ECU receives the steering unlock signal via the immobiliser code ECU, and releases the steering lock.
m)	After checking the steering unlock condition, the certification ECU transmits an engine immobiliser disengage signal to the immobiliser code ECU.
n)	The immobiliser code ECU certifies the disengage signal of the certification ECU, transmits the engine immobiliser disengage signal to the ECM, and disengages the engine immobiliser.



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(Continued)

Step	System Operation
o)	After checking that the steering is in the unlocked condition, the main body ECU transmits a starter request (STSW) signal to the ECM.
p)	The ECM receives this signal, outputs an starter relay (STAR) signal, and actuates the starter. (For details, see the cranking hold function on page EG-70.)
q)	The ECM and main body ECU both output the starter relay signal in order to actuate the starter. Both the ECM and main body ECU output the signal in order to prevent situations where the starter may fail to operate, such as when the battery voltage supplied to the ECM is low.
r)	When the ECM judges from the engine speed that engine start is completed, it stops the starter relay (STAR) signal, and stops the starter.
s)	The main body ECU receives this signal, checks that engine start is completed, and turns OFF the indicator light of the engine switch.



*1: Models with automatic transmission
*2: Models with manual transmission

Pattern B: OFF → ACC → IG ON → OFF

1) OFF → ACC

Step	System Operation
a)	The driver has the key in their possession and enters the vehicle.
b)	When the driver presses the engine switch once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and transmits the key certification request to the certification ECU. • Shift position is P.*1 • Brake pedal is not depressed.*1 • Clutch pedal is not depressed.*2 • Engine switch is OFF.
c)	Due to the brake pedal*1 or the clutch pedal*2 not being depressed, the main body ECU will turn ON the amber indicator light in the engine switch.
d)	The rest of the system operation is the same as d) to h) in pattern A. For details, see page BE-160.

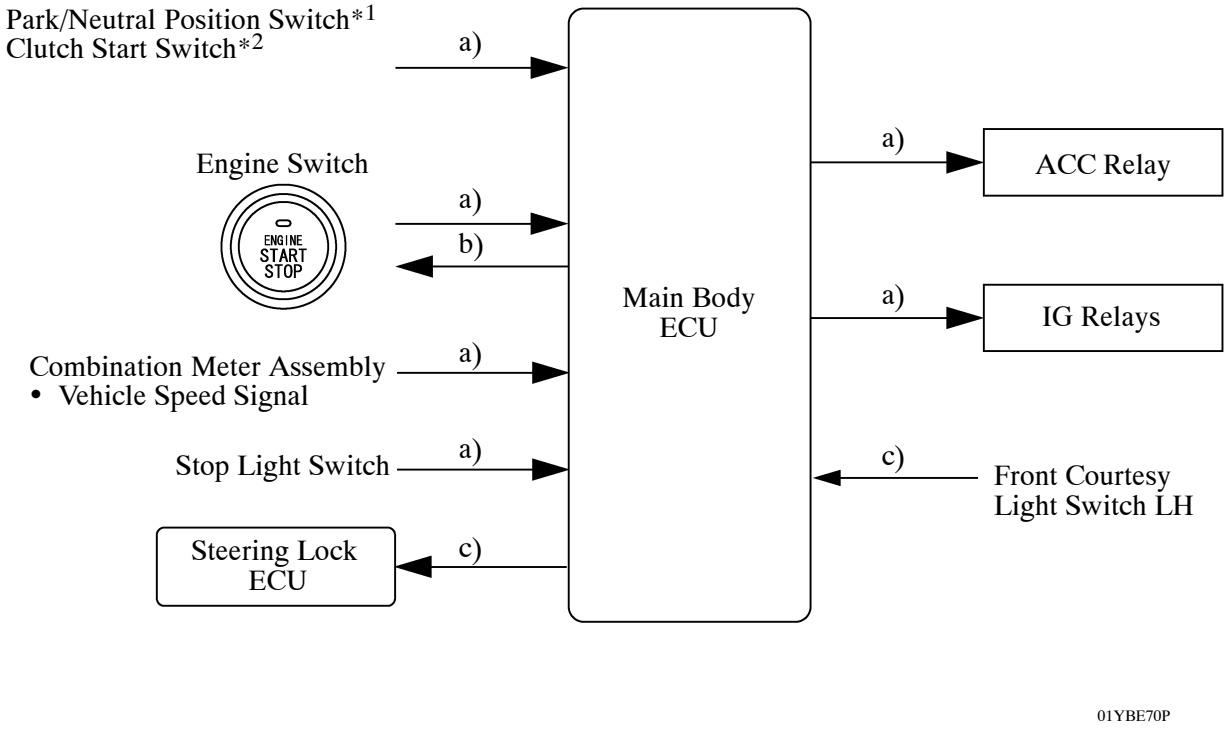
*1: Models with automatic transmission
*2: Models with manual transmission

2) ACC → IG-ON

Step	System Operation
a)	When the engine switch is at ACC and the driver pressed the engine switch again, the main body ECU recognizes the engine switch signal and turns ON the IG relays.
b)	The rest of the system operation is the same as j) to n) in pattern A. For details, see page BE-161.

3) IG ON → OFF

Step	System Operation
a)	When the engine switch is pressed once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and turns OFF the ACC, IG relays. • Shift position is P.*1 • Brake pedal is not depressed.*1 • Clutch pedal is not depressed.*2 • Vehicle speed is 0 km/h (0 mph). • Engine switch is in IG-ON mode.
b)	When the engine switch is switched from IG-ON to OFF, the main body ECU will turn OFF the indicator light in the engine switch.
c)	If the driver's door is opened, the main body ECU receives a signal from the front courtesy light switch LH. Then, the power supply to the steering lock ECU stops in order to lock the steering.

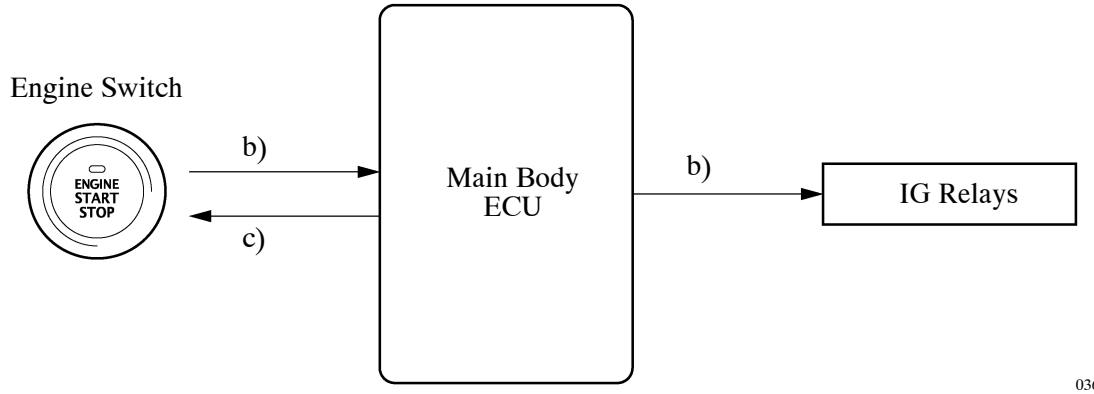


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*1: Models with automatic transmission
*2: Models with manual transmission

Pattern C: OFF → ACC → IG ON → ACC

Step	System Operation
a)	The system operations for the engine switch "OFF → ACC → IG-ON" are the same as those in pattern B. For details, see page BE-163.
b)	When the engine switch is pressed once with the following conditions satisfied, the main body ECU recognizes the engine switch signal and turns OFF the IG relays. • Shift position is in any position except P. • Brake pedal is not depressed. • Vehicle speed is 0 km/h (0 mph). • Engine switch is in IG-ON mode.
c)	Even after the engine switch switches from IG-ON to ACC, the indicator light in the engine switch will remain illuminated in amber.



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Pattern D: IG-ON → OFF

This system operation is the same as IG-ON → OFF for pattern B. For detail, see page BE-163.

Pattern E: IG-ON → ACC

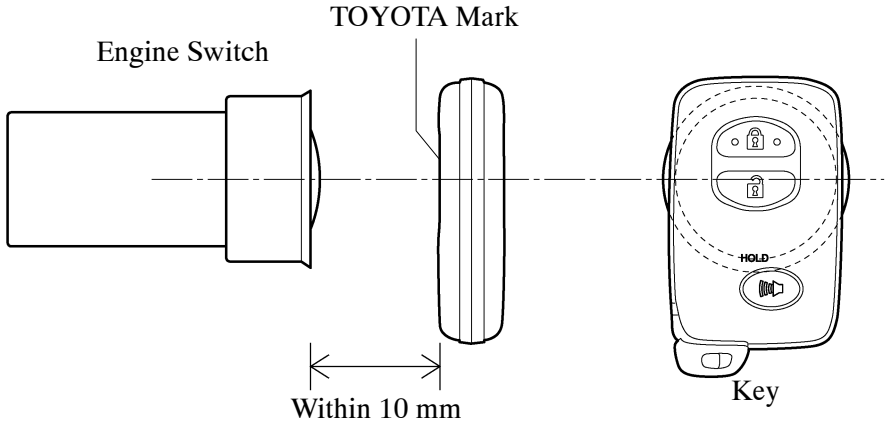
This system operation is the same as pattern C. However, the indicator light of the engine switch will illuminate as follows:

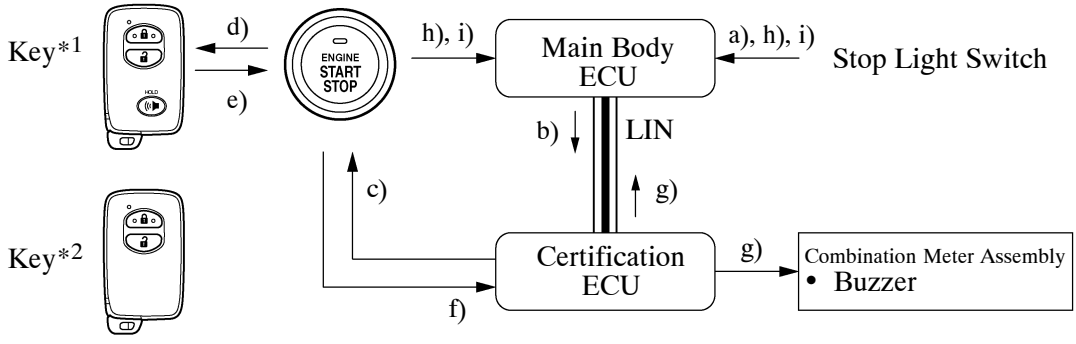
- When the engine switch is switched from IG-ON to ACC, the main body ECU makes the amber indicator light of the engine switch continue to illuminate.
- When the engine switch is switched from engine running to OFF, the main body ECU turns OFF the indicator light of the engine switch.

When key battery is low

Step	System Operation
a)	To operate the entry and start system when the key battery is low, hold the key against the engine switch as shown in the illustration while depressing the brake pedal.
b)	The main body ECU receives the stop light switch signal and transmits a key certification request signal to the certification ECU.
c)	The certification ECU does not receive an ID code response from the tuner, so it actuates the transponder key amplifier built into the engine switch.
d)	The transponder key amplifier outputs an engine immobiliser radio wave to the key.
e)	The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
f)	The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU.
g)	The certification ECU judges and verifies the ID code, and transmits a key certification OK signal to the main body ECU. The buzzer in the combination meter assembly sounds at the same time.
h)	After the buzzer sounds, if the engine switch is pressed within ten seconds while the brake pedal*1 or clutch pedal*2 is depressed, the power source switches to start the engine running, the same way as with normal entry and start system operation.
i)	After the buzzer sounds, if the engine switch is pressed within ten seconds while the brake pedal is not depressed, the power source will be switched to ACC or IG-ON, the same as with normal condition.

*1: Models with automatic transmission
*2: Models with manual transmission





*1: Models with PANIC control
*2: Models without PANIC control

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7. Diagnosis

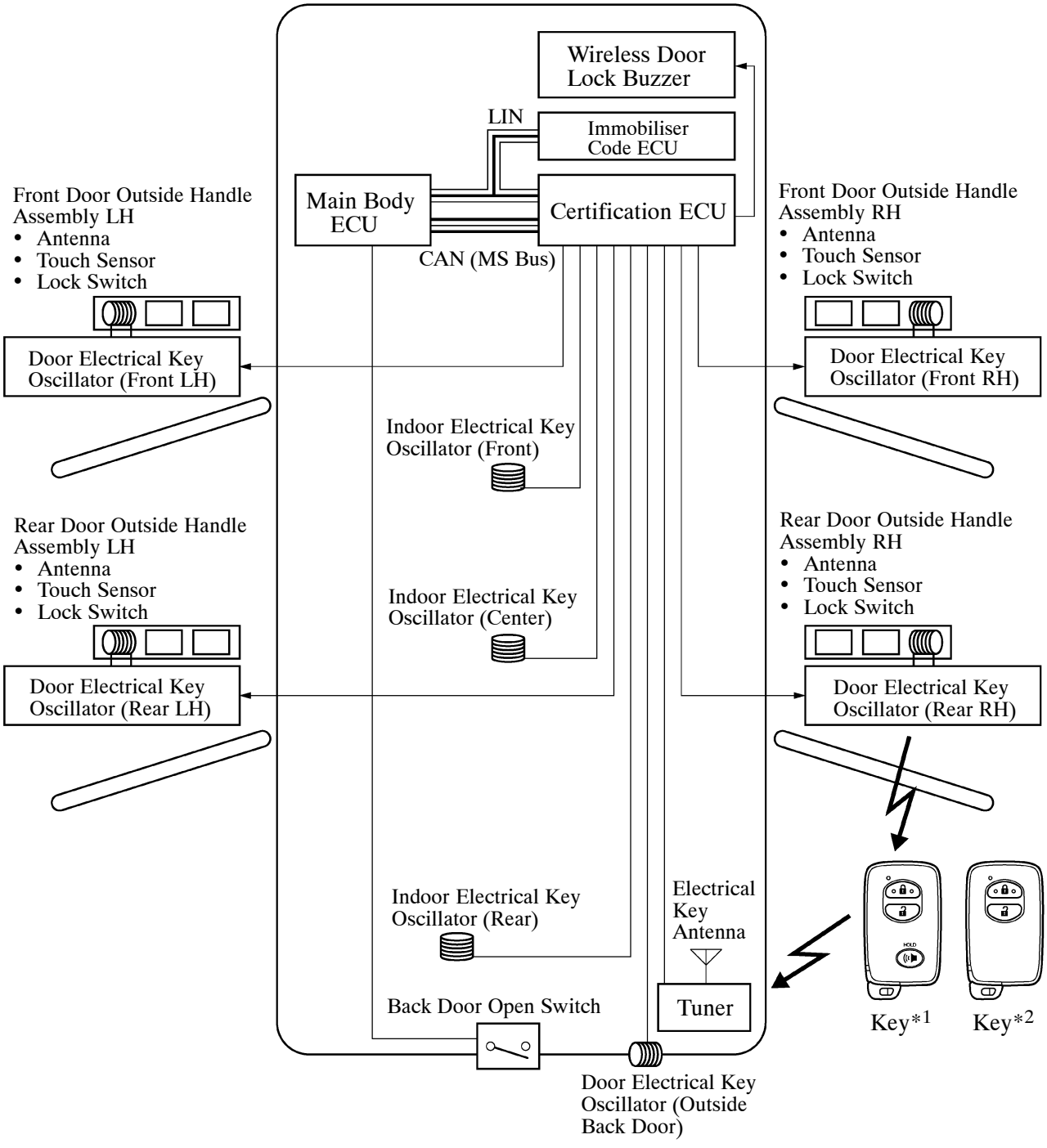
The main body ECU and certification ECU can detect malfunctions in the entry and start system when the engine switch is in the IG-ON mode.
When the ECUs detect a malfunction, the amber indicator light in the engine switch flashes to warn the driver. At the same time, the ECUs store 5-digit DTC (Diagnostic Trouble Code) in their memories.

- The indicator light warning continues for 15 seconds even after the engine switch is switched to OFF.
- The DTC can be read by connecting an intelligent tester II to the DLC3.
- The entry and start system may not operate successfully if a malfunction occurs.

■ ENTRY FUNCTION

1. System Diagram

The certification ECU controls the entry function. The system diagram below shows the main components that relate to the function.

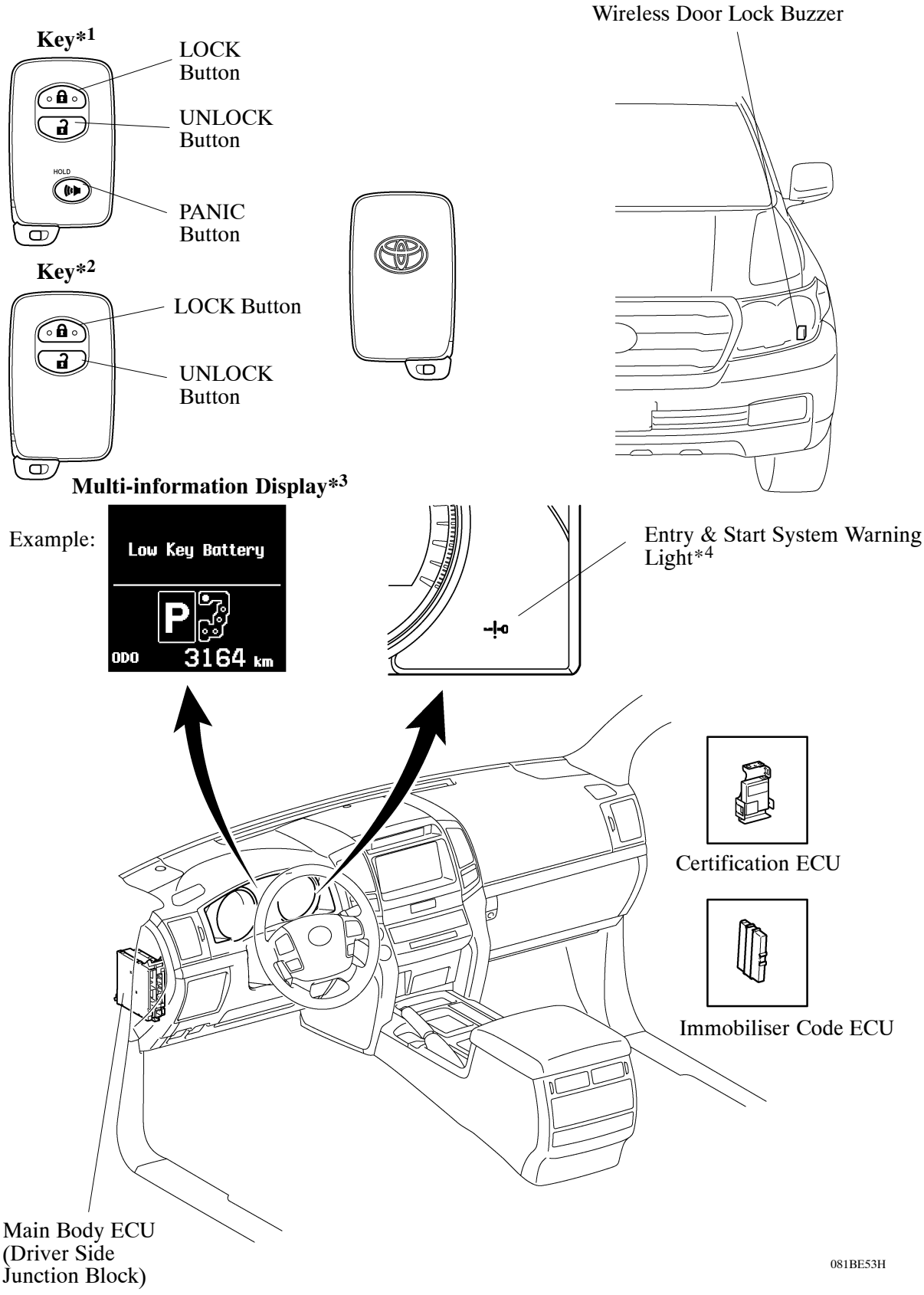


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*1: Models with the PANIC control

*2: Models without the PANIC control

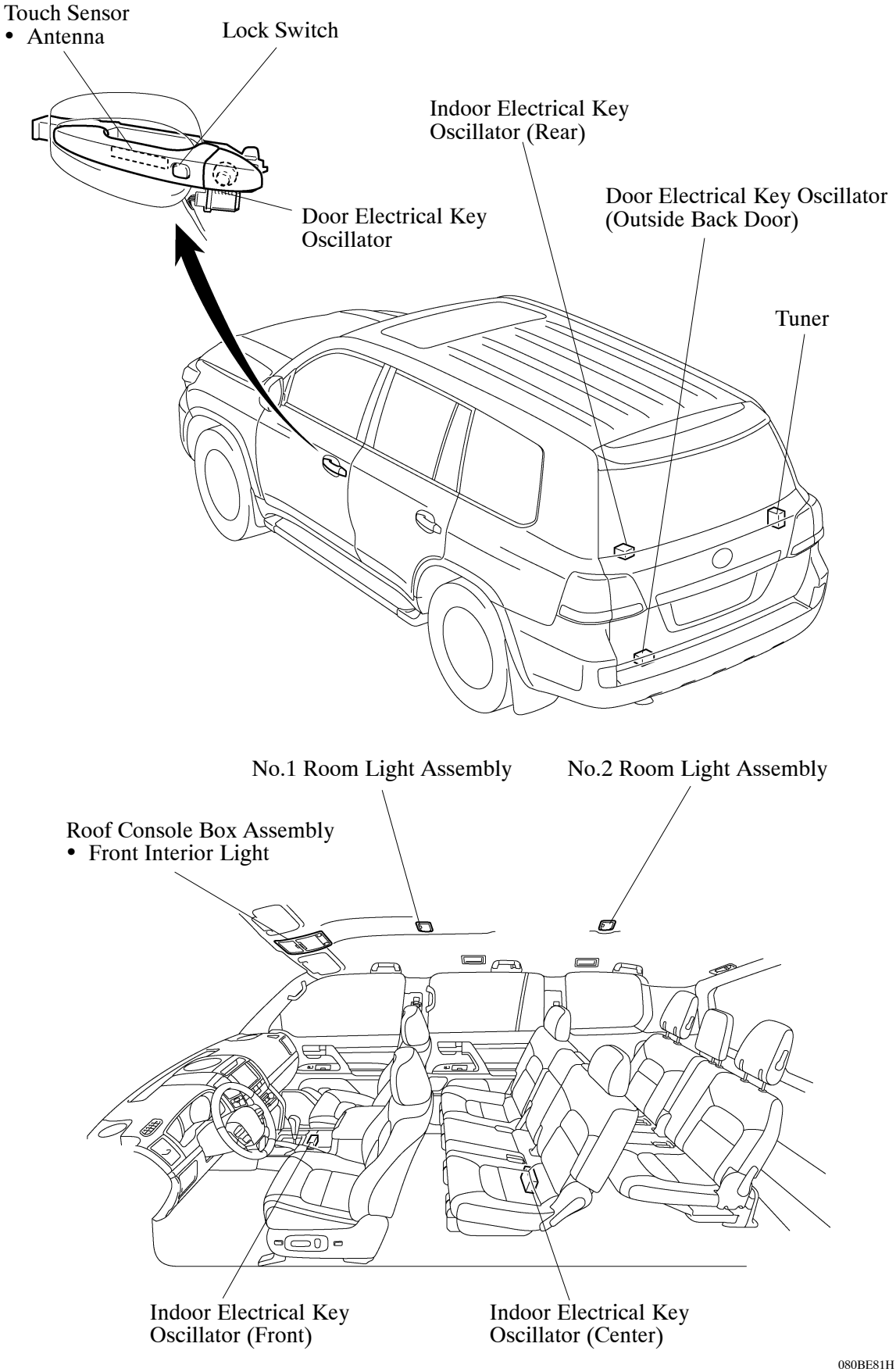
2. Layout of Main Components



*1: Models with the PANIC control
*2: Models without the PANIC control
*3: Models with optitron type combination meter assembly
*4: Models with analog type combination meter assembly

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Door Outside Handle Assembly



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3. Function of Main Components

Component		Function
Key		The key consists of a mechanical key, a transmitter for the wireless door lock remote control, a transceiver for the entry and start system, and a transponder chip for the engine immobiliser control.
Certification ECU		Controls the entry and start system in accordance with the signals from each oscillator, various switches, ECUs and the key. • Judges and certifies the ID code from the tuner. • Transmits the engine immobiliser deactivation signal to the immobiliser code ECU. • Transmits steering unlock signals to the steering lock ECU.
Main Body ECU		Controls the entry and start system in accordance with the signals from the various switches, ECUs and the combination meter assembly. • Transmits the key certification request signals to the certification ECU in accordance with the engine switch signals, and turns the relays ON and OFF. • Receives the request signals from the certification ECU and actuates the door lock motor to unlock or lock the door.
Immobiliser Code ECU		Receives and certifies the engine immobiliser deactivation signals transmitted from the certification ECU, and sends it to the ECM.
Door Outside Handle Assembly	Antenna	Transmits the request signals.
	Touch Sensor	Detects when a person touches the inside of an outer door handle.
	Lock Switch	Transmits door lock request signals to the certification ECU.
	Door Oscillator (All Doors)	Receives the request signals from the certification ECU, and creates an actuation area around the door.
Indoor Electrical Key Oscillator (Front, Center and Rear)		Receives the request signals from the certification ECU, and forms an actuation area in the vehicle interior.
Door Electrical Key Oscillator (Outside Back Door)		Receives the request signals from the certification ECU, and forms an actuation area around the back door.
Tuner		• Receives the ID code from the key in the actuation area and transmits it to certification ECU. • Receives the ID code from the key in the cabin and transmits it to certification ECU.
Back Door Open Switch		Transmits a back door open request signal to the certification ECU via the main body ECU.
Wireless Door Lock Buzzer*1		Sounds as an answerback for entry lock or unlock to inform the driver.
Combination Meter Assembly	Multi-information Display	When the certification ECU detects human error, it warns the driver by sounding the wireless door lock buzzer and the buzzer in the combination meter assembly, and by illuminating a warning on the multi-information display, the master warning light and the entry and start system warning light*2, in accordance with the request signal from the certification ECU.
	Entry and Start System Warning Light*2	
	Master Warning Light	
	Buzzer	

*1: Except for European, Chinese, South African and New Caledonian models
*2: Models with analog type combination meter

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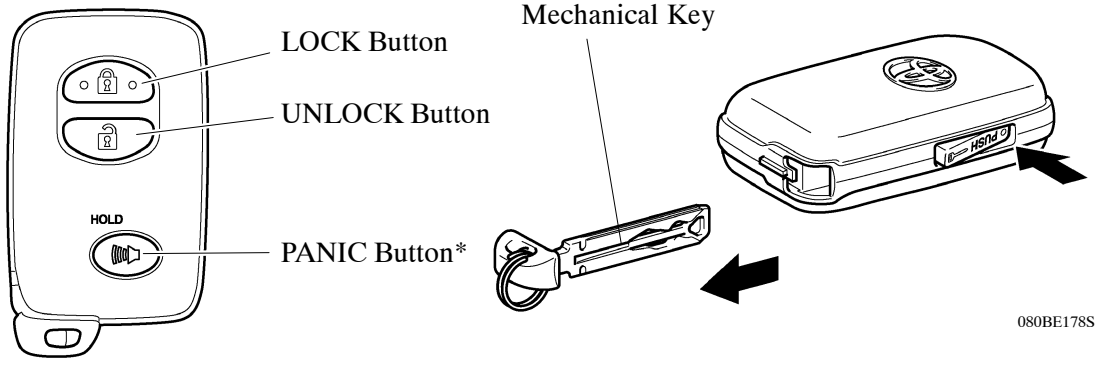
4. Construction and Operation

Key

The key consists of a mechanical key, a transmitter for the wireless door lock remote control and a transceiver for the entry and start system, and a transponder chip for the engine immobiliser control.

- The transceiver function of the key receive signals from the oscillators and returns the ID code to the tuner.
- The transmitter function for the wireless door lock remote control has a LOCK button, UNLOCK button, and PANIC button.*
- The transponder chip in the key for the engine immobiliser control returns a signal to the engine switch as a response to the radio wave it received from the engine switch.
- This mechanical key operates the driver door lock cylinder, and glove box lock cylinder, but cannot be used to start the engine. When the mechanical key is used, the cap on the driver door lock cylinder must be removed.

A total of four keys can be registered. For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).



*: Models with the PANIC control

Oscillator (Each Door, Font, Center and Rear, and Outside Back Door)

Each oscillator functions based on a request signal received from the certification ECU, and creates a key actuation area that is used to detect the presence of a key.

The actuation area formed by the door electrical key oscillator (front door and outside back door) is approximately 0.7 to 1.0 m (2.3 to 3.3 ft.) from the outside handle of the front doors, or the center of the rear bumper.

- The actuation area of each door oscillator is formed by transmitting a request signal every 0.25 seconds while the engine switch is OFF and each door is locked. In this way it detects the proximity of a key. When locking the door using the lock switch on the outer door handle, the actuation area is formed when the lock switch is pressed.
- The actuation area of the door electrical key oscillator (outside back door) is formed when the back door open switch is ON. It is formed twice to allow the key to be verified.
- The actuation area of the indoor electrical key oscillator (front, center and rear) is formed when the driver door is opened or closed, when the start button is pressed, when a warning is activated, or when the lock switch is ON.

5. Entry Function Operation

General

The entry function has the following functions.

Function	Outline
Mechanical Key [See page BE-172]	The operation is the same as a usual mechanical key.
Wireless Door Lock Remote Control [See page BE-175]	This function is a convenient system for locking and unlocking the doors at a distance. The operation is same as a standard wireless door lock remote control system.
Entry Illumination [See page BE-32]	When a key enters the actuation area of any door oscillator, the front interior light, rear interior light, and engine switch illumination illuminate.
Entry Unlock [See page BE-176]	When a key is located in the actuation area any door oscillator, the door will unlock after the inside of an outside door handle is touched.
Entry Unlock Mode Switching [See page BE-177]	Allows selection of one of two modes that can be activated with the entry unlock function. • Driver Door Mode • All Door Mode
Entry Lock [See page BE-178]	When a key is located in the actuation area of any door oscillator and the engine switch is OFF, the door can be locked by merely pressing the lock switch on the outside door handle.
Back Door Open [See page BE-179]	When a key is in the actuation area of the door electrical key oscillator (outside back door), the back door can be opened by merely pressing the back door open switch.
Window and Sliding Roof Close [See page BE-180]	With the key in the actuation area of any door oscillators, all open windows and the sliding roof are closed when the lock switch on the door outside handle is pressed for 3 seconds or more.
Memory Call [See page BE-181]	This function operates the driving position memory system in accordance with the key ID.
Prevention of Key Confinement [See page BE-185]	Prevents the key from being confined in the vehicle when a door is locked with the outside door handle while the key is still inside the vehicle.
Warning [See page BE-186]	When any of the situations below occur, the entry and start system causes the certification ECU to sound the buzzer in the combination meter and the wireless door lock buzzer*, and indicate a warning on the multi-information display in order to the alert driver. • An exit warning if the shift lever is in a position other than P and the engine switch is in a mode other than OFF. • An exit warning if the shift lever is in P and the engine switch is in a mode other than OFF. • A warning if the occupant leaves with the key in inappropriate circumstances. • A warning if the engine switch is operated while the key is outside the actuation area. • A warning if the entry lock button on the door handle is operated while the key is inside the vehicle. • A warning if the key battery is weak. • A warning if any door is ajar.

(Continued)

Function	Outline
Battery Saving [See page BE-200]	If the key remains within the actuation area of any door oscillator, the system maintains periodic communication with key. Therefore, if the vehicle remains parked in that state for a long time, the key battery and the vehicle battery could be drained.
Key Cancel [See page BE-201]	The following key functions can be cancelled by following certain procedures. • Entry Unlock/Lock • Back Door Open • Memory Call • Prevention of Key Confinement • Warning
Key Code Registration [See page BE-201]	A total of 7 keys can be registered. Enables the registering (writing and storing) of transmitter recognition codes in the EEPROM that is contained in the certification ECU.

*: Except for European, Chinese, South African and New Caledonian models

Wireless Door Lock Remote Control Function

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

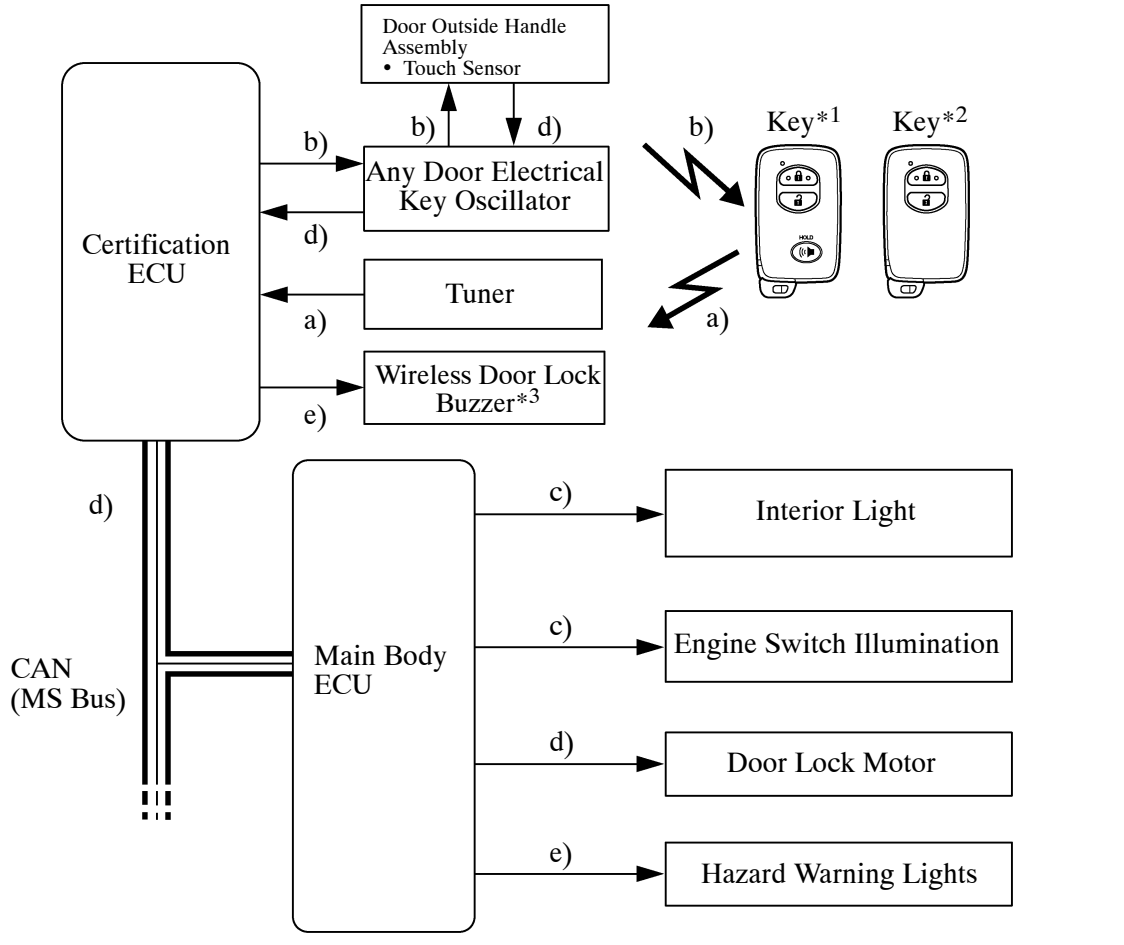
Function	Outline
All Doors Lock	Pressing the LOCK button on the key locks all doors.
All Doors Unlock	Pressing the UNLOCK button on the key unlocks all doors.
All Doors Unlock (2-step Unlock)*1	Pressing the UNLOCK button on the key once, unlocks the driver's door, and pressing it again within three seconds unlocks all the doors.
Answer Back*1	The hazard lights flash once when locking, and flash twice when unlocking, to indicate that the operation has been completed.
Panic Alarm	Keeping the PANIC button on the key pressed for longer than about 0.8 of a second causes the following functions of the alarm to activate. • Sounds the horn and security horn. • Flashes the hazard lights, headlights, and taillights. • Illuminates the front and rear interior light (If the interior light switch is in the DOOR position).
Automatic Lock	If none of the doors are opened within 30 seconds*1 of being unlocked by the wireless door lock remote control, all the doors will be locked again automatically.
Door Ajar Warning*1	If any door is open or ajar, pressing the LOCK button of the key will cause the wireless door lock buzzer to sound for about 10 seconds.
Repeat	If a door is not locked in response to the locking operation of the key, the integration relay will output a lock signal after approximately 1 second.
Illuminated Entry	When all the doors are locked, pressing the UNLOCK button causes the interior lights to illuminate simultaneously with the unlock operation.
Security	Sends an operation signal as a rolling code.
Wireless Buzzer*2	The wireless door lock buzzer sounds when the theft deterrent system performs warning operations.

*1: The function settings can be changed using the customized body electronics system. For details, refer to "Customized Body Electronics System" section on page BE-17.

*2: Except for European, Chinese, South African and New Caledonian models

Entry Unlock Function

a) When a key enters the actuation area of any door oscillator, the certification ECU judges and certifies the key ID code received from the tuner.
b) After the key certification OK is confirmed, the certification ECU transmits an unlock stand-by signal to the touch sensor of the relevant door.
c) If the touch sensor is touched during this condition, the certification ECU transmits a door unlock signal to the main body ECU and unlocks the door.
d) At the same time, the main body ECU transmits the lighting signals to the engine switch illumination and interior lights (front and rear), and turns ON these illuminations (Illuminated Entry Function).
e) The certification ECU sounds the wireless door lock buzzer twice*3 and main body ECU flashes the hazard warning lights twice as an answerback for entry unlock.

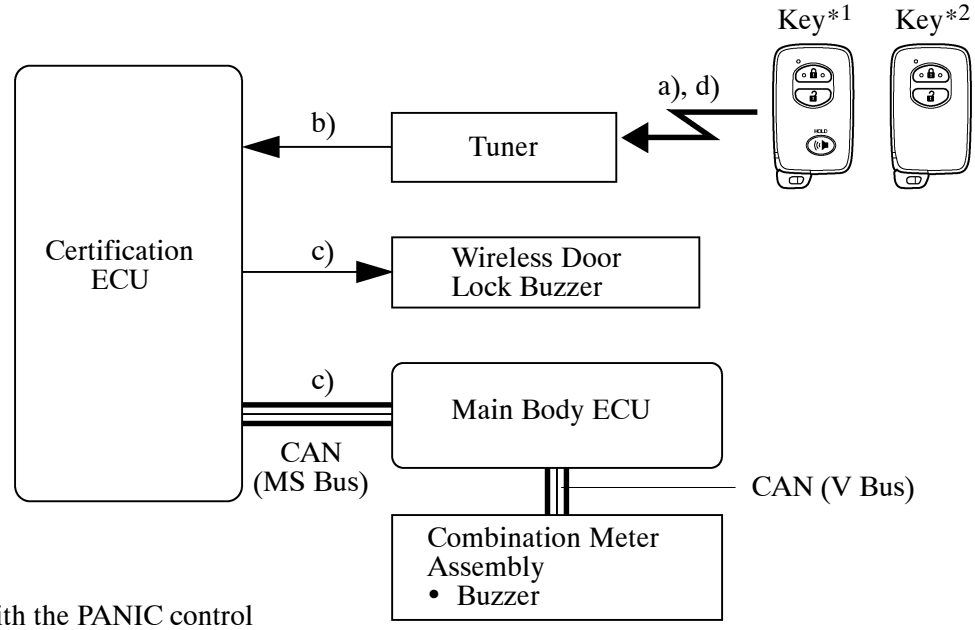


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*1: Models with the PANIC control
*2: Models without the PANIC control
*3: Except for European, Chinese, South African and New Caledonian models

Entry Unlock Mode Switching

a) When the engine switch is OFF, press the lock button and one of the other buttons on the key at the same time for approximately 5 seconds while the key is in the actuation area.
b) The certification ECU receives this signal from the tuner and switches the entry unlock mode.
c) The certification ECU sounds the wireless door lock buzzer and the buzzer of the combination meter assembly to inform the user that the mode has been switched.
d) If the entry unlock mode needs to be switched again, press the lock button and one of the other buttons on the key at the same time for approximately 5 seconds after the LED of the key goes off, thereby the mode changes in the following sequence: Driver Door and All Doors.



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*1: Models with the PANIC control
*2: Models without the PANIC control

Mode	Wireless Door Lock Buzzer	Buzzer in Combination Meter Assembly	Multi-information Display*
Driver Door (Customized)	Sounds three times	Sounds once	
All Doors (Default)	Sounds twice	Sounds once	

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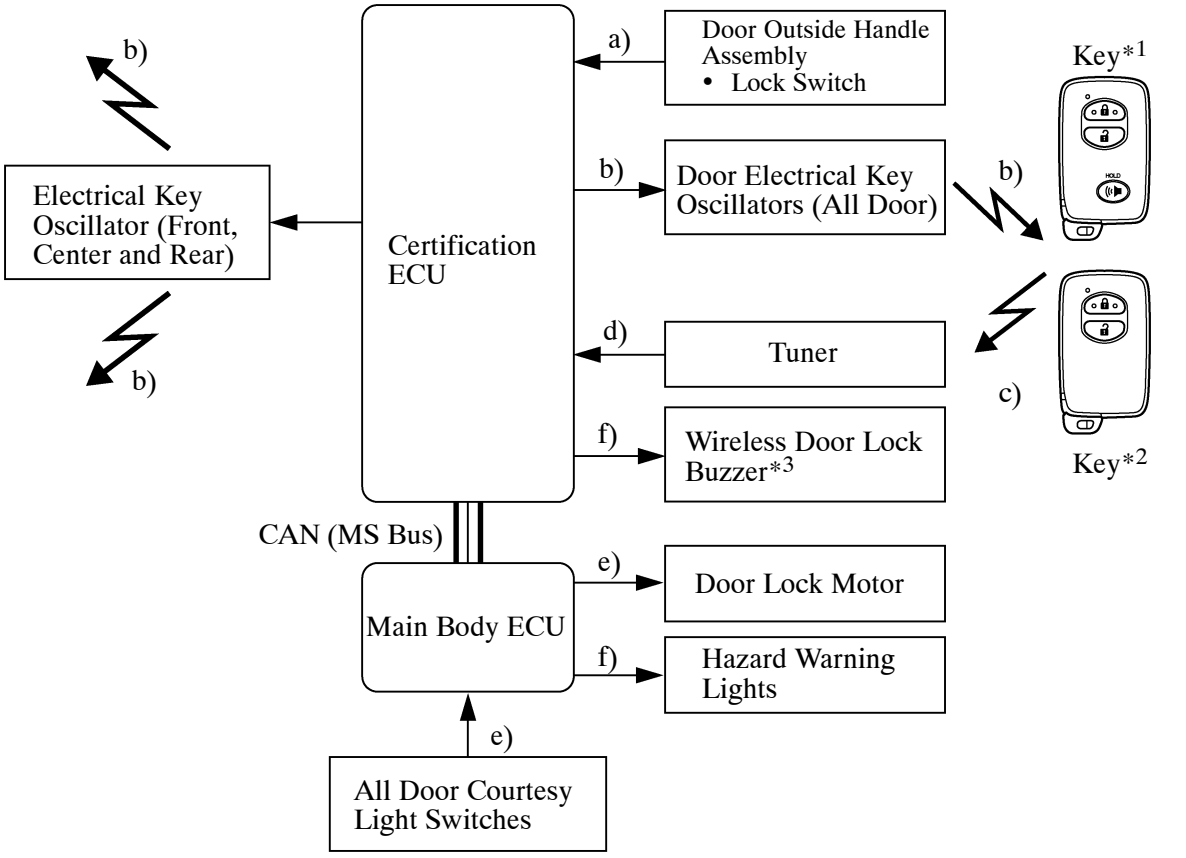
*: Displayed for 4 seconds (and then automatically turned off)

NOTE: This function only switches the entry unlock mode of the entry and start system. It is not applied to the unlock function using the wireless door lock remote control.

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Entry Lock Function

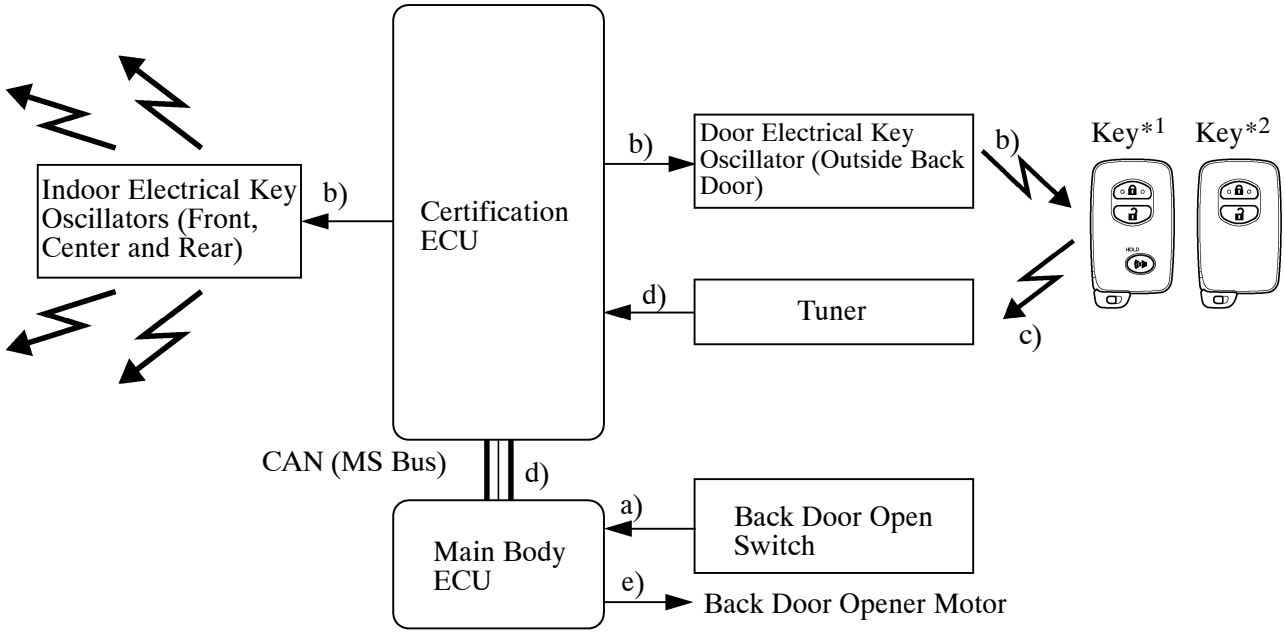
a) This signal is transmitted to the certification ECU when the driver (who has the key in their possession), exits the vehicle and presses the lock switch on the outside door handle.
b) The certification ECU transmits a request signal for all door and indoor oscillators to form actuation areas.
c) The key receives this signal and returns the ID code to the tuner.
d) The certification ECU judges and certifies the ID code from the tuner. It then checks the location of the key, and if all the doors are closed, the ECU transmits a door lock signal to the main body ECU.
e) When the main body ECU receives the signal and judges that all the doors are closed, it actuates the door lock motors to lock the doors.
f) The main body ECU blinks hazard warning lights once and the certification ECU sounds the wireless door lock buzzer once as an answerback for the entry lock function.*3



*1: Models with the PANIC control
*2: Models without the PANIC control
*3: Except for European, Chinese, South African and New Caledonian models

Entry Back Door Open

a) The unlock signal is transmitted to the certification ECU when the driver pushes the back door open switch with the key carried in the driver's possessions.
b) The certification ECU transmits a request signal for electrical key oscillators (front, center, rear and outside back door) to form actuation areas.
c) The key transmits the ID code to the tuner.
d) The certification ECU judges and certifies the ID code, and checks the location of the key. The ECU transmits a back door open signal to the main body ECU.
e) The main body ECU receives this signal and actuates the back door opener motor to open the back door.

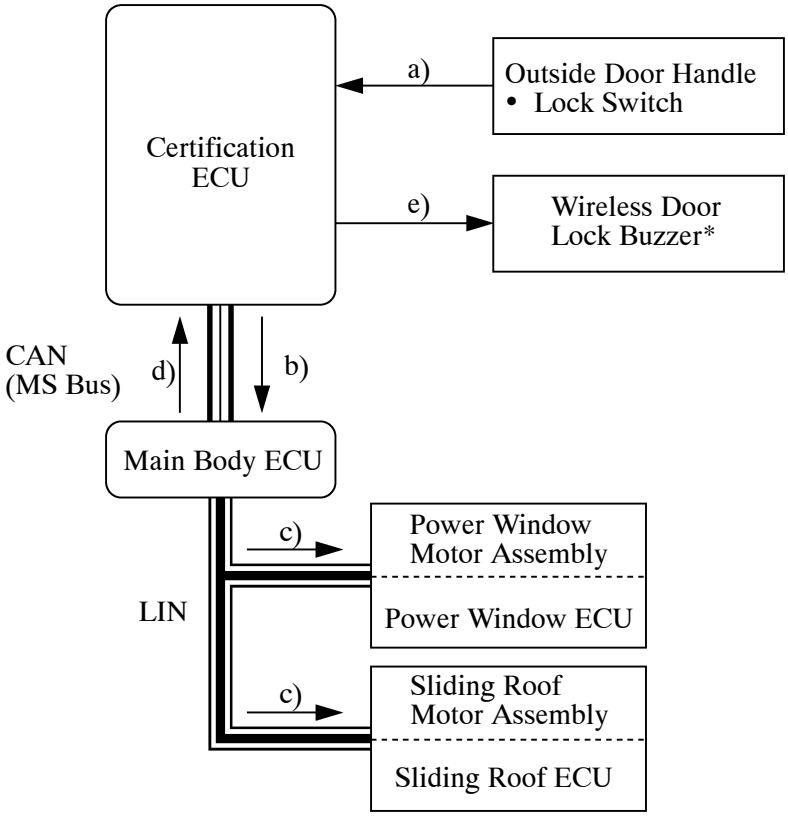


*1: Models with the PANIC control
*2: Models without the PANIC control

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Window and Sliding Roof Close Function

a) After all the doors have been locked, and the driver keeps pressing the lock switch on the outside door handle for approximately 3 seconds, the certification ECU receives continuous door lock switch ON signals.
b) The certification ECU transmits these signals to the main body ECU.
c) The main body ECU transmits the window and sliding roof close request signals to the power window master switch and sliding roof ECU built into the sliding roof motor assembly. The power window master switch transmits the window close request signals to the power window ECU built into the power window motor assembly. These ECUs operate their motors to close windows and sliding roof.
d) The certification ECU sounds the wireless door lock buzzer as an answer back for the window and sliding roof close function.



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*: Except for European, Chinese, South African and New Caledonian models

Memory Call Function

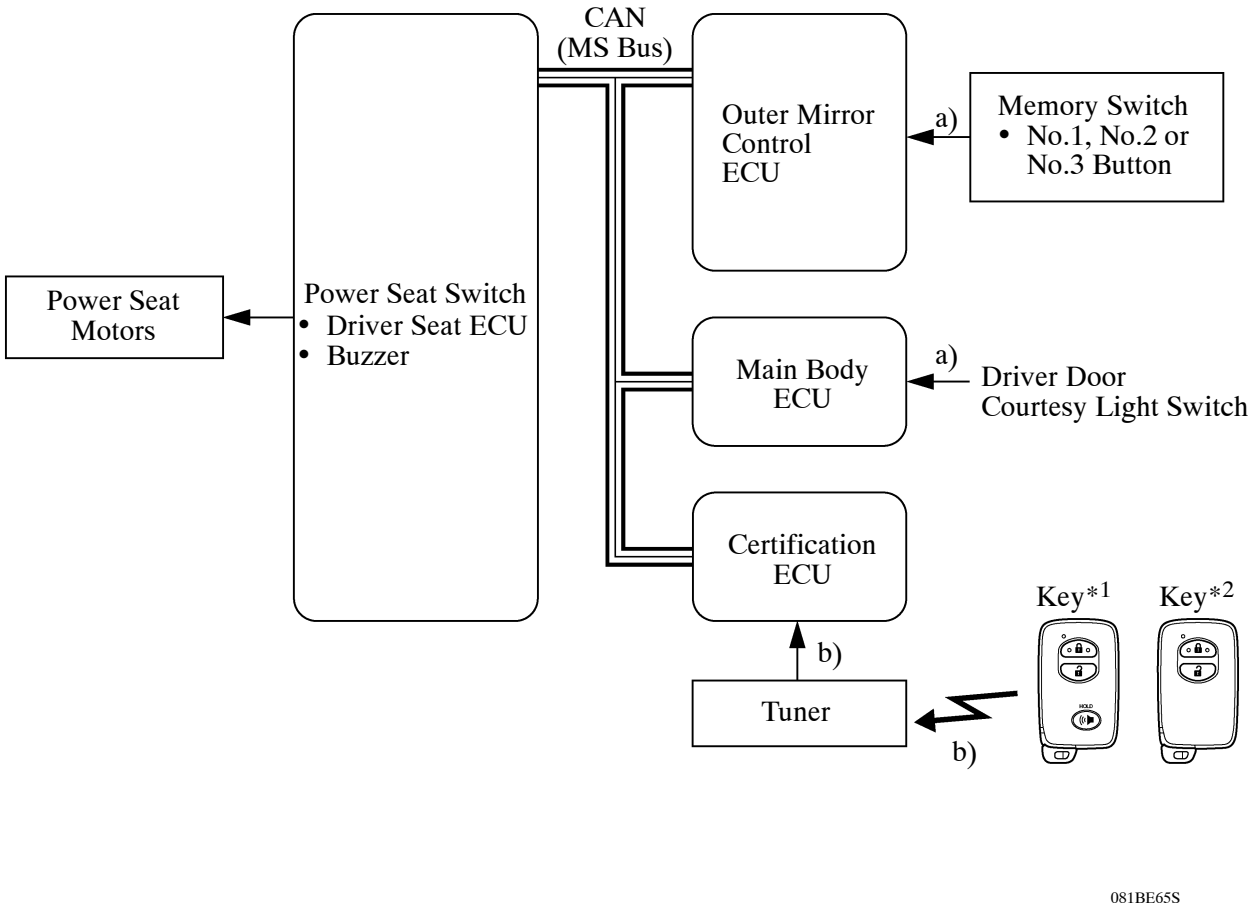
1) General

The memory call function while using a key utilizes the key ID to restore the driver seat position (driving position memory system), steering column position and outer rear view mirror position, automatically, which increases driver convenience.

Condition	Outline
Memory Registration	When all the following conditions are met, the key ID is recorded. • Engine switch is OFF. • Driver door is closed. • Memory No. (1, 2 or 3) button is pressed and held. • LOCK or UNLOCK button in the key pressed and held.
Memory Call Operation	After the door is unlocked using the entry and start system function or the wireless door lock remote control function, if the driver door is opened, the memory call function is operated.
Memory Call Cancel	When all the following conditions are met, the memory call function can be disabled. • Engine switch is OFF. • Driver door is closed. • SET button is pressed and held. • LOCK or UNLOCK button on the key is pressed and held.

2) Memory Registration

a) The driver seat ECU enters the key ID registration mode (linking mode), if the seat memory No.1, No.2 or No.3 button is pressed with the engine switch OFF and driver door closed.
b) In this condition, when the LOCK or UNLOCK button on the key is pressed, the key ID is transmitted from certification ECU to the driver seat ECU.
c) The driver seat ECU records the key ID and each position into the memory.
d) When the driver seat ECU completes recording, it beeps the buzzer in the driver seat ECU once as an answer back.

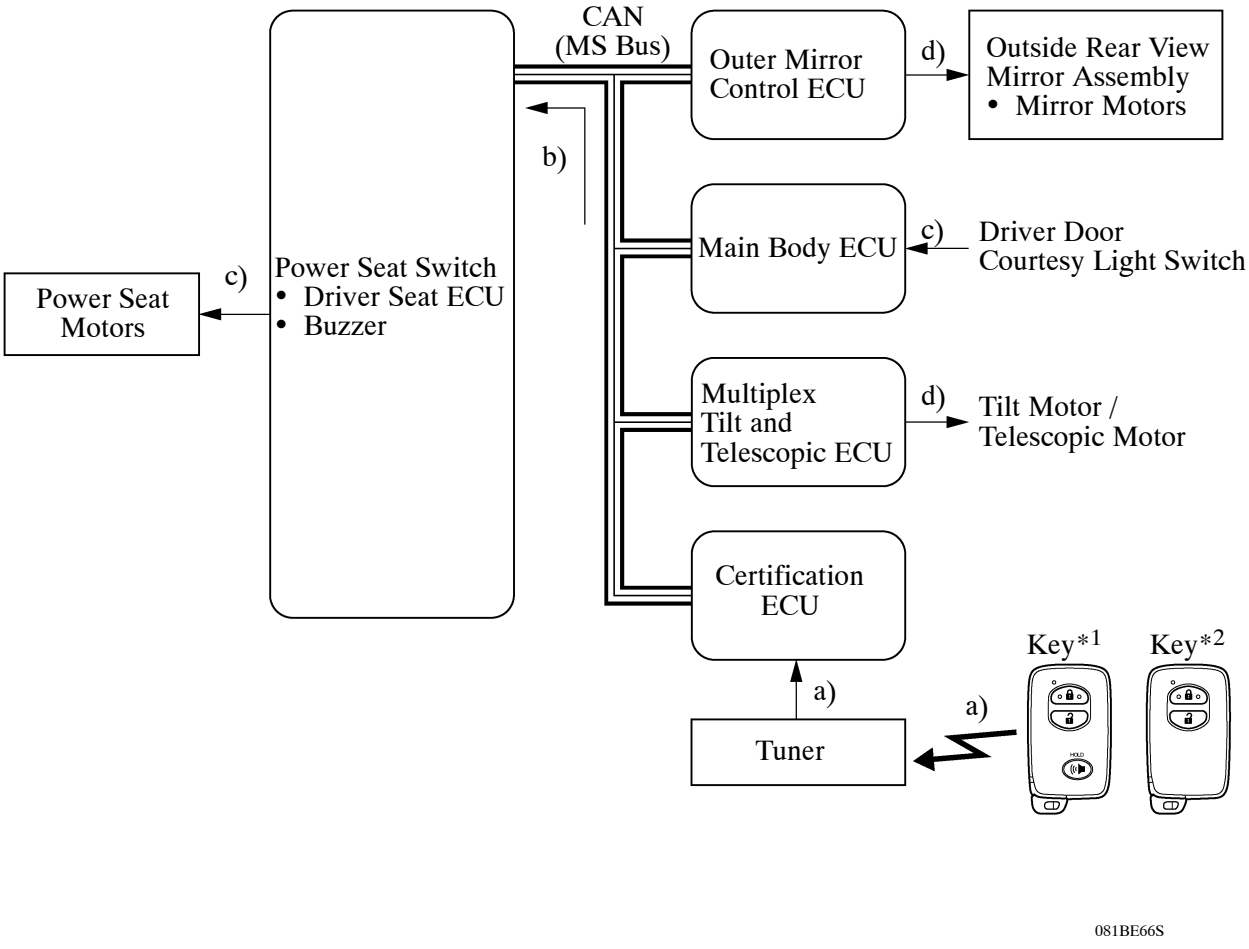


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*1: Models with the PANIC control
*2: Models without the PANIC control

3) Memory Call Operation

a) When the UNLOCK button on the key is pressed or the key enters the actuation area, the key ID is input to certification ECU through the tuner.
b) The certification ECU transmits the key ID to the driver seat ECU.
c) If the driver door is opened, the driver seat ECU outputs a key ID memory restoration signal from certification ECU to each ECU and activates the drive seat motors.
d) When each ECU receives this signal, it activates each actuator.

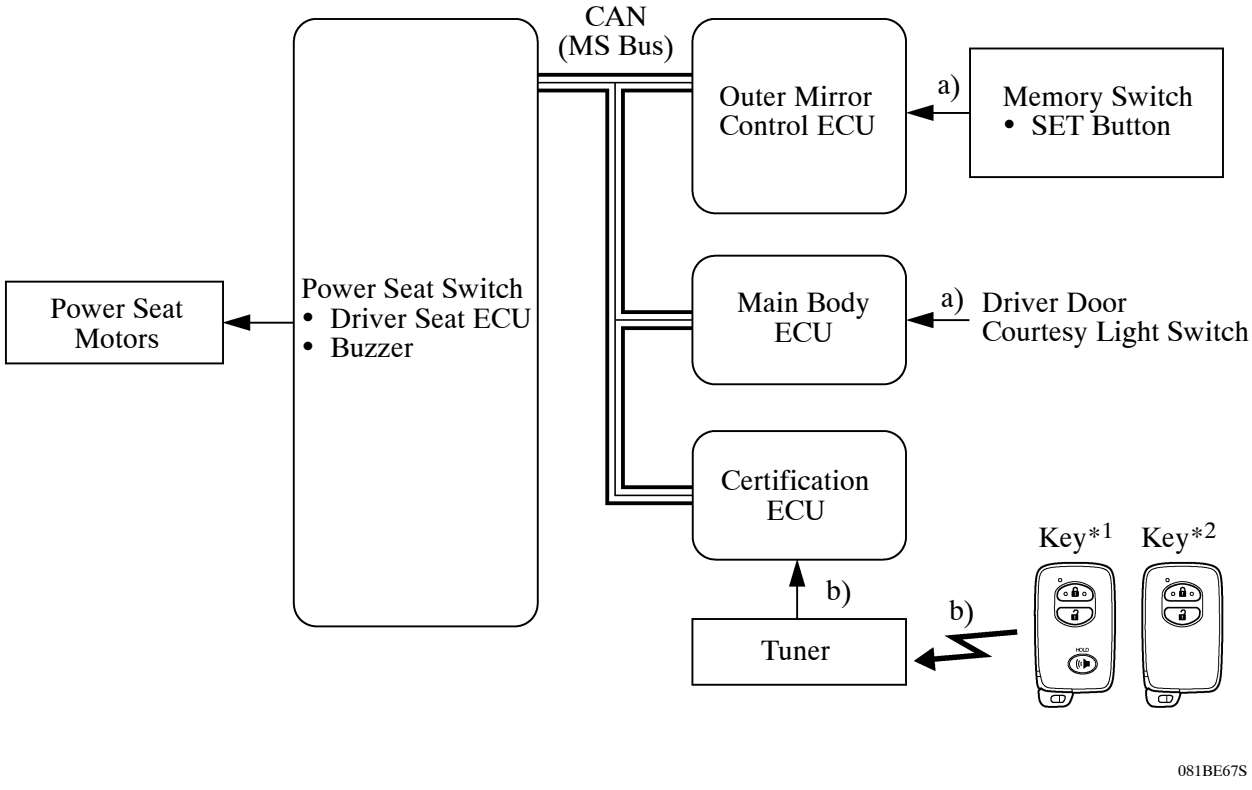


*1: Models with the PANIC control
*2: Models without the PANIC control

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4) Memory Call Cancel

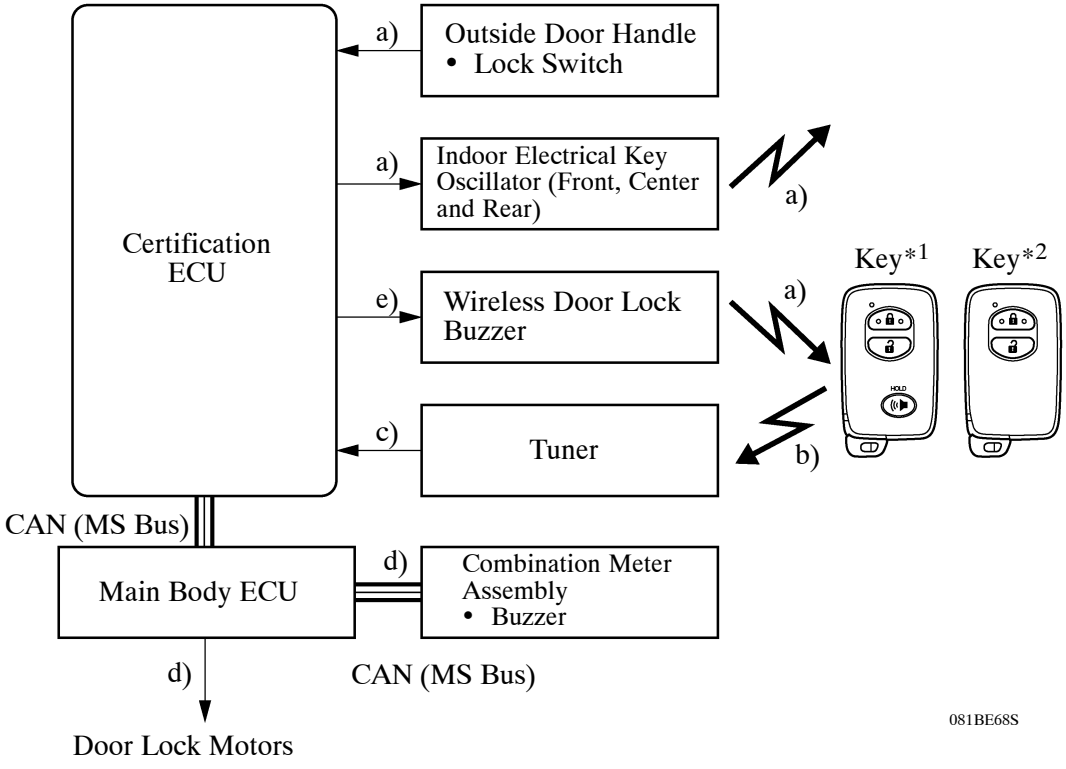
a) If the SET button is pressed when the engine switch is OFF and the driver door is closed, the driver seat ECU enters the memory call cancel mode.
b) In this condition, when LOCK or UNLOCK button in a key is pressed, the key ID is transmitted from certification ECU to the driver seat ECU.
c) If the key ID has already been registered, the driver seat ECU will cancel the key ID memory call function. To perform the key ID memory call function again, it is necessary to register the key ID.
d) When the driver seat ECU completes switching, it beeps the buzzer in the driver seat ECU twice as an answer back.



*1: Models with the PANIC control
*2: Models without the PANIC control

Prevention of Key Confinement

a) When the door is locked with the outside door handle while the key is still inside the vehicle, the certification ECU receives this signal and transmits a request signal for the indoor electrical key oscillators (front, center and rear) to form a actuation area.
b) The key receives this signal and returns the ID code to the tuner.
c) The certification ECU judges and certifies the ID code, and checks the location of the key. The ECU transmits a door unlock signal to the main body ECU.
d) The main body ECU receives the signal and operates each door lock motor to unlock the doors.
e) The certification ECU sounds the wireless door lock buzzer*3 and the buzzer of the combination meter assembly as an answerback for the unlock function that was performed.



*1: Models with the PANIC control
*2: Models without the PANIC control
*3: Except for European, Chinese, South African and New Caledonian models

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Warning

1) General

When any of the situations below occur, the entry and start system causes the certification ECU to sound a buzzer in the combination meter assembly and the wireless door lock buzzer, and illuminate the multi-information display or the entry and start system warning light in order to the alert the driver.

Situation	Condition
A*	The shift lever is in a position other than P when the driver gets out of the vehicle.
B	The key is left in the vehicle.
C	The shift lever is in the P position when the driver gets out of the vehicle.
D	A door is ajar.
E	Any passenger carries the key out of the vehicle.
F	The key is not within the actuation areas.
G	The key is left in the cabin.
H	The key battery is low.
I	Steering lock does not release.
J	The steering lock mechanism is malfunctioning.
K	The main body ECU is malfunctioning.
L	The engine start method is displayed.

*: Only for models with automatic transmission

2) Situation: A

There are two patterns for situation A.

- Pattern 1: When the shift lever is in a position other than P, the driver opens the door and attempts to get out of the vehicle.
- Pattern 2: Under the conditions of pattern 1, the driver closes the door and attempts to leave the vehicle holding the key.

In these situations, the following control is performed:

Pattern 1.

<table>
<tr><td colspan="2">Possible Effects without Warning</td><td>Sudden vehicle start, Vehicle theft, Vehicle roll-away</td></tr>
<tr><td colspan="2">Warning Condition</td><td>The warning is activated when all of the following conditions are met:
• Engines switch is in a mode other than OFF.
• Shift lever is in any position except P.
• Vehicle speed is 0 km/h (0 mph).
• Driver door is opened.</td></tr>
<tr><td rowspan="4">Combination Meter Assembly</td><td>Buzzer</td><td>Continuous sound</td></tr>
<tr><td>Multi-information Display</td><td>

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<tr><td>Master Warning Light</td><td>—</td></tr>
<tr><td>Entry and Start System Warning Light*</td><td>—</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer</td><td>—</td></tr>
<tr><td colspan="2">Engine Switch Indicator Light</td><td>—</td></tr>
<tr><td colspan="2">Warning Stop Condition</td><td>The warning is stopped when one of the following conditions is met:
• Engine switch is OFF.
• Shift lever is in the P position.
• Vehicle speed is above 0 km/h (0 mph).
• Driver door is closed.</td></tr>
</table>

*: Models with analog type combination meter assembly

Pattern 2.

<table>
<tr><td colspan="2">Possible Effects without Warning</td><td>Sudden vehicle start, Vehicle theft, Vehicle roll-away</td></tr>
<tr><td colspan="2">Warning Condition</td><td>The warning is activated when all of the following conditions are met:
• Shift lever is in any position except P.
• Engine switch is in a mode other than OFF.
• Vehicle speed is 0 km/h (0 mph).
• Key is not in the vehicle.
• Driver door is opened → closed.</td></tr>
<tr><td rowspan="4">Combination Meter Assembly</td><td>Buzzer</td><td>Sounds continuously</td></tr>
<tr><td>Multi-information Display</td><td>The following warnings are alternately displayed:


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<tr><td>Master Warning Light</td><td>Flash</td></tr>
<tr><td>Entry and Start System Warning Light*1</td><td>Illuminate</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer*2</td><td>Sounds continuously</td></tr>
<tr><td colspan="2">Engine Switch Indicator Light</td><td>—</td></tr>
<tr><td colspan="2" rowspan="3">Warning Stop Condition</td><td>• Key is in the vehicle.
• The wireless door lock buzzer stops.
• Multi-information Display:


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<tr><td>• Vehicle speed is above 0 km/h (0 mph).
• The wireless door lock buzzer stops.
• Multi-information Display:


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<tr><td>• Engine switch is OFF.
All warning operations stop.</td></tr>
</table>

*1: Models with analog type combination meter assembly
*2: Except for European, Chinese, South African and New Caledonian models

3) Situation: B

There are two patterns for situation B.

- Pattern 1: While the driver's door is open, the driver changes the power source mode to ACC and attempts to leave the vehicle.
- Pattern 2: While the driver's door is open, the driver changes the power source mode from ON to OFF and attempts to leave the vehicle.

In these situations, the following control is performed:

Pattern 1. and Pattern 2.

Possible Effects without Warning		Vehicle theft
Warning Condition		The warning is activated when one of the following conditions is met: • Engine switch is in ACC mode and the driver door is opened. • Engines switch is in OFF mode the steering is unlocked, and the driver door is opened.
Combination Meter Assembly	Buzzer	Continues to sound at short and even intervals
	Multi-information Display	—
	Master Warning Light	—
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • Engine switch is in IG-ON mode. • Driver door is closed. • Engine switch is in OFF mode and the steering is locked.

*: Models with analog type combination meter assembly

4) Situation: C

There are two patterns for situation C.

- Pattern 1: When the engine is left running and the shift lever is in the P position, the driver closes the driver's door and attempts to leave the vehicle while holding the key.
- Pattern 2: Under the conditions of pattern 1, the driver presses the lock switch on the door outside handle.

In these situations, the following control is performed:

Pattern 1.

Possible Effects without Warning		Vehicle theft, The engine cannot be restarted, Discharged battery
Warning Condition		The warning is activated when all of the following conditions are met: • Shift lever is P.*1 • Engine switch is in a mode other than OFF. • Key is not in the vehicle. • Driver door is opened → closed.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 080BE195S
	Master Warning Light	Flash
	Entry and Start System Warning Light*2	Illuminate
Wireless Door Lock Buzzer*3		Sounds three times
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • Engine switch is OFF. • Key is in the vehicle.

*1: Models with automatic transmission
*2: Models with analog type combination meter assembly
*3: Except for European, Chinese, South African and New Caledonian models

Pattern 2.

Possible Effects without Warning		Vehicle theft, Discharged battery
Warning Condition		The warning is activated when all of the following conditions are met: • Shift lever is P. *1 • Vehicle speed is 0 km/h. • Engine switch is in a mode other than OFF. • All doors are closed. • The key is outside the vehicle (within one of the actuation areas). • Lock switch on the door outside handle is ON
Combination Meter Assembly	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
	Entry and Start System Warning Light*2	—
Wireless Door Lock Buzzer*3		Sounds for 60 seconds
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • The engine switch is OFF and the key is not within the actuation areas. • Key is in the vehicle. • Vehicle speed is above 0 km/h.

*1: Models with automatic transmission
*2: Models with analog type combination meter assembly
*3: Except for European, Chinese, South African and New Caledonian models

5) Situation: D

The lock switch on the door outside handle is pressed to perform entry lock with a door open.
In this situation, the following control is performed:

Possible Effects without Warning		Vehicle theft
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch is OFF. • Any doors are opened. • Entry lock button on the outer door handle is operated.
Combination Meter Assembly	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
	Entry and Start System Warning Light*1	—
Wireless Door Lock Buzzer*2		Sounds for 10 seconds
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • Engine switch is in a mode other than OFF. • All doors are closed. • Wireless door lock remote function is unlocked. • Entry unlock is operated. • 10 seconds have elapsed since the wireless door lock buzzer was activated.

*1: Models with analog type combination meter assembly
*2: Except for European, Chinese, South African and New Caledonian models

6) Situation: E

When the engine is left running, a passenger leaves the vehicle holding the key.
In this situation, the following control is performed:

Possible Effects without Warning		The engine cannot be restarted
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch is in a mode other than OFF. • Door except driver door is opened → closed. • Vehicle speed is 0 km/h (0 mph). • Key is not in the vehicle.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 080BE195S
	Master Warning Light	Flash
	Entry and Start System Warning Light*1	Illuminate
Wireless Door Lock Buzzer*2		Sounds 3 times
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • Engine switch is OFF. • Vehicle speed is above 0 km/h (0 mph). • Key is in the vehicle.

*1: Models with analog type combination meter assembly
*2: Except for European, Chinese, South African and New Caledonian models

7) Situation: F

When the key is not in the cabin or the key does not operate properly, the driver attempts to start the engine or change the engine switch to ON.
In this situation, the following control is performed:

Possible Effects without Warning		Confuses the user
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch is pushed. • Key is not in the vehicle.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 080BE195S Displayed for 10 seconds(and then automatically turned off)
	Master Warning Light	Flash
	Entry and Start System Warning Light*	Illuminate
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		—
Warning Stop Condition		Check if the key is in the detection area. If the key is in the detection area, press the wireless door lock switch and confirm that the indicator comes on. If the indicator does not come on, replace the key battery with a new one.

*: Models with analog type combination meter assembly

8) Situation: G

The lock switch on the door outside handle is pressed to perform entry lock with the key left in the cabin. In this situation, the following control is performed:

Possible Effects without Warning		Vehicle theft
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch is OFF. • All doors are closed. • Key is in the vehicle. • Lock switch on the door outside handle switch is ON.
Combination Meter Assembly	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
	Entry and Start System Warning Light*1	—
Wireless Door Lock Buzzer*2		Sounds for 2 seconds
Engine Switch Indicator Light		—
Warning Stop Condition		The key is removed from the cabin and the lock switch on the door outside handle is pressed again.

*1: Models with analog type combination meter assembly
*2: Except for European, Chinese, South African and New Caledonian models

9) Situation: H

The vehicle is driven using a key that has a low battery.
In this situation, the following control is performed:

Possible Effects without Warning		Entry and start system does not function
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch to OFF after being left in IG-ON for over 20 minutes. • Key battery voltage is low. • Key is in the vehicle.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 Displayed for 10 seconds (and then automatically turned off) 080BE196S
	Master Warning Light	Illuminate
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		—
Warning Stop Condition		The key battery is replaced with a new one.

*: Models with analog type combination meter assembly

10) Situation: I

Steering lock cannot be released.
In this situation, the following control is performed:

Possible Effects without Warning		Steering usability function
Warning Condition		The Steering lock cannot be released, thus the engine is prevented from starting.
Combination Meter Assembly	Buzzer	—
	Multi-information Display	 080BE197S Displayed for 15 seconds (and then automatically turned off)
	Master Warning Light	Illuminate
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		The green indicator blinks at 1 second intervals (goes off automatically in 30 seconds).
Warning Stop Condition		The power switch is pressed while the steering wheel is turned left and right, and the steering lock successfully disengages.

*: Models with analog type combination meter assembly

11) Situation: J

A malfunction of the steering lock ECU is detected.
In this situation, the following control is performed:

Possible Effects without Warning		Malfunction detection
Warning Condition		A malfunction of the steering lock ECU is detected.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 080BE19Y
	Master Warning Light	Illuminate
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		The amber indicator blinks at 2 second intervals.(goes off automatically in 15 seconds)
Warning Stop Condition		The steering lock ECU returns to normal.

*: Models with analog type combination meter assembly

12) Situation: K

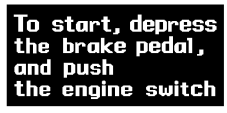
A malfunction of the main body ECU is detected.
In this situation, the following control is performed:

Possible Effects without Warning		Malfunction detection
Warning Condition		A malfunction in the main body ECU is detected.
Combination Meter Assembly	Buzzer	—
	Multi-information Display	—
	Master Warning Light	—
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		The amber indicator blinks at 2 second intervals.
Warning Stop Condition		The main body ECU returns to normal.

*: Models with analog type combination meter assembly

13) Situation: L

A warning message appears on the meter when the driver does not follow the proper procedure to start the vehicle.
In this situation, the following control is performed:

Possible Effects without Warning		Usability function
Warning Condition		The warning is activated when all of the following conditions are met: • Engine switch is in a mode other than ON. • Any doors are closed → opened. • The engine switch is changed from OFF to ACC more than once with the power off and brake pedal not depressed.
Combination Meter Assembly	Buzzer	Sounds once
	Multi-information Display	 080BE15Y
	Master Warning Light	—
	Entry and Start System Warning Light*	—
Wireless Door Lock Buzzer		—
Engine Switch Indicator Light		—
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • 10 seconds have elapsed since a warning message was displayed. • The engine switch is pushed with the brake pedal depressed or the engine switch is OFF.

*: Models with analog type combination meter assembly

Battery Saving

1) Vehicle Battery Saving Function

In the entry and start system, signals are emitted outside the vehicle at a prescribed interval (250 msec.) when the doors are locked. Therefore, the vehicle battery could be drained if the vehicle remains parked for a long time. For this reason, the controls listed below are effected.

Condition	Control
No response from key for 10 to 14 days	Signal transmission interval is extended from 250 msec. to 750 msec.
No response from key for 15 to 30 days	Signal transmission interval is extended from 750 msec. to 2250 msec.
No response from key for more than 31 days	Automatically deactivates entry and start system.

▶ Reinstatement Conditions ◀

- A wireless door lock remote control signal (lock and unlock) is input and the ID matches.
- A user is carrying the key and pushes a lock switch on an door outside handle.
- A door is locked or unlocked using the mechanical key.

2) Key Battery and Vehicle Battery Saving Function

In the entry and start system, if the key is constantly located within the vehicle exterior actuation area of the doors, the system will maintain periodic communication with the key. Therefore, if the vehicle remains parked in that state for a long time, the key battery and the vehicle battery could be drained.
For this reason, if this state continues longer than 10 minutes, the entry and start system automatically deactivates.

▶ Reinstatement Conditions ◀

- A wireless door lock remote control signal (lock and unlock) is input and the ID matches.
- A user who has the key in their possession pushes a lock switch on an door outside handle.
- A door is locked or unlocked using the mechanical key.

Key Cancel

Key cancel is operated when certain operations are performed with the vehicle in the following condition:
- Engine switch is OFF.
- Driver door is closed.
- Driver door is unlocked.

The operation procedure is as follows:
1) Unlock once with the UNLOCK button on the key.
2) Open the driver door within 5 seconds.
3) Unlock twice with the UNLOCK button on the key within 5 seconds.
4) Repeat open → close twice for the driver door within 30 seconds, and open again.
   (Driver Door: Open → Close → Open → Close → Open)
5) Unlock twice with the UNLOCK button on the key within 30 seconds.
6) Repeat open → close once for the driver door within 30 seconds, and open again.
   (Driver Door: Open → Close → Open)
7) Close the driver door within 5 seconds.

When key cancel is activated, the wireless door lock buzzer sounds twice.
To return to the original condition, perform the procedures again. When it is returned to its original condition, the wireless door lock buzzer sounds once.

Key Code Registration Function

The table below shows the four special coded ID registration function modes through which up to seven different codes can be registered. The codes are electronically registered (written to and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

Mode	Function
Rewrite	Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a transmitter or the integration relay is replaced.
Add	Adds a newly received code while preserving 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	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit	To delete all the registered codes and to prohibit the wireless door lock function. This mode is used when a transmitter (key) is lost.

THEFT DETERRENT SYSTEM

■ DESCRIPTION

- The theft deterrent system is controlled by the certification ECU.
- The theft deterrent system detection methods and alert system settings are different for each package model. For details, refer to Equipment List on page MO-33.
- The parts used for this system vary depending on the destinations as shown below.

Destination	Item				
	Security Horn	Self -power Siren	Tilt Sensor	Intrusion Sensor	Print Pattern Type Glass Breakage Sensor
Europe	-	○	○*	○*	○*
Except Europe	○	-	-	-	-
Europe: Only on United Kingdom package models	-	○	-	-	-

*: Available on some European models. For details, see the equipment list on MO-33.

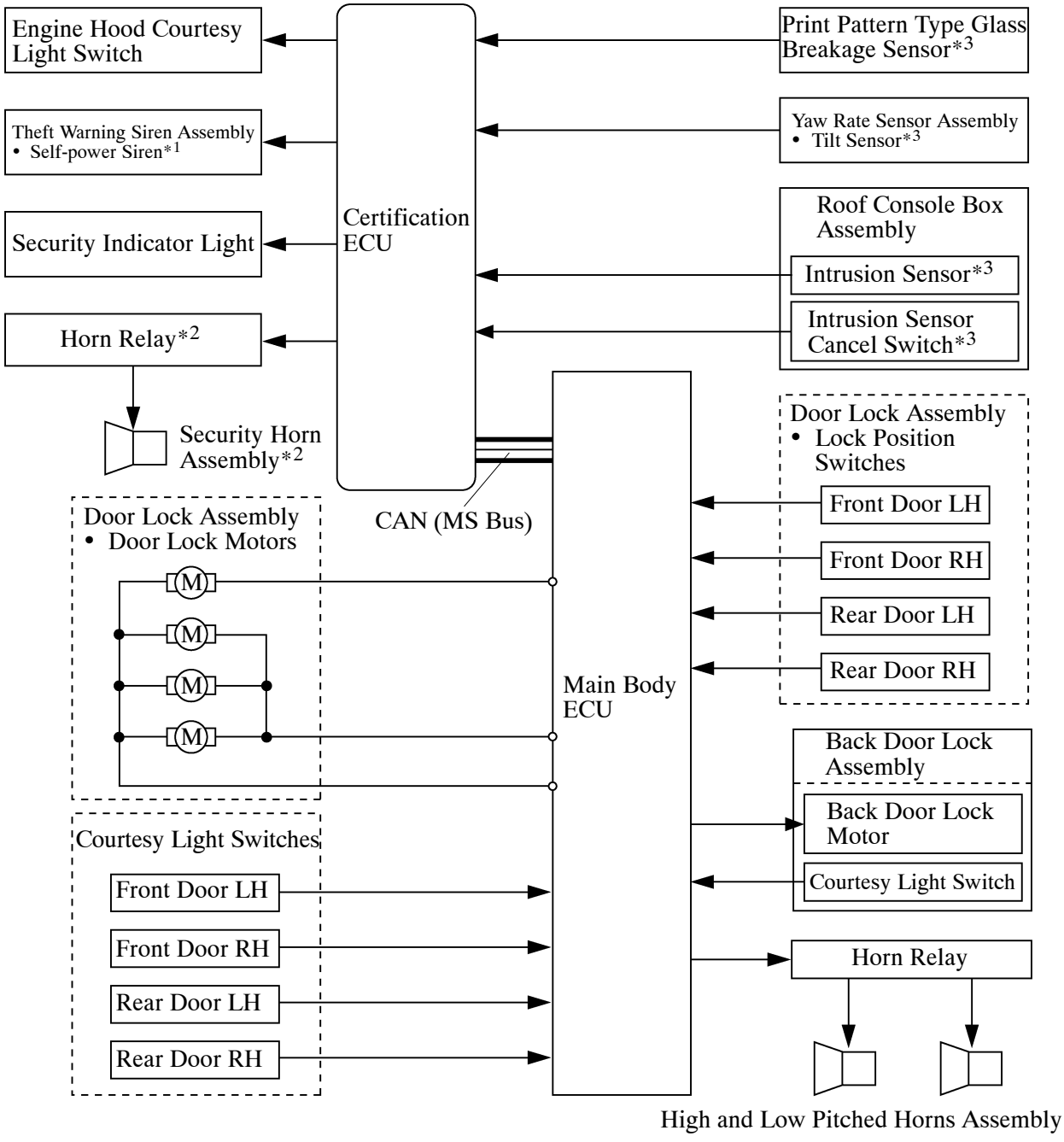
- The theft deterrent system sounds an alarm when any of the following are detected:
  - The back door being opened without the entry and start system, or key (mechanical key).
  - Any door being unlocked without the key (electronic key) unlock button, the entry and start system, or key (mechanical key).
  - The engine hood being opened.
  - The battery terminals are removed and reconnected.
  - The battery terminals are removed.
  - The vehicle being forcibly entered.
  - The pitch angle of vehicle inclination is changed.
  - The power source has been changed to IG-ON by hot wiring and not by operating the engine switch.
  - A rear side glass or back door glass has been broken.

- The system consists of door lock control system parts, entry and start system parts, intrusion sensor, tilt sensor, security horn (or self-power siren), print pattern type glass breakage sensor and the security indicator light.
- The warning methods and timing of the system are listed below.

Warning Method	Hazard Warning Lights	Flash	
	Vehicle Horn	Sound	Approximately 0.4 second cycles
	Security Horn	Sound	
	Self-power Siren	Sounds a warning at the cycle of the self-power siren itself	
	Door Lock Motors	Lock	
Warning Time		Approximately 30 seconds (Approximately 10 seconds*)	

*: Only on Chinese models

■SYSTEM DIAGRAM

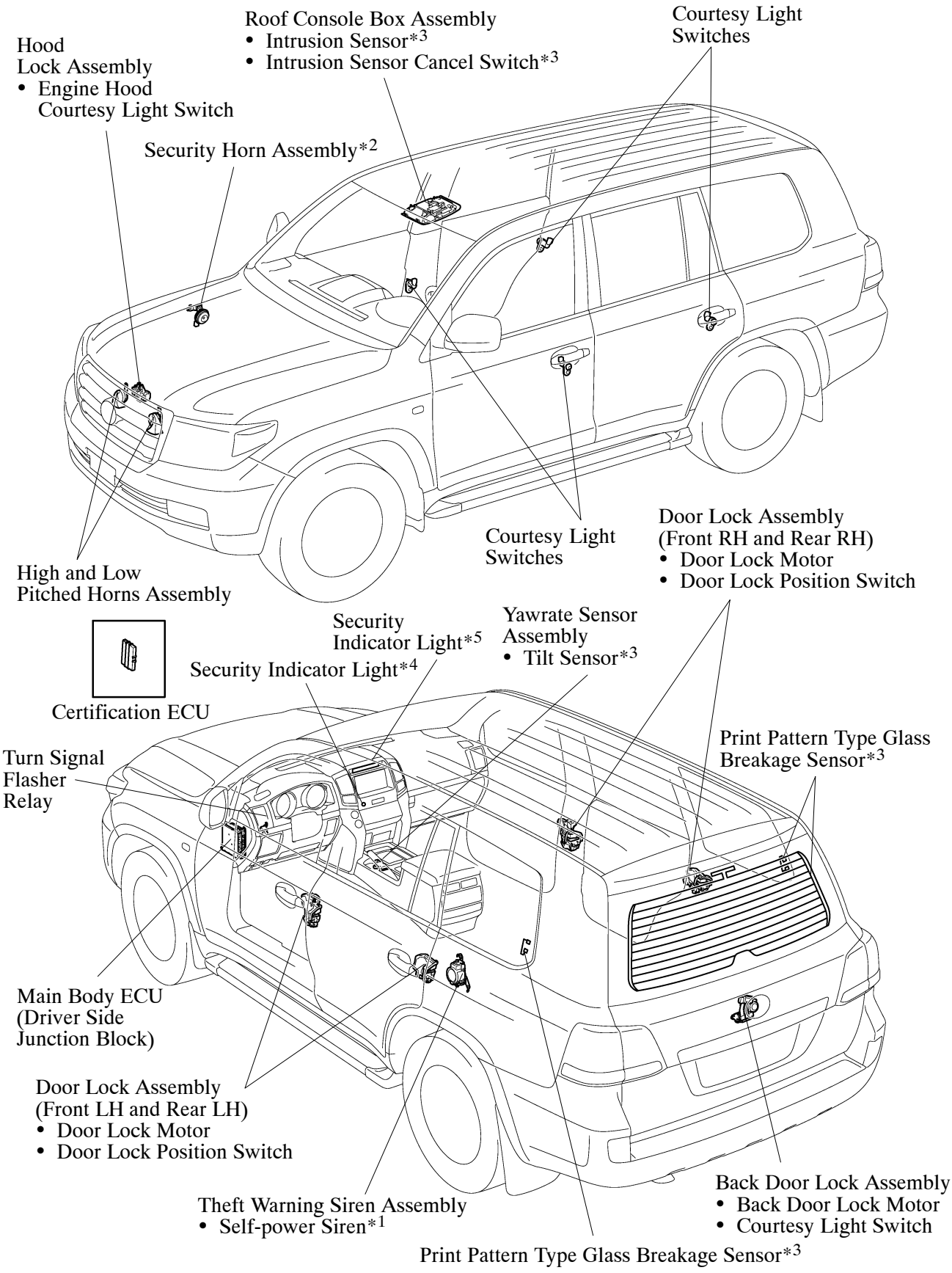


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*1: Only on European models
*2: Except for European models
*3: Available on some European models. For details, see the equipment list on MO-33.

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■ LAYOUT OF MAIN COMPONENTS



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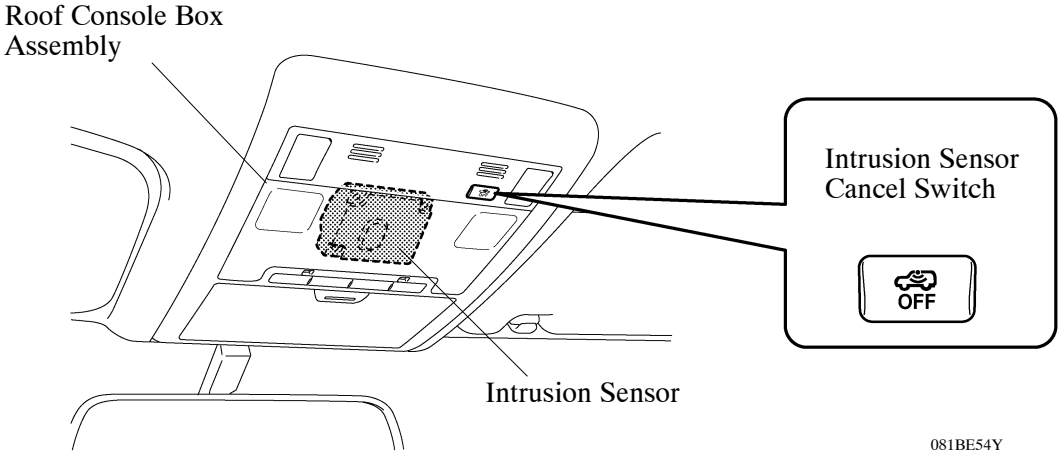
*1: Only on European models
*2: Except for European models
*3: Available on some European models. For details, see the equipment list on MO-33.
*4: Models with the multi-display
*5: Models without the multi-display

■CONSTRUCTION AND OPERATION

1. Intrusion Sensor

General

- An intrusion sensor is provided in the front interior light located in the roof console box assembly.
- The intrusion sensor detects any intrusion into the vehicle interior and transmits a warning signal to the certification ECU.
- This sensor transmits radiowaves at 24.5 GHz in the vehicle interior. When an intruding object moves, it disrupts the reflection of the radiowaves, and the sensor detects the resulting changes in the phase of the radiowaves.



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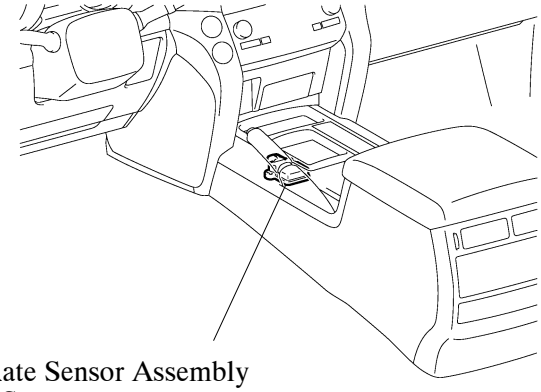
Operation

- The certification ECU activates the intrusion sensor when the system changes from the armed preparation state to the armed state. If an intrusion detection signal is received from the intrusion sensor during the armed state, the ECU changes to the alarm state in order to output an alarm.
- When the power source is OFF, pressing the intrusion sensor cancel switch can disable the function of the intrusion sensor. (For models with the tilt sensor, the tilt sensor function will also be disabled by pressing the cancel switch.) If the system changes to the armed state, the intrusion sensor will not activate. This function is canceled each time all doors are unlocked with a entry and start system, and is reinstated when the intrusion sensor is ON.
- When the key enters the actuation area of any door oscillator, the certification ECU judges and certifies the key ID code received from the tuner. At this time, while the certification ECU is evaluating that the key ID code matches the ID code stored in the memory, the intrusion sensor is disabled for approximately 30 seconds, thus preventing the sensor from detecting incorrectly and malfunctioning.

2. Tilt Sensor

General

- The tilt sensor is incorporated in the yaw rate sensor assembly located inside the front floor console.
- The tilt sensor detects pitch angles of vehicle inclination using the two deceleration sensors. When the tilt sensor detects a change in the pitch angle of vehicle inclination, such as attempting to tow the vehicle thieves, it transmits the warning signal to the certification ECU.



Yaw Rate Sensor Assembly
• Tilt Sensor

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LHD Models

Operation

- The certification ECU activates the tilt sensor when the system changes from the armed preparation state to the armed state. If the warning signal is received from the tilt sensor during the armed state, the ECU changes to the alarm state in order to output an alarm.
- When the system is in the disarmed state, pressing the intrusion sensor cancel switch can disable the functions of the intrusion sensor and the tilt sensor simultaneously. If the system changes to the armed state, the tilt sensor will not activate. This function is canceled each time all doors are unlocked with a entry and start system, and is reinstated when the tilt sensor is ON.
- When the key enters the actuation area of any door oscillator, the certification ECU judges and certifies the key ID code received from the tuner. At this time, while the certification ECU is evaluating that the key ID code matches the ID code stored in the memory, the tilt sensor is disabled for approximately 30 seconds, thus preventing the sensor from detecting incorrectly and malfunctioning.

NOTE: Under the following conditions, if the vehicle tilts or an acceleration of gravity in the vertical and horizontal directions of the vehicle is detected by the tilt sensor, an alarm may occur accidentally. To avoid accidental alarm activation, turn the tilt sensor off using the tilt sensor OFF switch.

- The vehicle is transported by ferry, trailer or train.
- The vehicle is parked in multi-storied parking facilities.
- The vehicle is washed by a conveyor type car washing machine.
- A tire has blown out.
- The vehicle is jacked up for a tire or wheel change.
- An earthquake occurs or the road subsides.
- Goods such as ski boards and snowboards are loaded or unloaded.

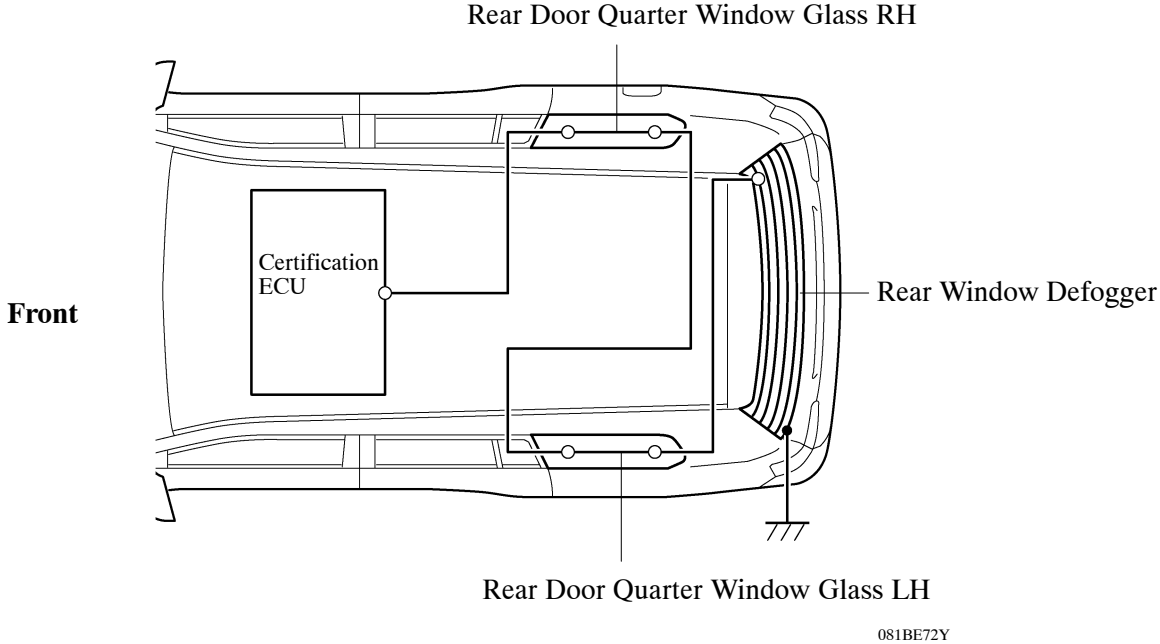
3. Self-power Siren

- A self-power siren is mounted on the rear quarter inner panel.
- During a normal operation, this siren sounds an alarm in accordance with the operation signal from the certification ECU. Because this siren has an internal battery, it can independently sound an alarm even if the vehicle's battery terminals are disconnected or if the wiring harnesses that are related to the system are cut.

4. Glass Print Pattern Type Glass Breakage Sensor

- The certification ECU, print patterns on the rear door quarter window glass and rear window defogger are connected in series, and when the certification ECU detects an open circuit, it determines that one of the windows has been broken.
- When the certification ECU receives an open circuit signal from the print pattern or rear window defogger for approximately 400 msec while in the armed state, it determines that one of the windows has been broken and changes the system to the alarm state in order to activate an alarm.
- When the key enters the actuation area of any door oscillator, the certification ECU judges and certifies the key ID code received from the tuner. At this time, while the certification ECU is evaluating that the key ID code matches the ID code stored in the memory, the print pattern and rear window defogger is disabled for approximately 30 seconds, thus preventing the sensor from detecting incorrectly and malfunctioning.

▶ System Diagram ◀



■ FUNCTION

The theft deterrent system has the following function:

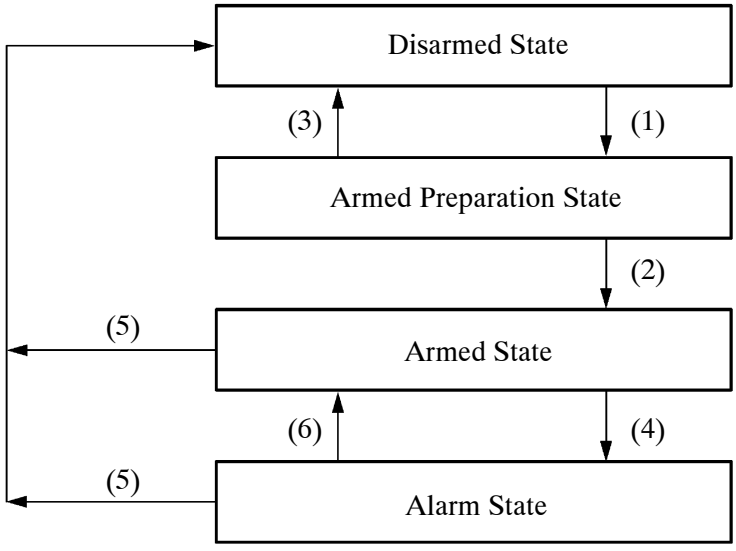
Function	Outline
Alarm	When the theft deterrent system enters the alarm state, the warning items (hazard warning lights, vehicle horn, and security horn*1 or self-power siren*2) are operated for approximately 30 seconds.
Security Indicator	When the state of the theft deterrent system enters the armed preparation or alarm state, the security indicator light is illuminated to inform the user. This indicator is also the engine immobiliser indicator, it blinks when the engine immobiliser is in an engaged state.
Forced Door Lock	The main body ECU transmits a door lock signal to all the doors when all the following conditions are satisfied. • The theft deterrent system is in the alarm state. • Either front door is unlocked without using the key (mechanical key). (IG OFF, ACC OFF position) The function stops when one of the following conditions is met. • All doors are locked. [lock function of door lock or key (electronic key) is operated] • The warning ends after approximately 30 seconds. • Either front door is unlocked using the key (mechanical key).
Panic Control*1	When the PANIC button of the key (electronic key) is pressed, the main body ECU activates the alarm function.

*1: Except for European models
*2: Only on European models

■SYSTEM OPERATION

The states of the theft deterrent system are as follows:

State	Description	Theft Detection
Disarmed State	The theft deterrent system has not been set by the user.	—
Armed Preparation State	The standby state before the theft deterrent system activates when the system has already been set.	—
Armed State	The theft deterrent system is being activated. (Theft can be detected.)	○
Alarm State	Theft has been detected and the warning operation activates.	—



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- The theft deterrent system activates as described in the diagram below when one of items in the chart occurs in order to cause the system to enter the respective state.

Condition	Item
(1)	In the disarmed state, when the engine switch is OFF, the system state is switched if all of the following conditions are met. • All doors, engine hood and back door are closed. • All doors are locked using the key (electronic key) lock button, the entry and start system *1 or key (mechanical key)*1.
(2)	The system state is switched when the doors, engine hood, and back door are all closed and locked, and approximately 30 seconds have elapsed.
(3)	The system state is switched when one of the following conditions is met. • Any door, engine hood, or back door is opened. • Any door is unlocked. • The engine switch is pushed. • A terminal is disconnected from the battery and reconnected.

(Continued)

Condition	Item
(4)	The system state is switched when one of the following conditions is met. • With all doors closed, any door is opened. • With all doors locked, any door is unlocked by a method other than key (electronic key), the entry and start system or the key (mechanical key). • With the back door closed, the back door is opened by a method other than the entry and start system or the key (mechanical key). • With the engine hood closed, the engine hood is opened. • A terminal is disconnected from the battery and reconnected.*2 • A terminal is disconnected from the battery.*3 • The engine switch has been changed to IG-ON by hot wiring and not by operating the engine switch. • The intrusion sensor*4 detects movement in the vehicle interior. • The tilt sensor*5 detects a change in vehicle inclination. • The certification ECU detects on open circuit in the print pattern or rear window defogger*6.
(5)	The system state is switched when one of the following conditions is met. • Any door is unlocked with the key (mechanical key)*1 or key (electronic key). • The engine switch has been changed to IG-ON by operating the engine switch.*1
(6)	The system state is switched after the alarm time elapses.

*1: Except European models.
*2: With a security horn.
*3: With a self-power siren.
*4: With a intrusion sensor
*5: With a tilt sensor
*6: With a print pattern type glass breakage sensor

SRS AIRBAG SYSTEM

■ DESCRIPTION

- The SRS (Supplemental Restraint System) has the following equipment:

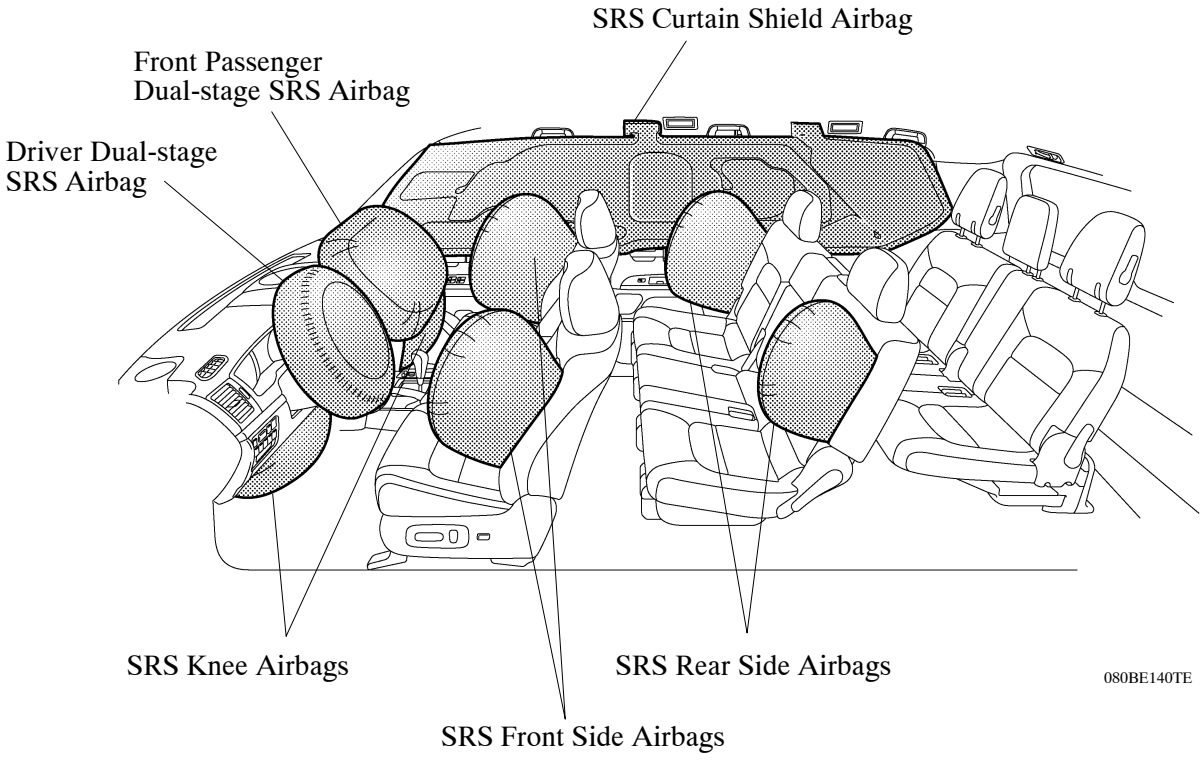
○: Standard OP: Option —: Not available

Destination	China		Europe	G. C. C. Countries		Australia		General Countries	
Grade	VX	GX	VX	VX	GX	VX	GX	VX	GX
Driver and Front Passenger Dual-stage SRS Airbag	○	○	○	○	○	○	○	○	○
SRS Knee Airbag	OP	—	○	OP	—	○	—	OP	—
SRS Front Side Airbag	○	OP	○	○	OP	○	OP	○	OP*1
SRS Rear Side Airbag	○	—	○*2	○	—	○	—	○	—
SRS Curtain Shield Airbag	○	OP	○	○	OP	○	OP	○	OP*1

*1: Only on 1GR-FE engine models

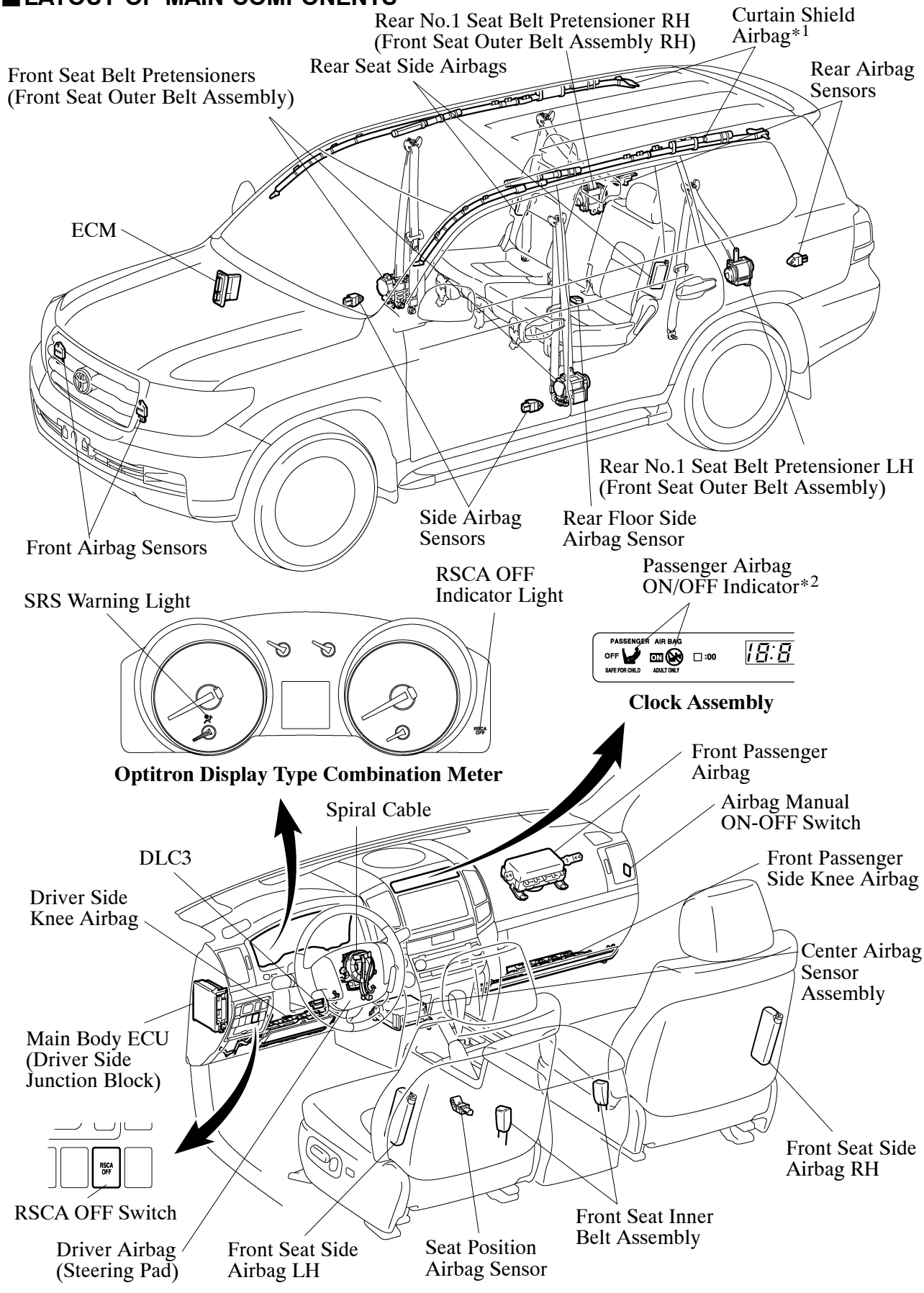
*2: Available as an option on left-hand drive 8-seater models

- The driver and front passenger dual-stage SRS airbags supplement the seat belts to help to reduce the shocks to the head and chest of the driver and front passenger in the event of a frontal collision.
- The SRS knee airbags help restrain the lower parts of the bodies of the driver and front passenger, thus enhancing the excellent passenger protection provided by the seat belts and front airbags.
- SRS front side airbags for the driver and the front passenger, SRS rear side airbags for rear No.1 seat outer passengers, and SRS curtain shield airbags help to reduce shocks to the chest and head of the driver, front passenger and rear No.1 and No.2 seat outer passengers in the event of a side collision.
- An RSCA (Roll Sensing Curtain Shield Airbags) function is used in order to activate the seat belt pretensioners for the driver, front passenger and rear No.1 seat outer passengers and deploy the curtain shield airbags in the event that the vehicle rolls over. The RSCA OFF switch is provided on the driver side instrument panel to allow the driver to disable this function.
- The airbag manual ON-OFF switch is provided on European models and Russian package models. The deployment of the following airbags can be turned ON or OFF by operating this switch manually: front passenger dual-stage SRS airbag, SRS knee airbag for the front passenger, and SRS front side airbag for the front passenger.



8-seater Models

■ LAYOUT OF MAIN COMPONENTS



LHD Models with Curtain Shield Airbags

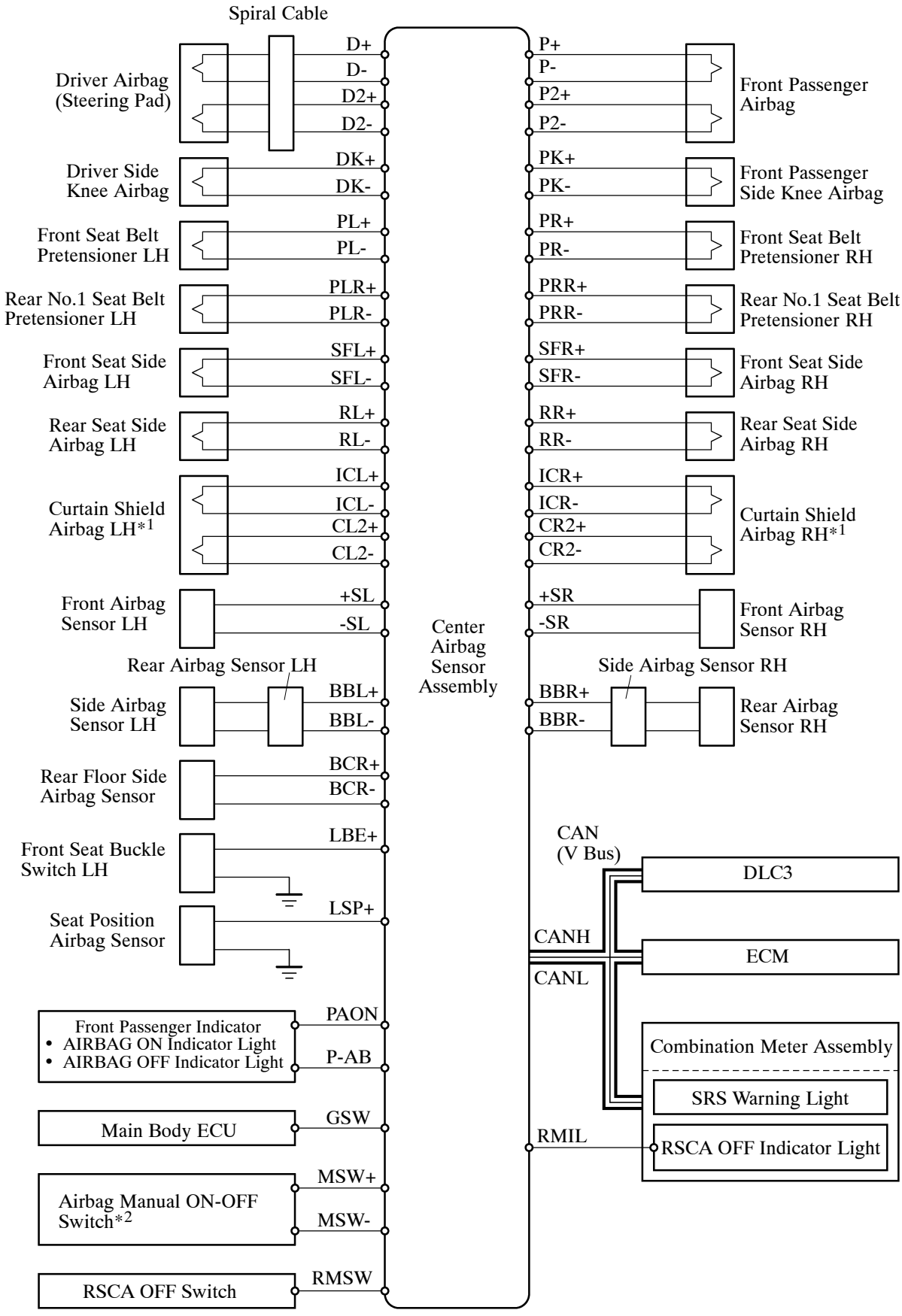
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*1: For 8-seater models

*2: Provided on European models and Russian package models

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■ WIRING DIAGRAM



LHD Models with Curtain Shield Airbags

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*1: For 8-seater models

*2: Provided on European models and Russian package models

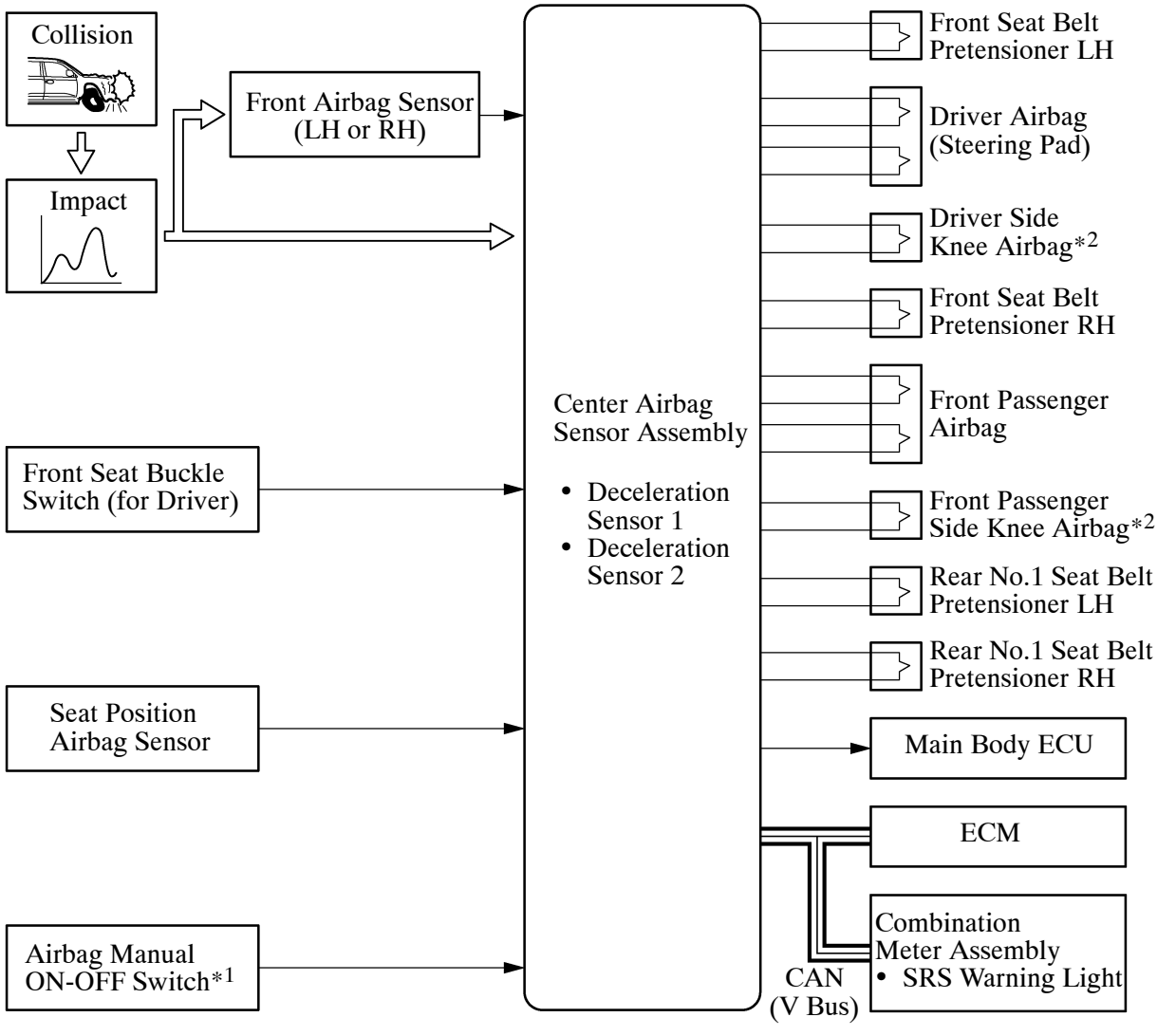
■AIRBAG FOR FRONTAL COLLISION

1. General

- In conjunction with their impact absorbing structure for frontal collisions, the driver and front passenger dual-stage SRS airbags and the driver side and front passenger side knee airbags* deploy simultaneously and are supplements to the seat belts. The driver and front passenger dual-stage SRS airbags have been designed to help reduce injuries to the head and chest in the event of a frontal collision. The driver and passenger knee airbags* restrict the lower parts of the occupants' bodies, thus enhancing the excellent passenger protection provided by the seat belts and front airbags.
- A deceleration sensor is provided in the front airbag sensor and the center airbag sensor assembly. Due to 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.

*: Provided on models with SRS knee airbags

▶ Front Airbag Operation ◀



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*1: Provided on European models and Russian package models
*2: Provided on models with the SRS knee airbag

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2. Dual-stage SRS Airbag System

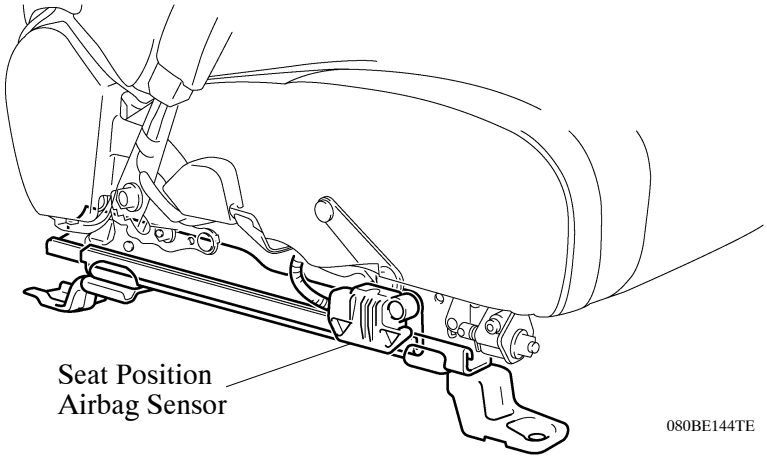
General

In this system, when the front airbag sensors and center airbag sensor assembly detect a front collision, the center airbag sensor assembly judges the extent of impact, seat position, and whether or not the seat belts are fastened, thus optimizing the airbag inflating output by delaying the inflation timing of the 2nd initiator and the 1st initiator.

Seat Position Airbag Sensor

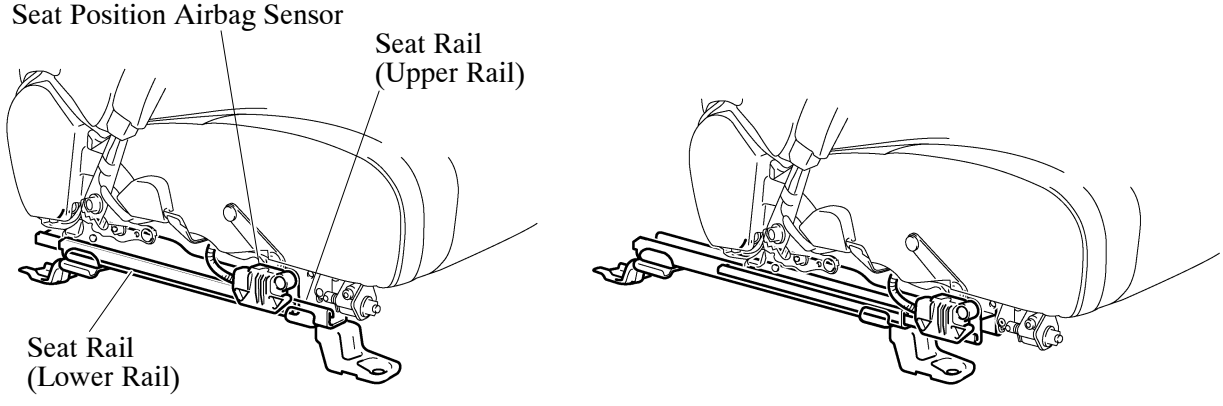
1) General

The seat position airbag sensor is mounted on the upper rail portion of the driver seat rail, and includes a Hall IC and a magnet. This sensor is used to detect the sliding position of the driver seat.



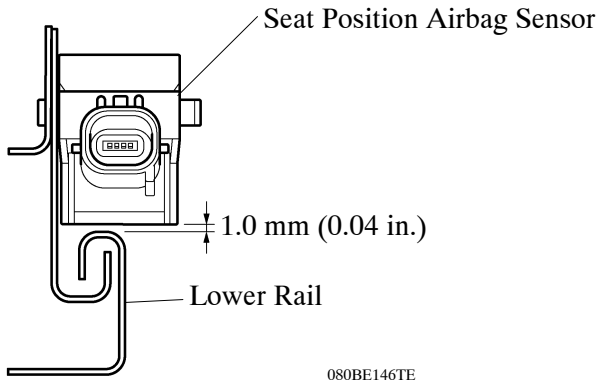
2) Operation

When the seat is in the rearward position, the lower rail portion of the seat rail is close to the seat position airbag sensor. When it is in the forward position, the distance between the lower rail portion and the sensor becomes larger.
Thus, the magnetic flux of the magnet inside the seat position airbag sensor varies depending on the seat position. The Hall IC detects this variation and outputs signals to the center airbag sensor assembly.



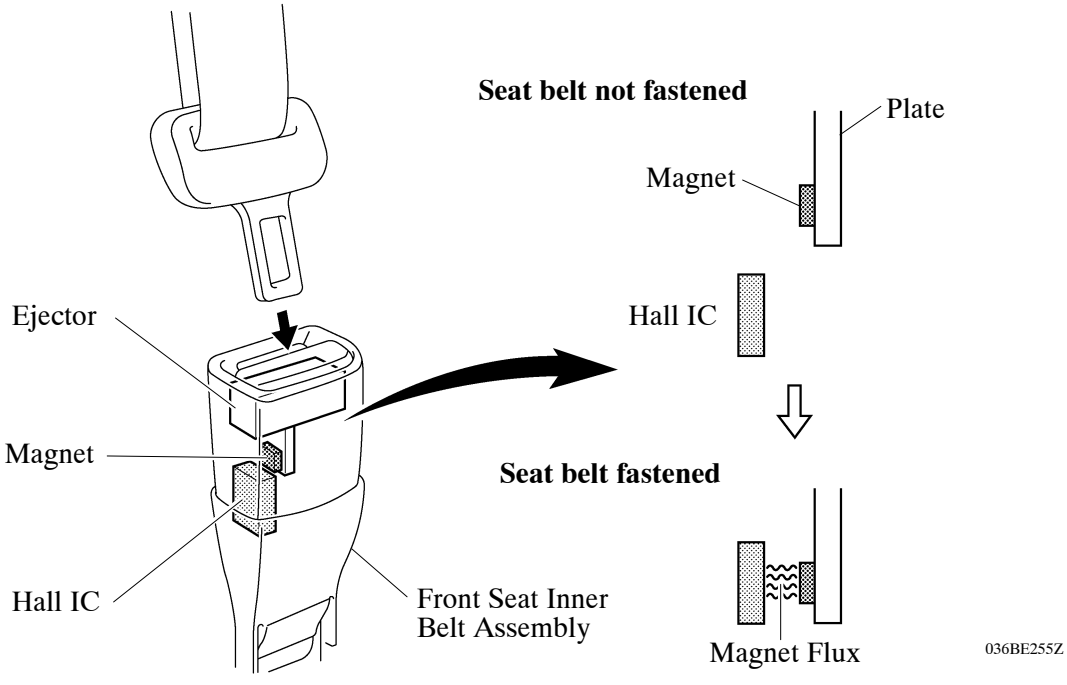
Service Tip

Follow the procedure indicated below to install the seat position airbag sensor.
1) Insert a 1.0 mm (0.04 in.) feeler gauge between the seat position sensor and the lower rail portion.
2) Tighten the mounting bolt to the specified torque with the seat position sensor pushed down as shown.
For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).



Front Seat Buckle Switch

- The front seat buckle switch detects whether or not the seat belt is fastened.
- The non-contact type switch is composed of a Hall IC and magnet, installed into the front seat inner belt assembly.
- The ejector inside the front seat inner belt assembly and the plate installed to the ejector move when the seat belt is removed or inserted. The movement of the plate changes the magnetic flux density of the magnet.
- The Hall IC detects changes in the magnetic flux density in accordance with the seat belt removal or insertion and outputs the front seat buckle switch signal for the driver seat to the center airbag sensor assembly.



3. SRS Driver and Front Passenger Airbag

SRS driver and front passenger airbags contain 2 sets of initiators and propellants. The center airbag sensor assembly helps optimize the airbag inflation speed by controlling the inflation timing of these initiators.

4. SRS Knee Airbag

The knee airbags deploy simultaneously with the front airbags in a frontal collision. With the deployment of the knee airbags, the driver and front passenger's lower bodies are restricted, thus enhancing the excellent the passenger protection provided by the seat belts and front airbags.

5. Front Airbag Sensor

Front airbag sensor uses an electrical type deceleration sensor. Based on the deceleration of the vehicle during a frontal collision, distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be accurately detected.

■AIRBAG FOR SIDE / REAR SIDE COLLISION

1. General

The airbag deployment during side collisions is shown in the tables below.

▶ Airbag For Side Collision ◀

○: Deployed —: Not deployed

Collision Detecting Sensor	Front Seat Side Airbag	Rear Seat Side Airbag	Curtain Shield Airbag
• Side Airbag Sensor • Rear Floor Side Airbag Sensor	○	○	○

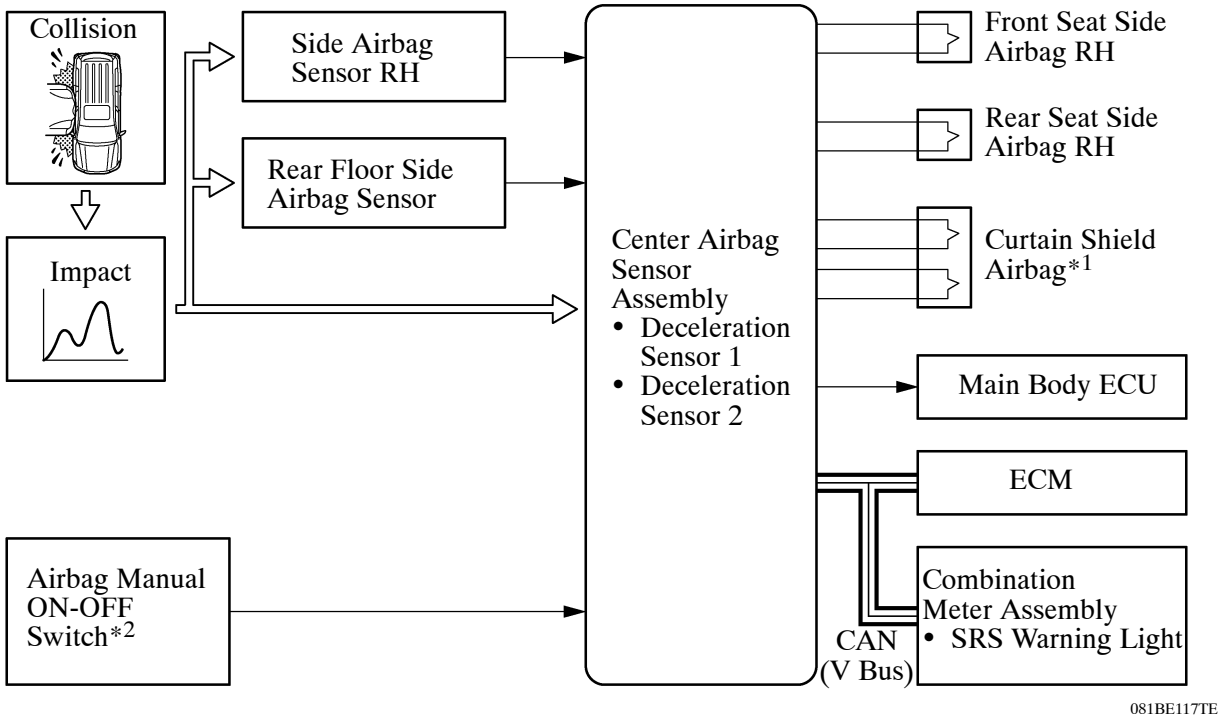
▶ Airbag For Rear Side Collision ◀

○: Deployed —: Not deployed

Collision Detecting Sensor	Front Seat Side Airbag	Rear Seat Side Airbag	Curtain Shied Airbag
• Rear Airbag Sensor • Rear Floor Side Airbag Sensor	—	○	○

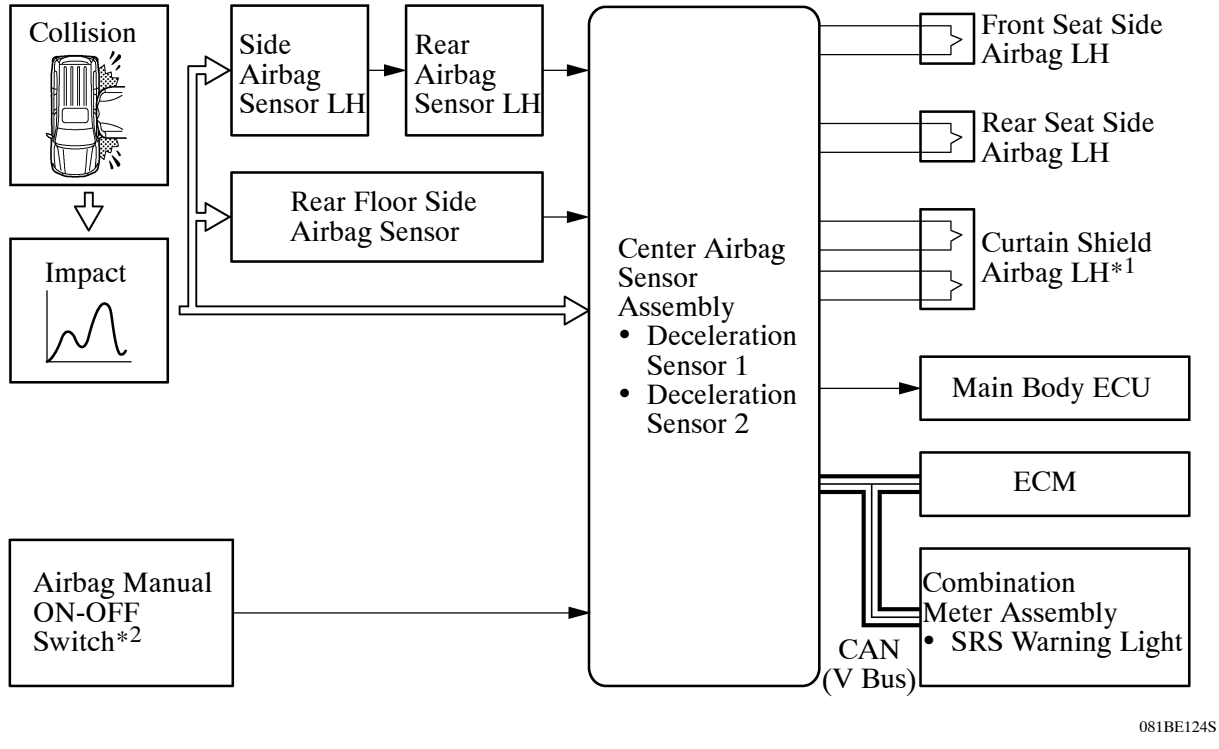
2. Airbags for Side Collision

▶ System Operation for Right Side Collision ◀



*1: For 8-seater models
*2: Provided on European models and Russian package models

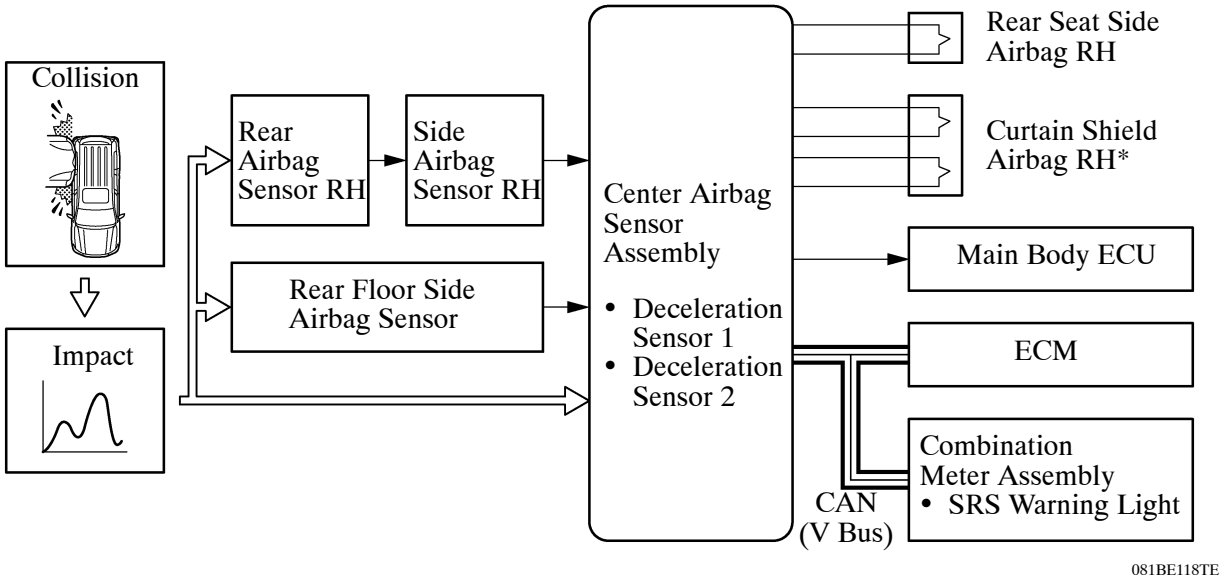
▶ System Operation for Left Side Collision ◀



*1: For 8-seater models
*2: Provided on European models and Russian package models

3. Airbags for Rear Side Collision

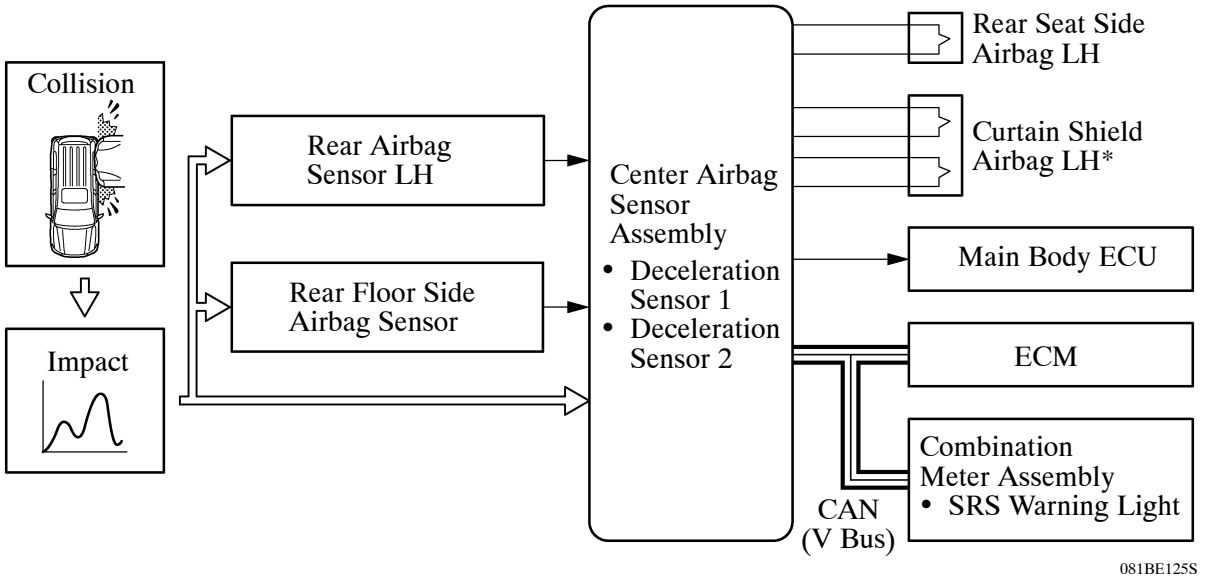
▶ System Operation for Rear Right Side Collision ◀



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*: Provided on European models and Russian package models

▶ System Operation for Rear Left Side Collision ◀



081BE125S

*: Provided on European models and Russian package models

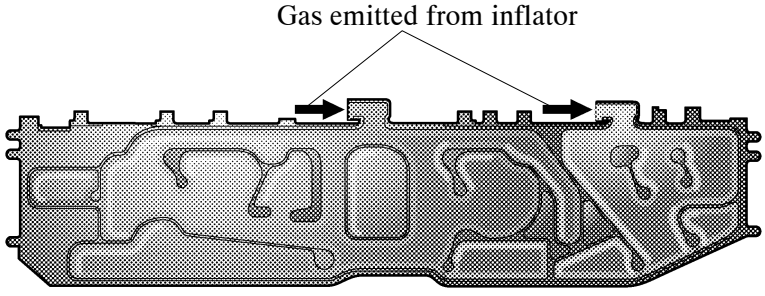
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4. SRS Front Side Airbag and SRS Rear Side Airbag

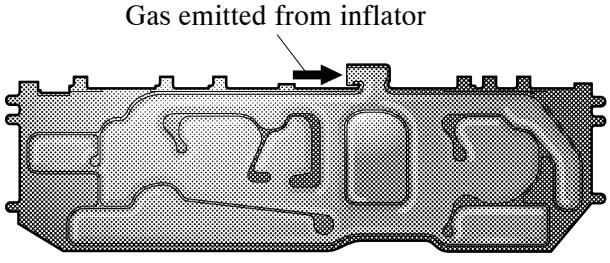
SRS front side airbags are installed into the seat backs of the driver and front passenger seats. SRS rear side airbags are installed into the outer passenger seat backs of the rear No.1 seat. Each SRS airbag is a one-piece design, consisting of an inflator, a bag, and a cover.

5. SRS Curtain Shield Airbag

- 2 types of SRS curtain shield airbags are available: 8-seater and European 5-seater types.
- 8-seater type SRS curtain shield airbags extend from the driver's and front passenger's front pillar to the rear pillar behind the rear No.2 seat and help to reduce injuries to the occupants on the front seats, rear No.1 seat and rear No.2 seat.
- 5-seater type SRS curtain shield airbags extend from the front pillar to the quarter pillar behind the rear No.1 seat and help to reduce injuries to the occupants on the front seats and rear No.1 seat. Each SRS airbag consists of an inflator, a bag and a cover.



7 & 8-seater Models



European 5-seater Models

081BE119TE

6. Front, Rear, and Rear Floor Side Airbag Sensors

A deceleration sensor is enclosed in front side airbag, rear side airbag, and rear floor side airbag sensor. Based on the change of acceleration of the sensor during a side or side rear collision, distortion is created in the sensor and converted into an electrical signal.

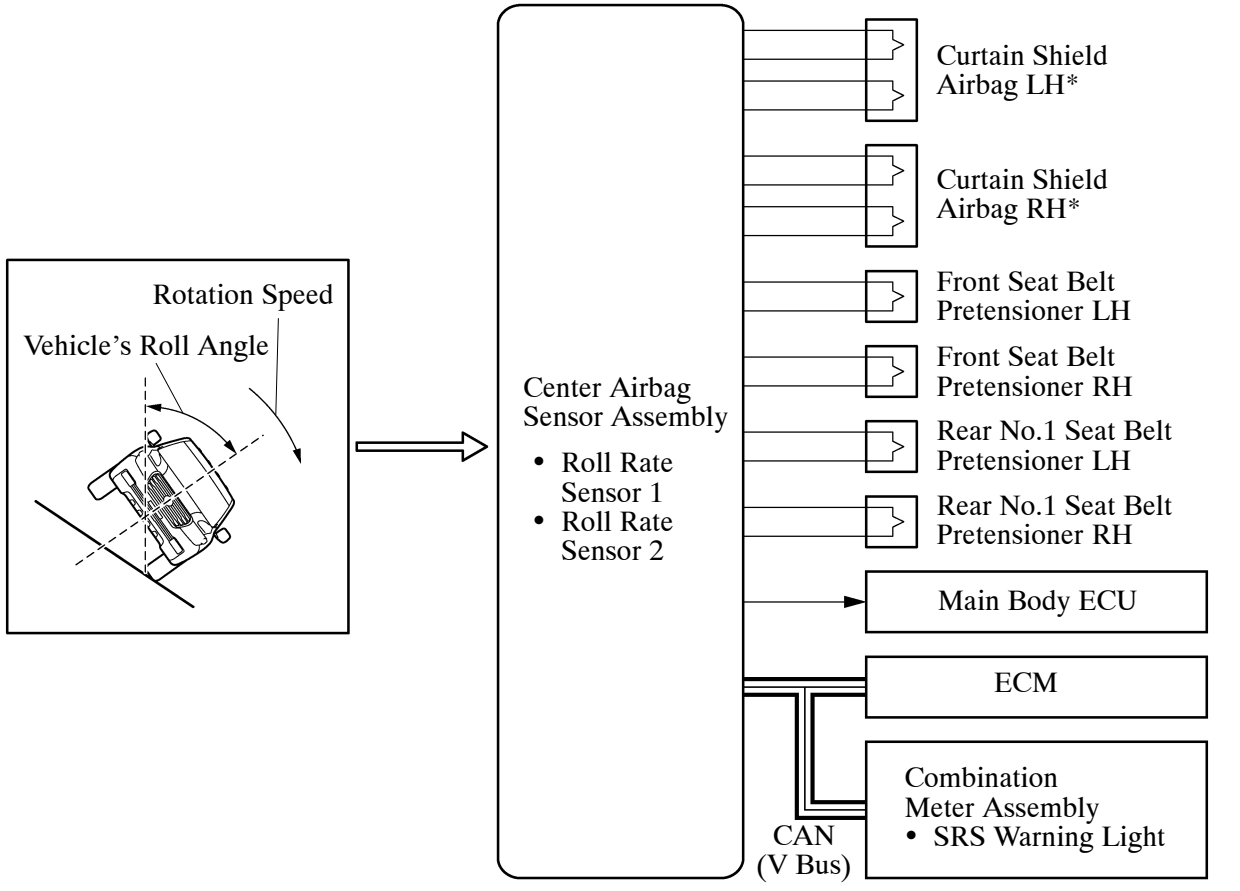
■AIRBAG FOR ROLL OVER

1. General

If the vehicle is rolling sideways, the RSCA (Roll Sensing Curtain Shield Airbags) helps to reduce the impact applied to the occupants by operating the seat belt pretensioners for the driver, front passenger and rear No.1 seat outer passengers and the left and right curtain shield airbags.

- If the vehicle rolls over due to an incline, the 2 roll rate sensors built into the center airbag sensor assembly detect the vehicle's roll angle and rotation speed.

▶ System Operation ◀



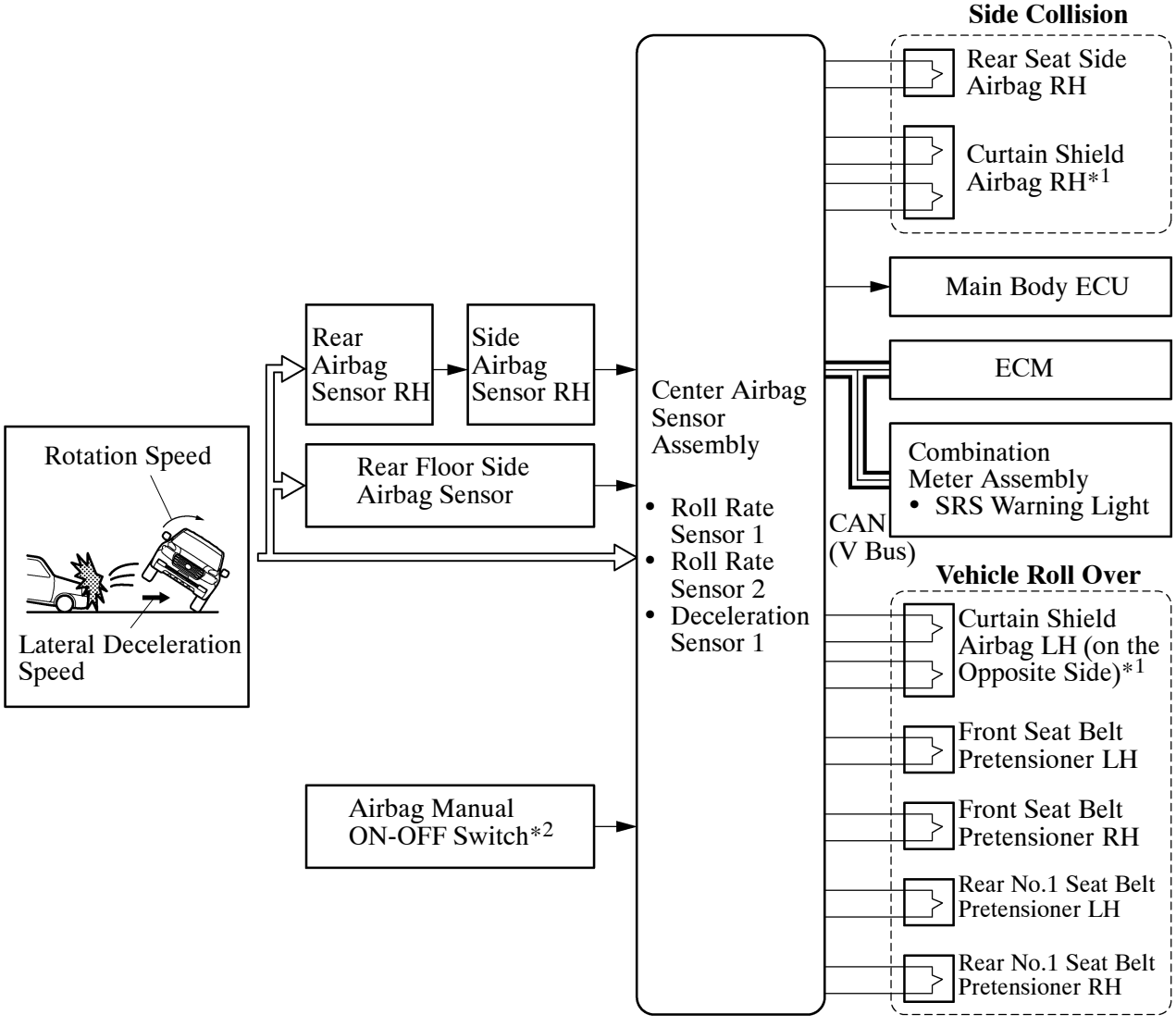
Roll over due to an incline 081BE120TE

*: For 8-seater models

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- If the vehicle has rolled over due to a side collision, the side airbag sensor or rear airbag sensor detects the impact of the collision and deploys the front or rear seat side airbag and curtain shield airbag on the side which experienced the collision. By detecting the roll over using 2 roll rate sensors and deceleration sensor 1 which can detect lateral deceleration, the center airbag sensor assembly activates the seat belt pretensioners for the driver, front passenger and rear No.1 seat outer passengers and deploys the curtain shield airbag on the opposite side of the collision.

▶ System Operation ◀



Roll over during rear right collision 081BE121TE

*1: For 8-seater models

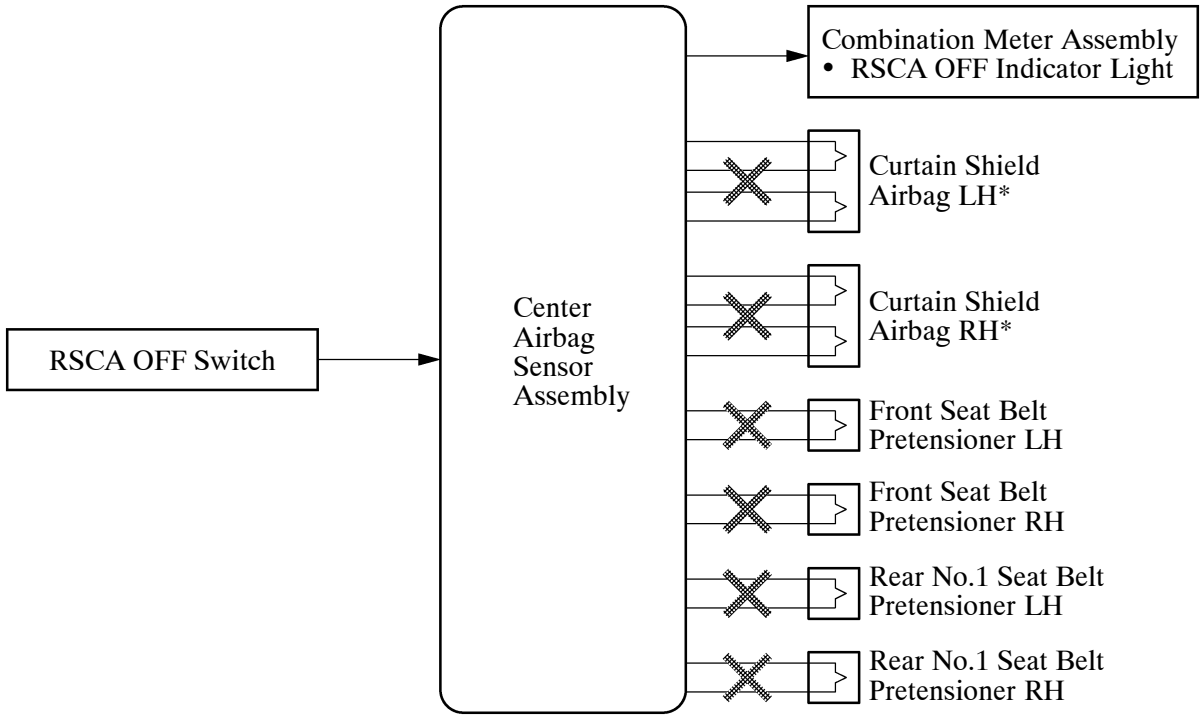
*2: Provided on European models and Russian package models

2. RSCA OFF Switch

In consideration of off-road driving, an RSCA OFF switch is used to enable the driver to cut off the RSCA control at will.

- If the RSCA OFF switch remains pressed for approximately 2 or more seconds, the center airbag sensor assembly cuts off the operation of the RSCA.
- In the case of a side collision, the center airbag sensor assembly will operate the curtain shield airbags regardless of whether the RSCA OFF switch is ON or OFF.

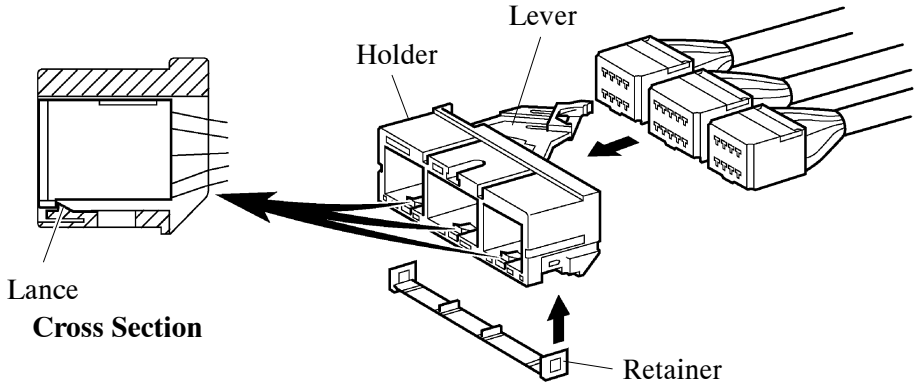
▶ System Diagram ◀



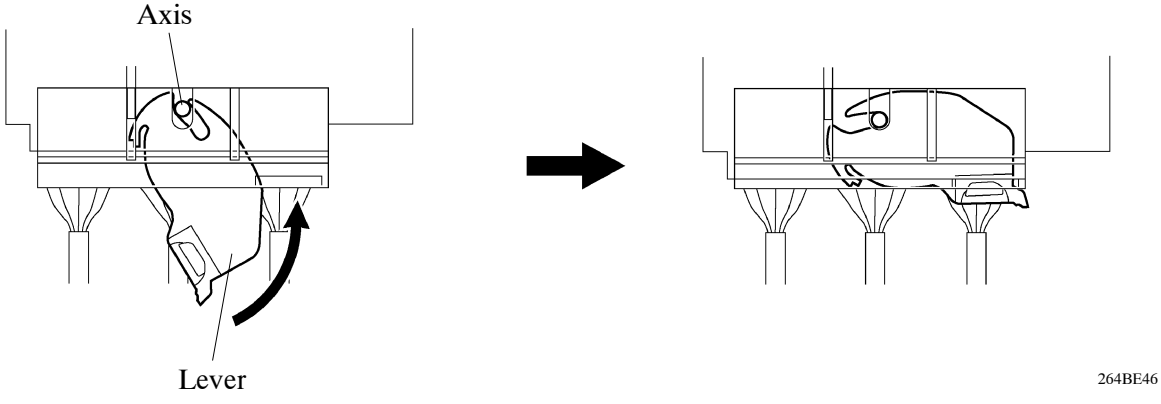
*: For 8-seater models

■ IMPROPER CONNECTION PREVENTION LOCK MECHANISM

- This improper connection prevention lock mechanism consists of the center airbag sensor assembly and the holder.
- The center airbag sensor assembly has a connector lock pin.
- The holder has a lever with a lock groove. The holder and the connectors are locked via a retainer and a lance.

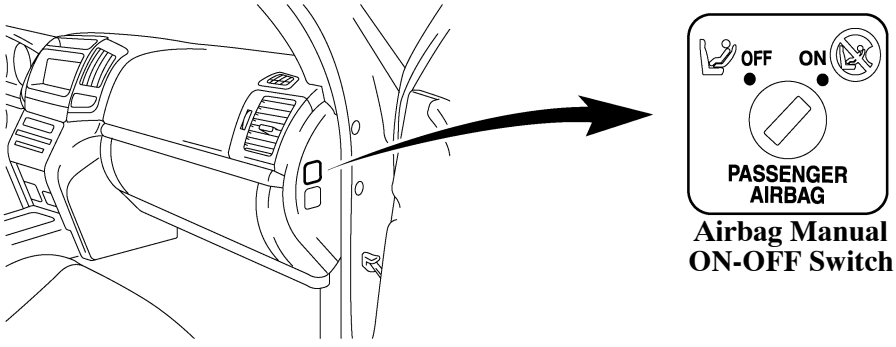


- When connecting the holder and connectors to the center airbag sensor assembly, the lever is pushed into position end by rotating it around the axis of the connector lock pin in order to lock the holder securely.



■AIRBAG MANUAL ON-OFF SWITCH

- An airbag manual ON-OFF switch is provided as standard equipment on European models and Russian package models to disable the deployment of the front passenger airbag, front passenger side knee airbag, and front passenger side airbag (front seat side airbag RH). This switch can be used if the deployment of those airbags is inconvenient.
- This switch is located on the side surface of the instrument panel on the front passenger side. It can be turned to ON or OFF by using the key (mechanical key), which is supplied with the key (electronic key). Once the airbag manual ON-OFF switch is turned to OFF, the front passenger airbag, front passenger side knee airbag and front passenger side airbag will be disabled, regardless of the collision conditions.
- If the deployment of the passenger airbag has been disabled, the front passenger airbag OFF indicator light in the clock assembly illuminates to inform the occupant.



Airbag Manual ON-OFF Switch

081BE122TE

■CENTER AIRBAG SENSOR ASSEMBLY

- When the airbag system reaches a decision to deploy the airbags based on the signals detected by the front airbag sensors and the center airbag sensor assembly, it deploys the driver and front passenger dual-stage SRS airbags, driver knee airbag, front passenger knee airbag, and seat belt pretensioners. When the airbag system reaches a decision to deploy the airbags based on the signals detected by the side airbag sensors, rear airbag sensors, rear floor side airbag sensor, and center airbag sensor assembly, it deploys the SRS front side airbags, rear side airbags, and SRS curtain shield airbags. Furthermore, it is equipped with a diagnosis function to perform self-diagnose system malfunctions.
- The center airbag sensor assembly has 4 built-in sensors: Deceleration sensor 1 detects vehicle deceleration in the lateral direction in addition to the longitudinal direction, deceleration sensor 2 detects deceleration in the longitudinal direction, and the 2 roll rate sensors detect angular velocity in the roll direction.
- Each signal is transmitted as follows:

Target ECU	Signal	Communication Path
ECM	Collision Detection Signal	CAN Communication Circuit
Combination Meter Assembly	• Driver Front Seat Buckle Switch ON Demand Signal • SRS Warning Light ON Demand Signal	CAN Communication Circuit

*: Provided on models with SRS curtain shield airbags

■DIAGNOSIS

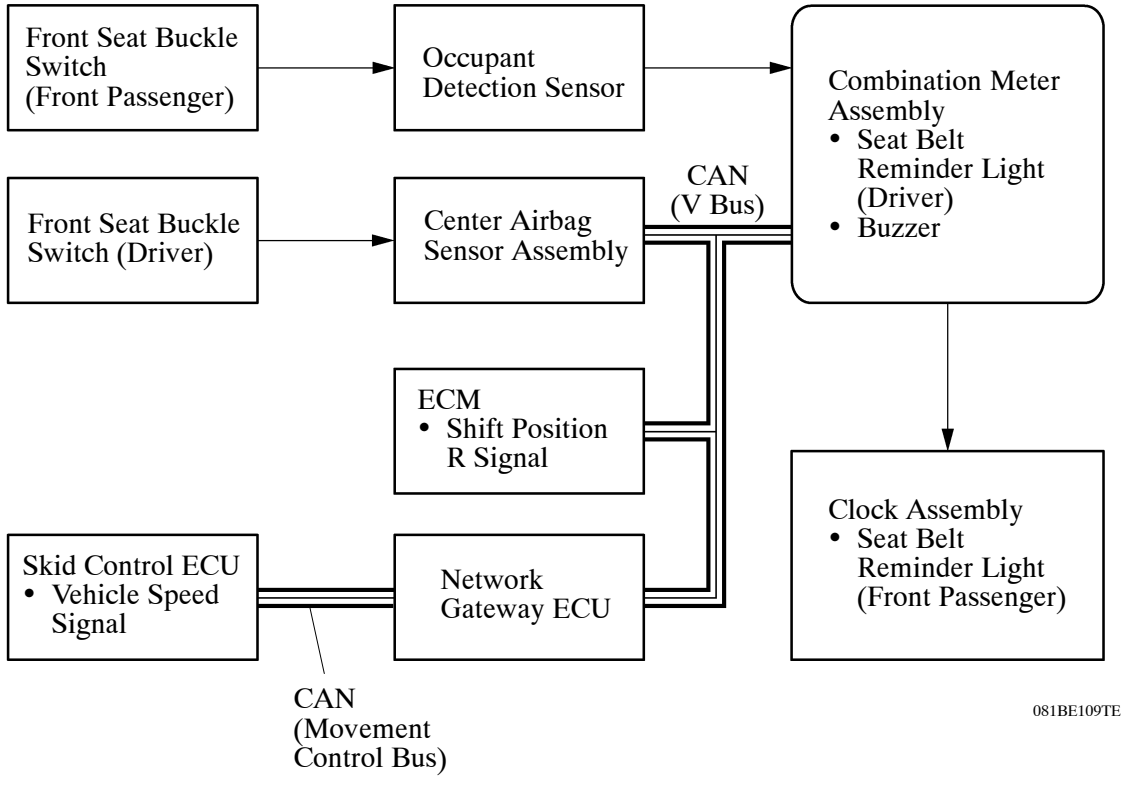
- If the center airbag sensor assembly detects a malfunction in the SRS airbag system, the center airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light.
  - There are 2 types of DTC for the SRS airbag system: 5-digit and 2-digit.
  - The 5-digit DTC can be read by connecting an intelligent tester II to DLC3.
  - The 2-digit DTC can be read by connecting the SST (09843-18040) to the TC and CG terminals of the DLC3 and reading the blinking of the SRS warning light.
  - If the SRS airbags deploy, the center airbag sensor assembly will turn ON the SRS warning light. If the SRS airbags deploy, the center airbag sensor assembly will turn ON the SRS warning light and stores a DTC. The SRS warning light can be turned OFF only by replacing the center airbag sensor assembly with a new one.

SEAT BELT REMINDER SYSTEM

■ DESCRIPTION

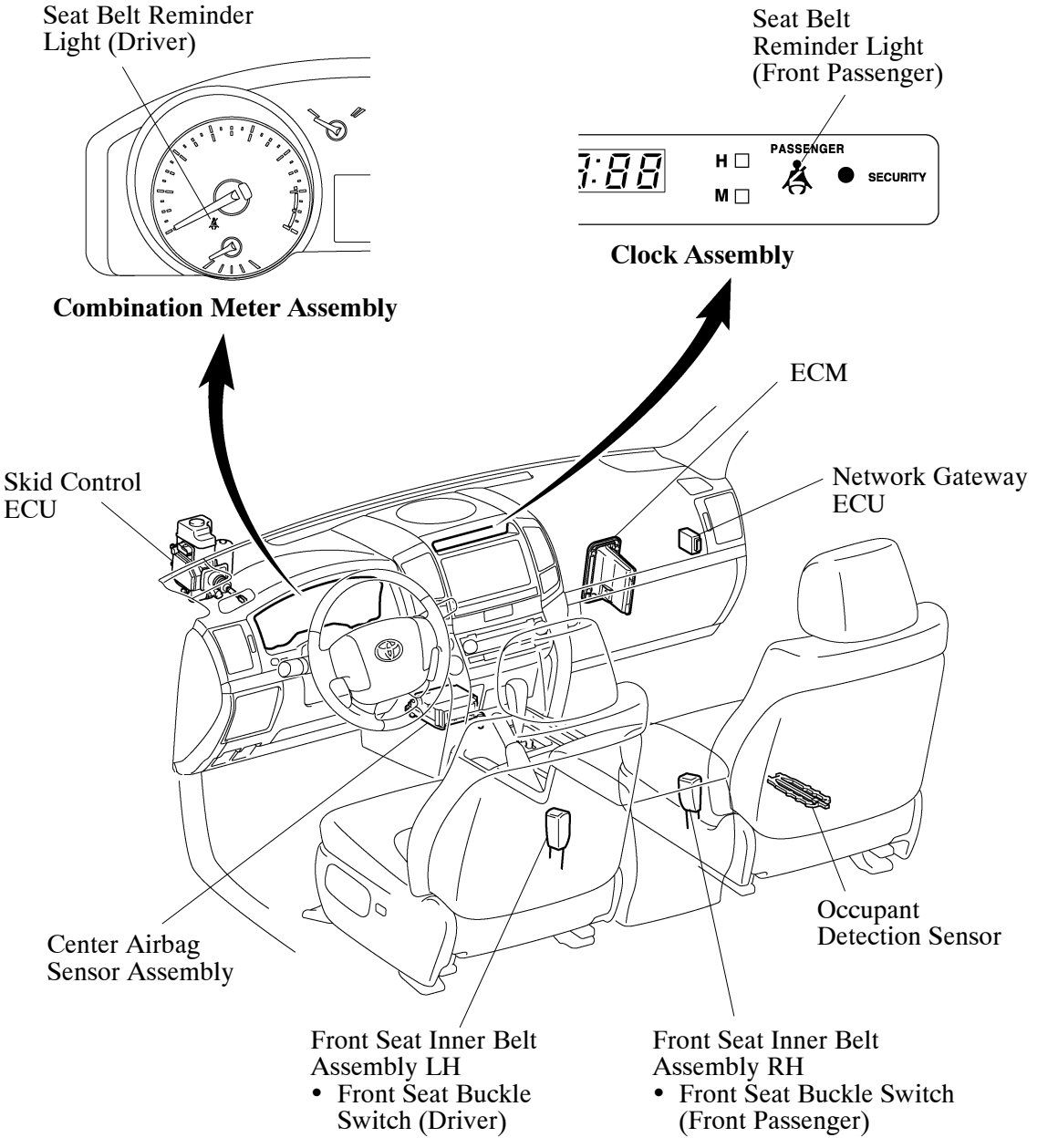
- The seat belt reminder system is standard equipment on all models.
- If a seat belt is not fastened, this system flashes the seat belt reminder light or sounds the buzzer in the combination meter assembly as a reminder.
- When the engine switch is turned on (IG), this system detects the condition of the seat belts based on the signals from the front seat buckle switches (for the driver and front passenger) and the occupant detection sensor.

▶ System Diagram ◀



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■ LAYOUT OF MAIN COMPONENTS

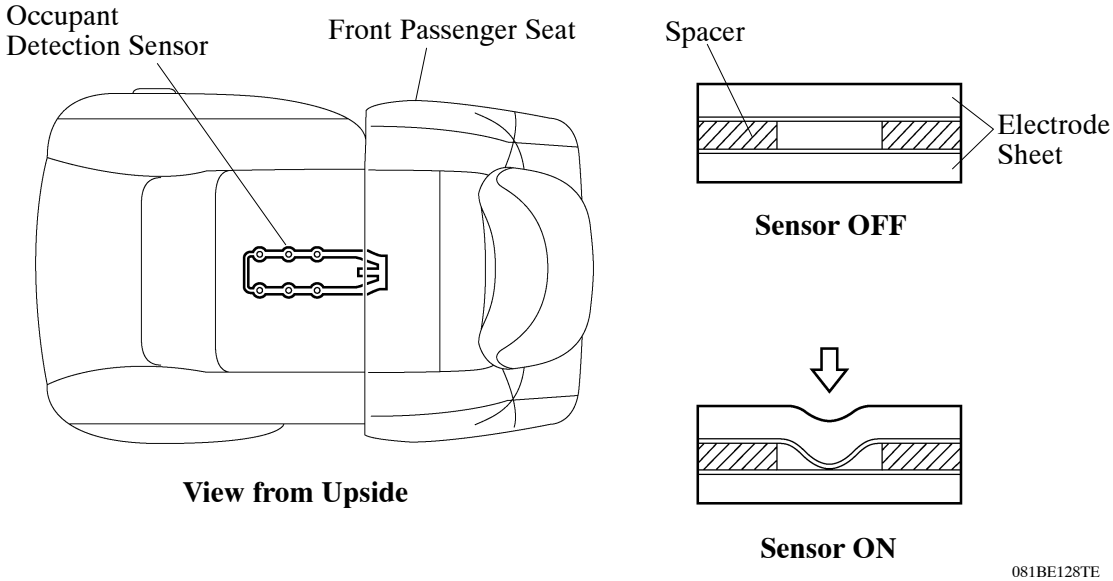


LHD Models

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■OCCUPANT DETECTION SENSOR

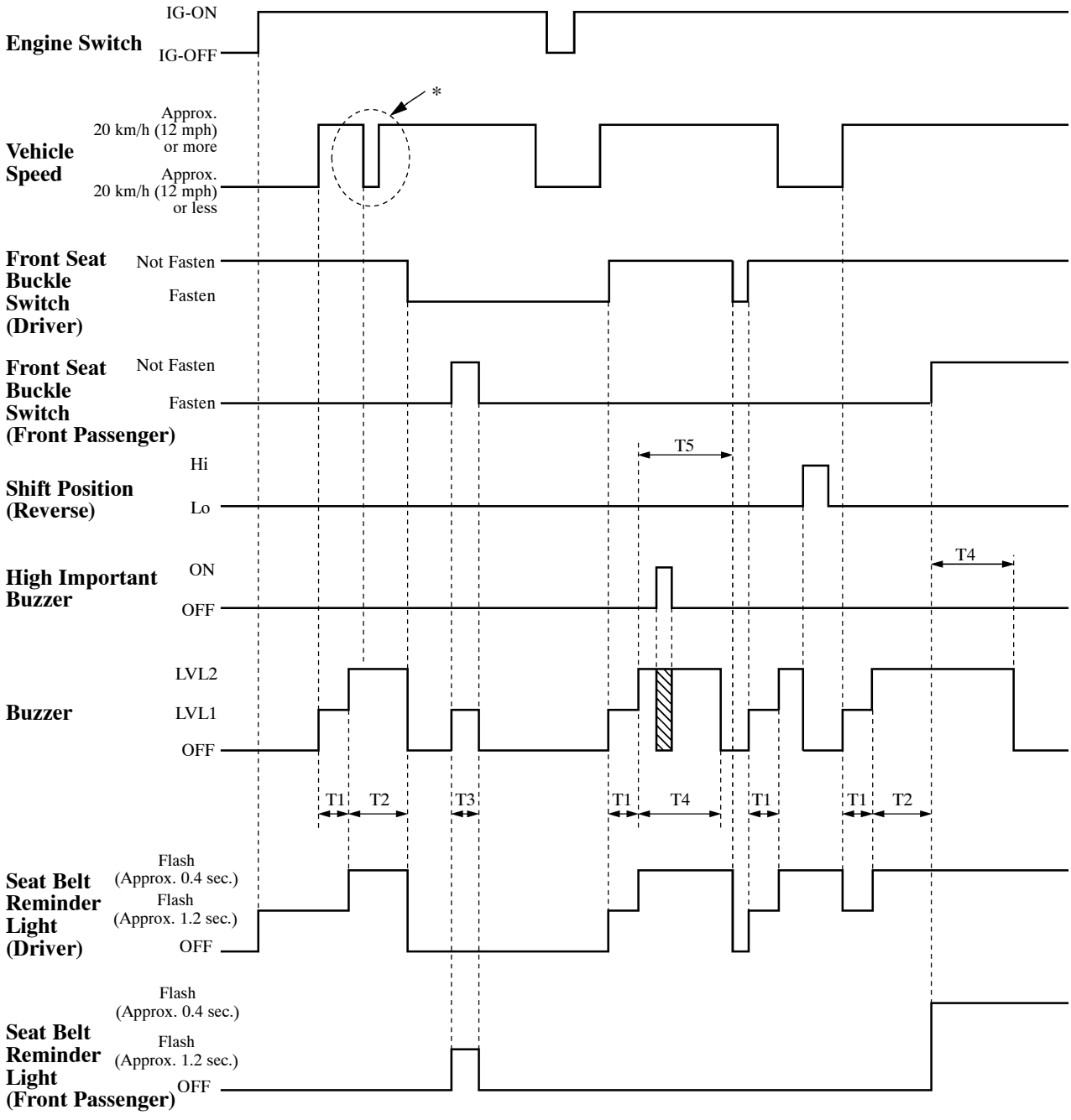
The occupant detection sensor, which is enclosed in the seat cushion of the front passenger seat, is used to detect whether or not the front passenger seat is occupied.
This sensor, which is shaped as illustrated below, consists of a construction in which 2 sheets of electrodes sandwich a spacer. When the occupant is seated, the electrode sheets come in contact with each other through the hole that is provided in the spacer portion, thus enabling the current to flow. As a result, the center airbag sensor assembly detects the presence of the occupant.



■ REMINDER METHOD

The timing chart of the buzzer and details of the reminder method are shown below.

▶ Timing Chart ◀



081BE111TE

T1: Approximately 30 seconds
T2: Approximately 90 seconds or less
T3: Approximately 30 seconds or less
T4: Approximately 90 seconds
T5: Approximately 90 seconds or more

*: If the vehicle speed drops below the setting level for seat belt warning after a buzzer begins to sound, the buzzer will continue to sound. After the vehicle speed exceeds approximately 20 km/h (12 mph) again, the buzzer will stop.

PRE-CRASH SAFETY SYSTEM

■ DESCRIPTION

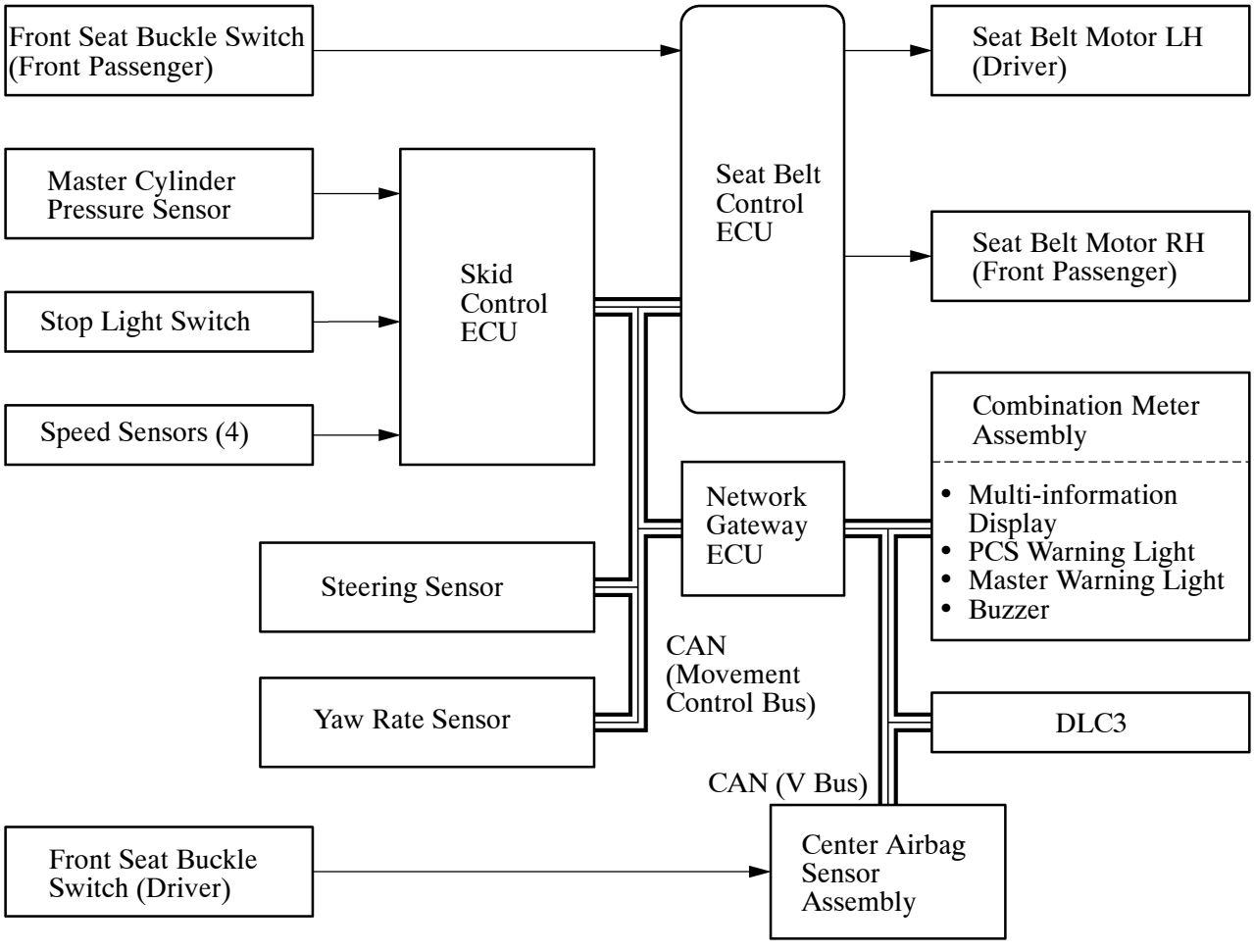
- The pre-crash safety system is available as an option on all European models.
- The pre-crash safety system retracts the slack in the front seat belts when any of the conditions below are present to reduce injury to the driver and front passenger.

Operating Conditions	• When the brakes are suddenly applied. • When the front wheels lose grip in relation to the rear wheels (front wheel skid tendency). • When the rear wheels lose grip in relation to the front wheels (rear wheel skid tendency).

- This system will not operate under the following conditions.

Non-operating Conditions	• The seat belt is not buckled. • The vehicle speed is approximately 30 km/h (20 mph) or less. • The engine switch is off or on (ACC). • Multi-information display in the combination meter assembly displays **Check PCS System** or **PCS Not available now** warning messages.

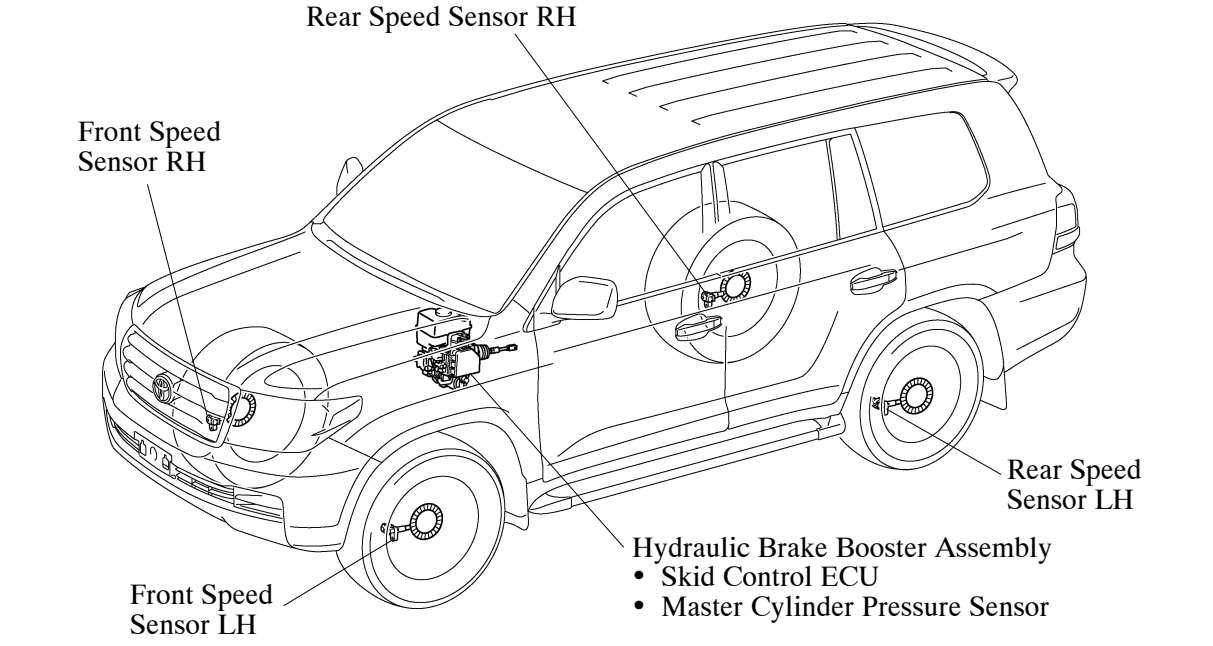
▶ System Diagram ◀

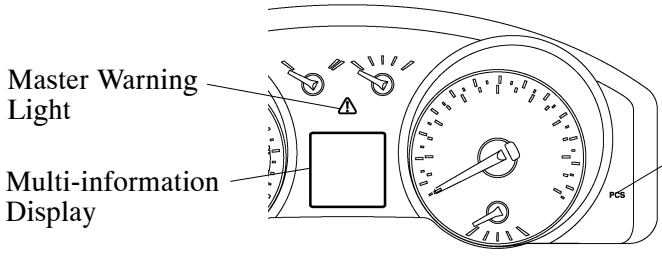


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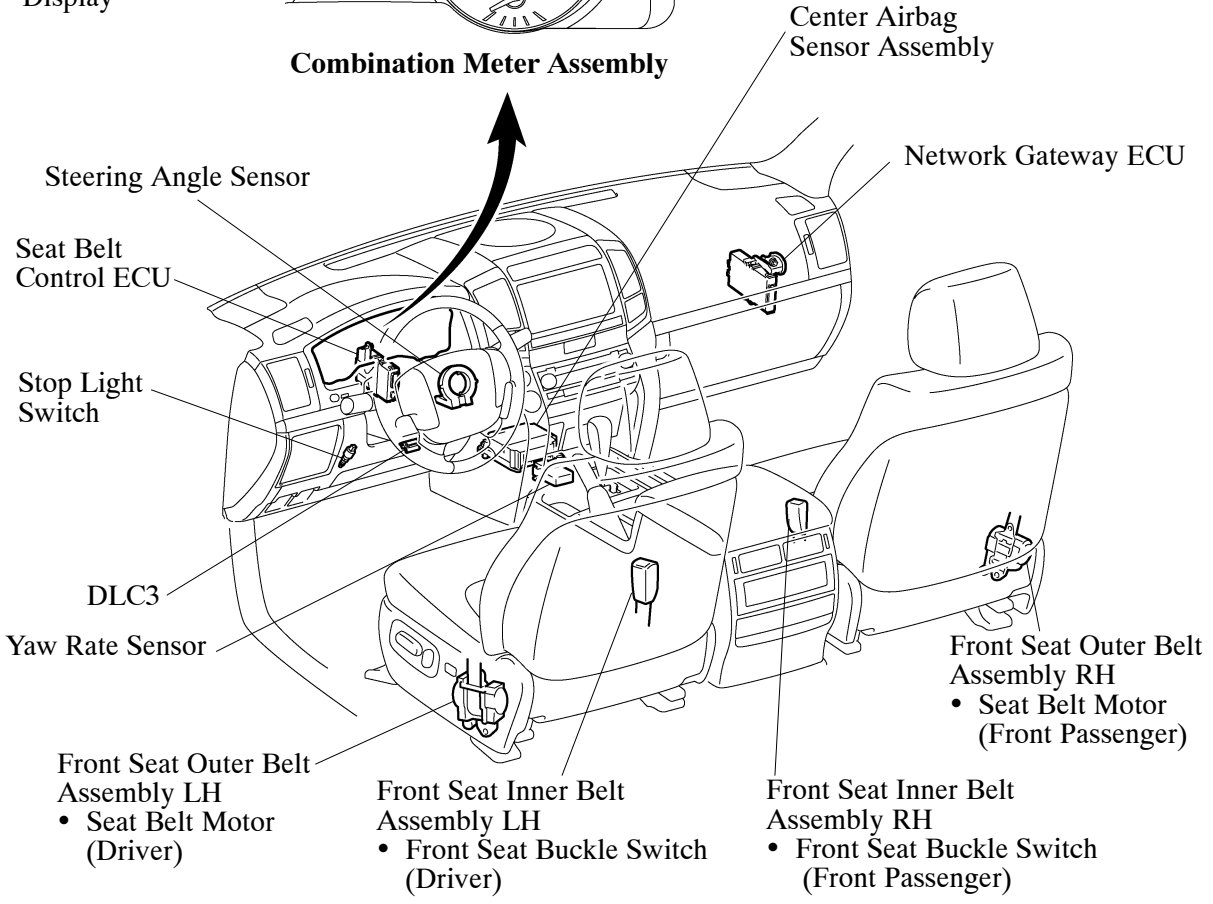
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■ LAYOUT OF MAIN COMPONENTS





Combination Meter Assembly



LHD Models

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■FUNCTION OF MAIN COMPONENTS

1. General

Item		Function
Combination Meter Assembly	PCS Warning Light	Illuminates or flashes to warn the driver in accordance with signals from the seat belt control ECU.
	Multi-information Display	Displays a warning message to inform or warn the driver of the system condition in accordance with signals from the seat belt control ECU.
	Master Warning Light	Illuminates to warn the driver in accordance with signals from the seat belt control ECU.
	Buzzer	Sounds on to warn the driver in accordance with signals from the skid control ECU.
Front Seat Outer Belt		Retracts the seat belt in accordance with signals received from the seat belt control ECU.
	Seat Belt Motor	
Front Seat Inner Belt (Driver)		Detects the condition (verifies if the belt is buckled) of the driver seat belt and transmits a signal to the center airbag sensor assembly.
	Front Seat Buckle Switch	
Front Seat Inner Belt (Front Passenger)		Detects the condition (verifies if the belt is buckled) of the front passenger seat belt and transmits a signal to the seat belt control ECU.
	Front Seat Buckle Switch	
Seat Belt Control ECU		• Receives the seat belt operation request signal from the skid control ECU and operates the seat belts. • If the seat belt control ECU detects a malfunction in the pre-crash safety system, it will store DTC (Diagnostic Trouble Code).
Hydraulic Brake Booster Assembly	Skid Control ECU	• Determines if the brakes have been applied suddenly through signals received from the master cylinder pressure sensor, and outputs a seat belt operation signal to the seat belt control ECU. • Determines the occurrence of a front or rear wheel skid tendency, and outputs a seat belt operation signal to the seat belt control ECU.
	Master Cylinder Pressure Sensor	Detects the master cylinder pressure and transmits a signal to the skid control ECU.
Network Gateway ECU		Transmits signals between the movement control bus and the V bus through CAN communication.
Stop Light Switch		Detects if the brake pedal is pressed and transmits a signal to the skid control ECU.
Speed Sensor (4)		Detects the wheel speed and transmits the signals to the skid control ECU.
Yaw Rate Sensor		Detects the yaw rate and lateral/longitudinal deceleration of the vehicle and transmits the signals to the skid control ECU.
Steering Sensor		Detects the angle and direction of steering and transmits the signals to the skid control ECU.

Service Tip

When the seat belt control ECU is replaced, an active test of the seat belt motor must be performed in accordance with the following procedure to check that the motor operates properly.

(1) Turn the engine switch on (IG).
(2) Monitor the PCS warning light for at least 3 seconds after turning the engine switch on (IG). Make sure that the warning light does not remain on.
(3) Connect an intelligent tester II to the DLC3 and enter the active test mode.
(4) Perform an active test of the seat belt motor and check that the motor operates properly.

For details, refer to the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

2. Combination Meter Assembly

- The master warning light, PCS warning light, warning message of the multi-information display, and buzzer in the combination meter assembly warn the driver of the abnormal or poor conditions of the pre-crash safety system.
- Two types of warning messages are used for the pre-crash safety system, as described below. The pre-crash safety system will not operate when these messages appear in the combination meter assembly.

Warning Message	Detail	0150BE35C	PCS 01YBE200P	Buzzer	DTC
 080BE102TE	This message appears when the seat belt control ECU detects a system malfunction.	Illuminate	Illuminate	Sounds once	○
 080BE103TE	This message appears when the seat belt control ECU overheats. After this condition has been resolved, the system will operate normally.	—	Flash	Sounds once	×

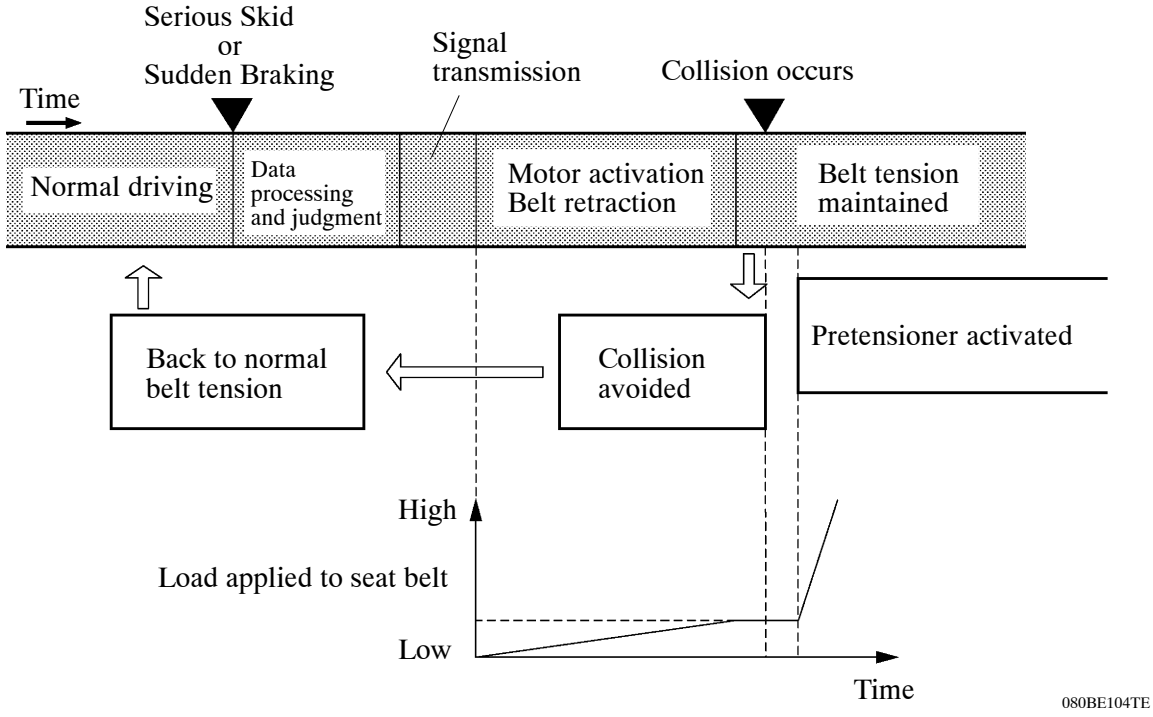
○: Repair is required / DTC are output
×: Repair is not required / DTC are not output
—: Not available

■SYSTEM OPERATION

1. General

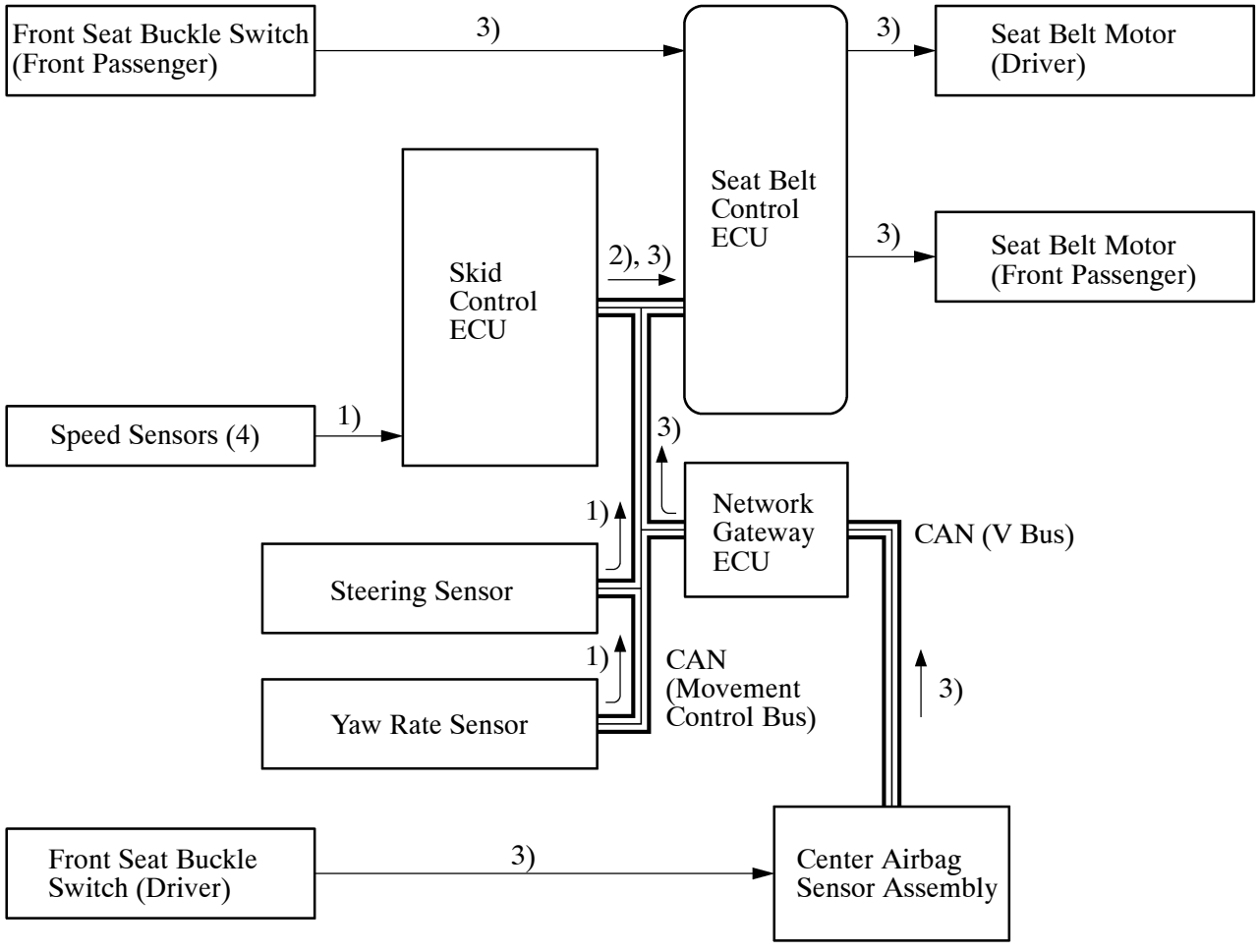
Upon receiving signals from the skid control ECU which indicate that a serious skid is occurring or that the brakes have been applied suddenly, the seat belt control ECU retracts the front seat belts to reduce possible injury to the driver and front passenger.

▶ Operation Flow ◀



2. Serious Vehicle Skid Operation

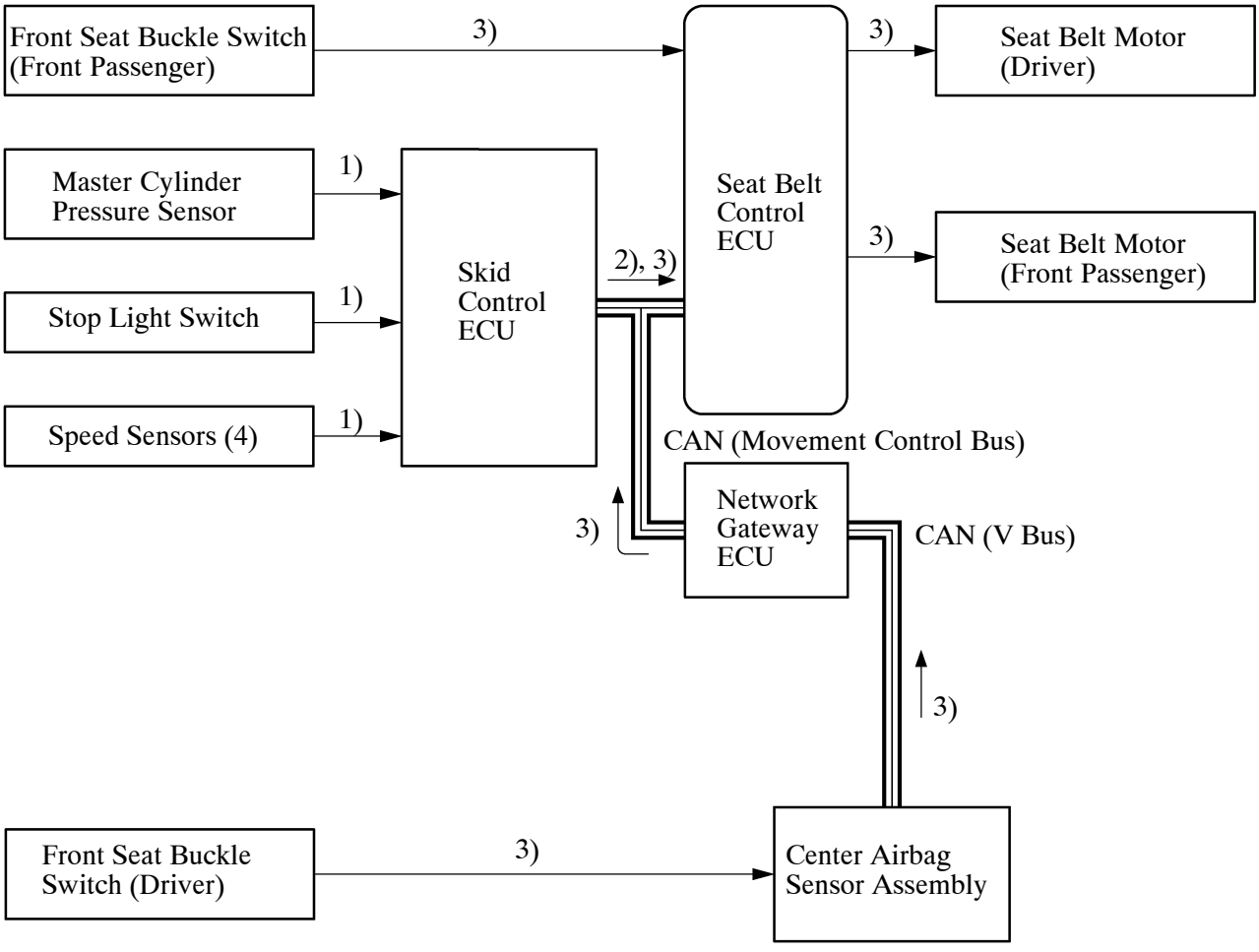
1) While the vehicle is traveling at approximately 30 km/h (20 mph) or above, the skid control ECU determines if skid recovery will be difficult based on the signals from the steering angle sensor, yaw rate sensor, and speed sensors.
2) The skid control ECU sends a seat belt operation request signal to the seat belt control ECU.
3) The seat belt control ECU determines the seat belt motor operation conditions based on this signal and the front seat buckle switch signal. Then, it retracts the slack in the seat belts by operating the seat belt motors.
4) The seat belts return to a normal state when the relevant conditions of the vehicle have stabilized.



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3. Sudden Braking Operation

1) While the vehicle is traveling at approximately 30 km/h (20 mph) or above, the skid control ECU can determine a sudden braking condition based on the signals from the master cylinder pressure sensor, stop light switch, and speed sensors.
2) At this time, the skid control ECU outputs a seat belt operation request signal to the seat belt control ECU.
3) The seat belt control ECU determines the seat belt motor operation conditions based on this signal and the front seat buckle switch signal. Then, it retracts the slack in the seat belts by operating the seat belt motors.
4) The seat belts return to a normal state when the brake pedal is released.



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■ DIAGNOSIS

1. General

The diagnosis circuit of the pre-crash safety system is integrated in the seat belt control ECU. This ECU detects malfunctions that may occur in the system in accordance with the signals provided by the ECUs and the sensors. The diagnosis function consists of an initial check, monitor, and DTC output functions.

2. Initial Check Function

The seat belt control ECU performs an initial check on the system for approximately 3 seconds after the engine switch has been turned on (IG).

3. Monitor Function

After completing the initial check, the pre-crash safety system becomes ready to operate. During this time, the seat belt control ECU periodically monitors the system for any malfunctions.

4. DTC Output Function

- If the seat belt control ECU detects a malfunction in the pre-crash safety system, it stores 5-digit DTC (Diagnostic Trouble Code) in memory.
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.

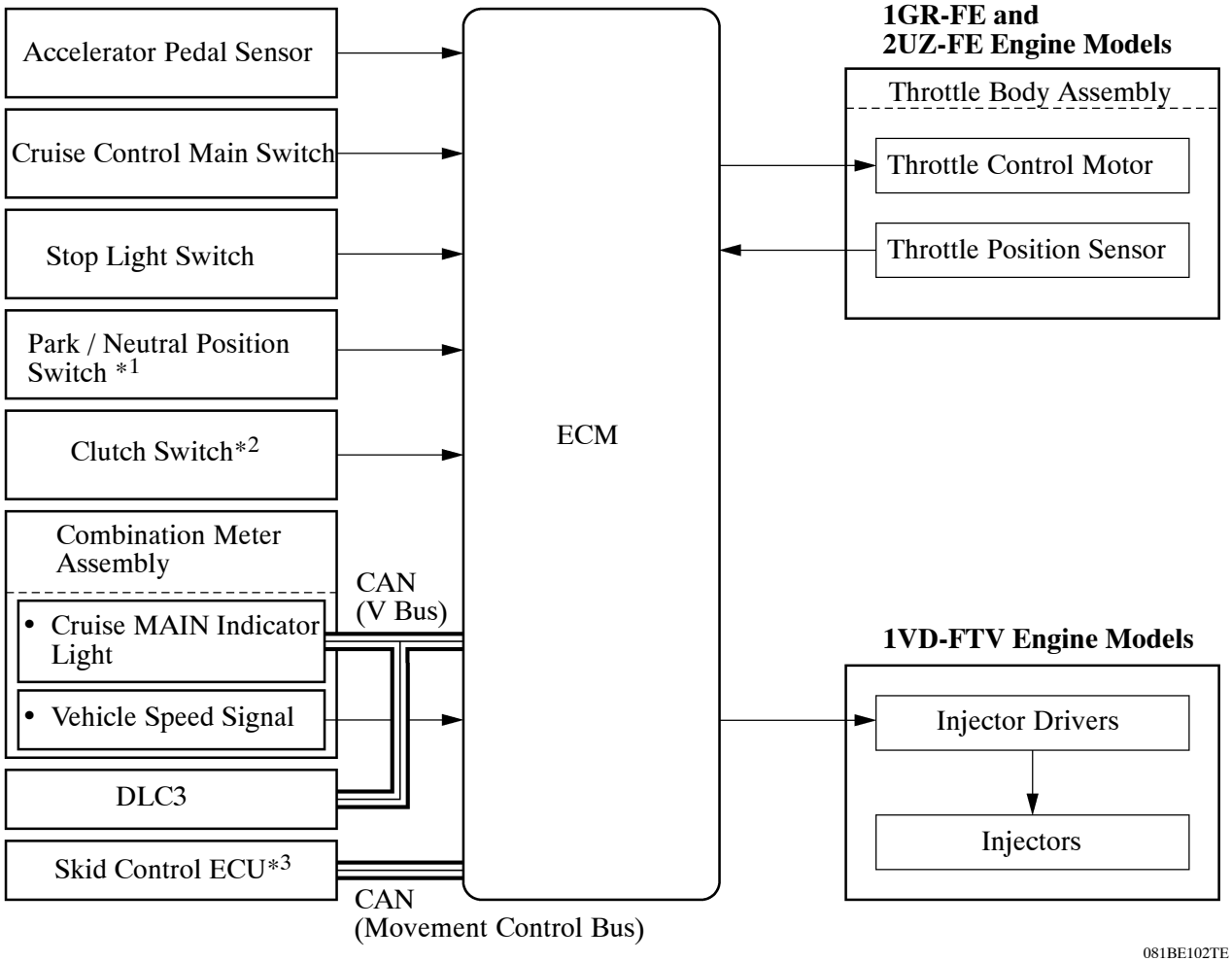
CRUISE CONTROL SYSTEM

■ DESCRIPTION

When the cruise control system is set to a desired vehicle speed, the throttle valve position or injection volume is adjusted automatically to maintain the vehicle speed without the driver having to depress the accelerator pedal.

- On the 1GR-FE and 2UZ-FE engine models, this system effects control through the ETCS-i.
- On the 1VD-FTV engine models, this system effects control through the diesel EFI system.
- The cruise control system is integrated in the ECM.
- Cruise control system settings vary depending on the destinations and grades. For details, see the equipment list in Model Outline (see page MO-33).

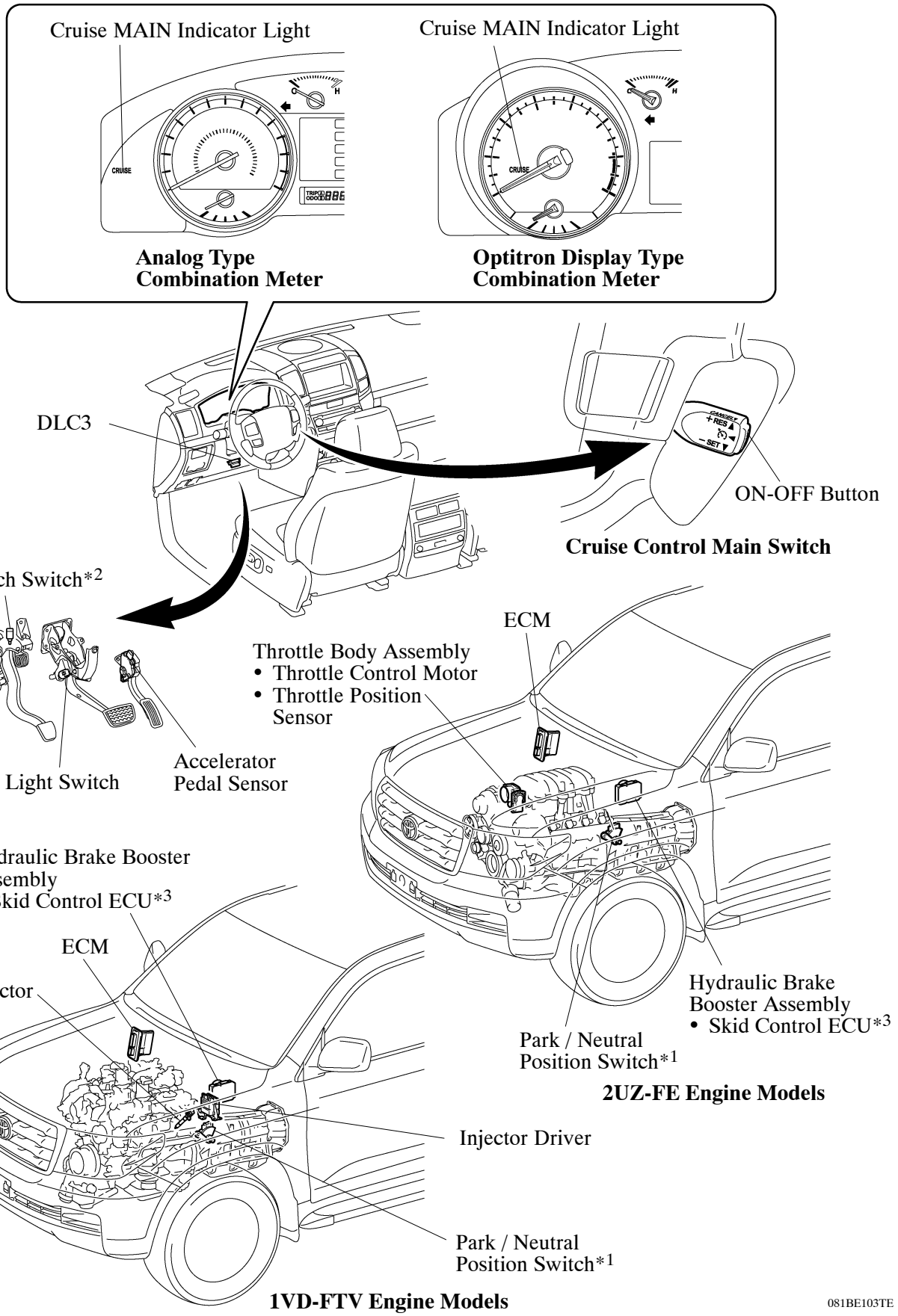
▶ System Diagram ◀



*1: Only for automatic transmission models
*2: Only for manual transmission models
*3: Only for models with VSC system

BE

■LAYOUT OF MAIN COMPONENTS



081BE103TE

*1: Only for automatic transmission models
*2: Only for manual transmission models
*3: Only for models with VSC system

■SYSTEM CONTROL

1. General

The cruise control has the following control.

Control	Outline	
Constant Speed Control	1GR-FE and 2UZ-FE Engine Models	The ECM compares the actual vehicle speed and the set speed. If the vehicle speed is higher than the set speed, the ECM activates the throttle control motor in the throttle closing direction. If the vehicle speed is lower than the set speed, the ECM activates the throttle control motor in the throttle opening direction.
	1VD-FTV Engine Models	The ECM compares the actual vehicle speed and the set speed. If the vehicle speed is higher than the set speed, the ECM decreases the injection volume by regulating the injectors via the injector drivers. If the vehicle speed is lower than the set speed, the ECM increases the injection volume by regulating the injectors via the injector drivers.
Set Control	While this system fulfils the following conditions, and the cruise control main switch is pressed to the - SET side and released, the ECM stores the vehicle speed and maintains the vehicle constantly at that speed. • ON-OFF button on the cruise control main switch is pressed. • The vehicle is running at a vehicle speed of approximately 40 km/h (25 mph) or more.	
Low Speed Limit Control	The low speed limit is approximately 40 km/h (25 mph). If the vehicle speed drops below that speed while running in the cruise control, the cruise control will be cancelled automatically. However the set speed in the memory is kept.	
COAST (-) Switch Control	While the cruise control main switch is held to the - SET side, the vehicle speed and the set vehicle speed change as follows. • The vehicle decelerates constantly. • The set vehicle speed changes to the speed as which the switch is released.	
Tap Down Control	When the cruise control main switch is pushed momentarily (approximately 0.6 seconds) to the - SET side, the vehicle speed and the vehicle setting speed change as follows. • The vehicle will decelerate in increments of approximately 1.6 km/h (1 mph) for each time the switch is pressed. • However, if the difference between the actual vehicle speed and the vehicle setting speed is greater than 5 km/h (3.1 mph), the vehicle setting speed will change to the speed at which the vehicle was being driven at the time the switch was released.	
ACC (+) Switch Control	When the cruise control main switch is pushed to the + RES side and held, the vehicle speed and the vehicle setting speed change as follows. • The vehicle accelerates constantly. • The set vehicle speed changes to the speed as which the switch is released.	
Tap Up Control	When the cruise control main switch is pushed momentarily (approximately 0.6 seconds) to the + RES side, the vehicle speed and the vehicle setting speed change as follows. • The vehicle accelerates in increments of approximately 1.6 km/h (1 mph) for each time the switch is pressed. • However, if the difference between the actual vehicle speed and the vehicle setting speed is greater than 5 km/h (3.1 mph), the vehicle setting speed does not change.	

(Continued)

Control	Outline
RES Switch Control	If the cruise control is canceled for any reason other than a malfunction (except cancellation by operating the ON-OFF button on the cruise control main switch) and the vehicle speed is more than the low speed limit, the vehicle is returned to the speed set before the cancellation of cruise operation by moving the cruise control main switch to the + RES side. The cruise control mode can be resumed even if the vehicle speed drops below the low speed limit, because the speed in the memory has not been cleared.
Shift Down Control	When the vehicle is cruising uphill, shift down control may be performed by the ECT (Electronic Control Transmission). If the gear has been shifted down, it will be shifted back up after a short time after the ECM judges that the upward slope has finished. If shift down control is performed during ACC (+) or RES switch control, the gear will be shifted back up after the ACC (+) or RES switch control has completed.
Manual Cancel Control	If any of the following signals is sent to the ECM, the cruise control is cancelled accordingly. However, the set speed remains in the memory. • Stop light switch ON signal (Depress the brake pedal) • Shift lever is shifted from D to N *1 • When 1st, 2nd or 3rd range is selected in S mode position *1 • Clutch switch ON signal (Depress the clutch pedal) *2 • CANCEL switch ON signal (cruise control main switch moved to CANCEL side) • Cruise control main switch (ON-OFF button) OFF signal (The set speed in the memory is cleared.)
Automatic Cancel Control	When any of the following conditions occur during cruise control driving, the speed that is set in the memory is cleared and the cruise control is cancelled. • Stop light switch open or short circuit. • Vehicle speed signal malfunction. • Throttle body assembly malfunction (1GR-FE and 2UZ-FE engine models). • Fuel injector malfunction (1VD-FTV engine models). Furthermore, the cruise MAIN indicator light will blink until the ON-OFF button on the cruise control main switch is used to turn the system off, and the operation of the cruise control will be disabled until the ON-OFF button is turned on again.
	When any of the following conditions occur during cruise control driving, the speed that is set in the memory is cleared and the cruise control is cancelled. • Stop light switch input signal is abnormal. • Cancel circuit malfunction. • Cruise control system malfunction (1VD-FTV engine models). Furthermore, the cruise MAIN indicator light will blink until the ON-OFF button on the cruise control main switch is used to turn the system off, and the operation of the cruise control will be disabled until the power source is turned off.
	When the following condition occurs during cruise control driving, the speed that is set in the memory is cleared and the cruise control is cancelled. • Vehicle speed decreases by approximately 16 km/h (10 mph) or more below the speed at which the cruise control was set.
	When the following condition occurs during cruise control driving, the cruise control is cancelled. However, the set speed remains in the memory. • Vehicle speed is below the low speed limit (approximately 40 km/h [25 mph]).
	When the VSC is activated, the cruise control is cancelled. However, the set speed remains in the memory. *3

*1: Only for automatic transmission models

*2: Only for manual transmission models

*3: Only for models with VSC system

2. Diagnosis

If a malfunction occurs in the cruise control system, during cruise control operation, the ECM actuates the automatic cancel control and blinks the cruise MAIN indicator light to inform the driver of a malfunction. At this time, the ECM memorizes the malfunction in the form of 5-digit and 2-digit DTCs (Diagnostic Trouble Code).

- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.
- The 2-digit DTC is output to the cruise MAIN indicator light when the TC and CG terminals of the DLC3 connector are connected through the use of the SST (09843-18040). Thus, these DTCs can be obtained by counting the number of blinks of the cruise MAIN indicator light.
- For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

REAR VIEW MIRROR

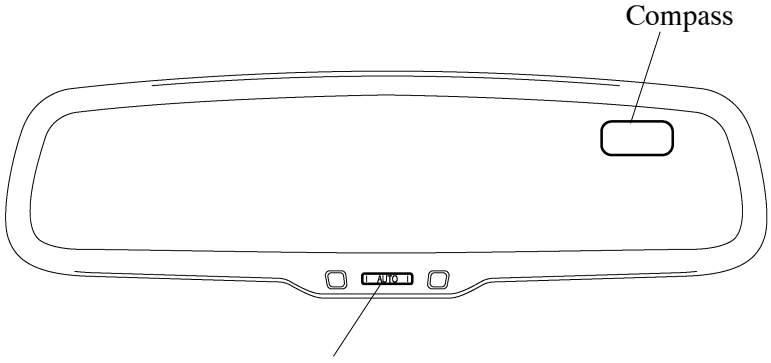
■ DESCRIPTION

The functions of the rear view mirror vary depending on the destinations and grades. For details, see the equipment list in Model Outline (see page MO-33).

Mirror	Function	Outline
Inner Rear View Mirror Assembly	Compass Display	The compass is incorporated into. The vehicle heading is indicated on the mirror surface.
	Automatic Glare-resistant EC (Electro Chromic) Mirror	The function can automatically reduce headlight glare from an on-coming vehicle during nighttime driving.
Outer Rear View Mirror Assembly	Mirror Heater (See page BE-262)	When the rear window defogger switch is turned on, the mirror surface is heated for a certain period of time.
	Electrical Remote Control	When the mirror control switch is operated, this function moves the mirror surface vertically or laterally to enable the driver to attain an optimal mirror angle.
	Power Retractable	This function retracts the outer rear view mirror assemblies when the retractable outer mirror switch is pressed.
	Reverse-linked Mirror	When the shift lever is shifted into the R position, the outer rear view mirror on the driver and passenger side tilts downward, thus facilitating confirmation of the rear side of the vehicle.
	Automatic Glare-resistant EC (Electro Chromic) Mirror	The function can automatically reduce headlight glare from an on-coming vehicle during nighttime driving.
	Memory System (See page BE-256)	The system stores up to 3 mirror positions.

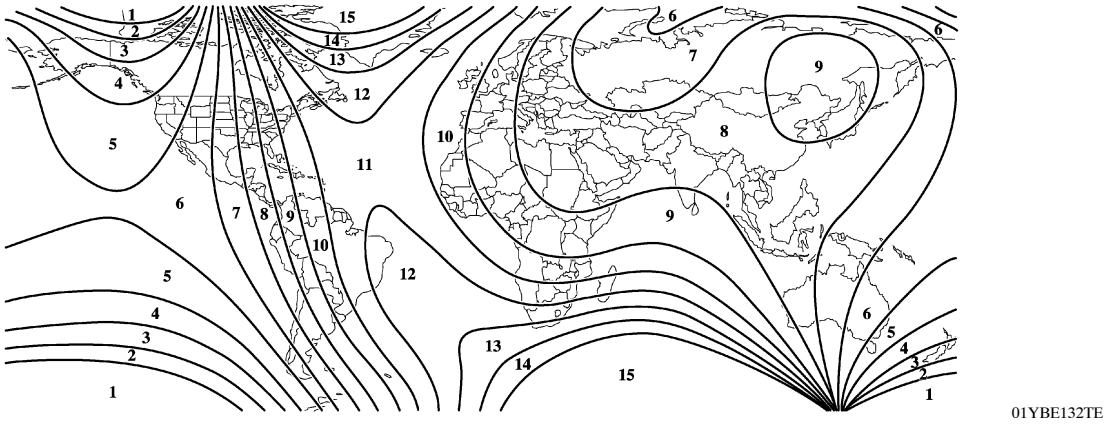
■COMPASS DISPLAY

- A sensor that detects the earth's magnetic field is built inside the inside rear view mirror. This sensor is not influenced by the magnetization of the vehicle.
- The compass indicates north as 0° and the forward direction of the vehicle using 8 azimuths. (N, NE, E, SE, S, SW, W, and NW)
- The compass display can be displayed or cleared by pressing the MIRROR switch for at least 3 seconds and less than 6 seconds.
- When the engine switch is changed from OFF to IG-ON, the display defaults to the compass setting.



Service Tip

To ensure an accurate compass reading, it is necessary to perform a magnetic variation (declination) adjustment in order to set the number that identifies the region that the vehicle will be used in. The numbers that identify the regions are shown in the illustration below.



As the compass system needs to store the vehicle's marked magnetic field, it is necessary to perform the calibration for each vehicle. Once the calibration has been completed, it is not necessary to perform the calibration again unless a sudden magnetic field change occurs. In the case of a sudden magnetic field change, CAL will be displayed in the compass display and it will be necessary to the perform calibration again.

For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

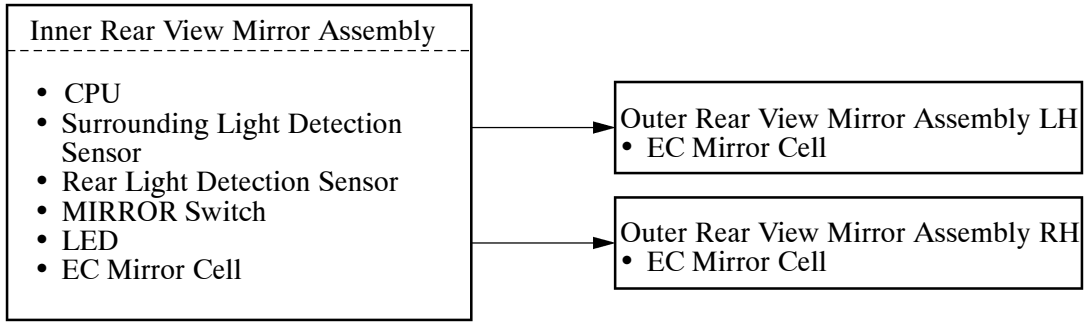
■AUTOMATIC GLARE-RESISTANT EC MIRROR

1. General

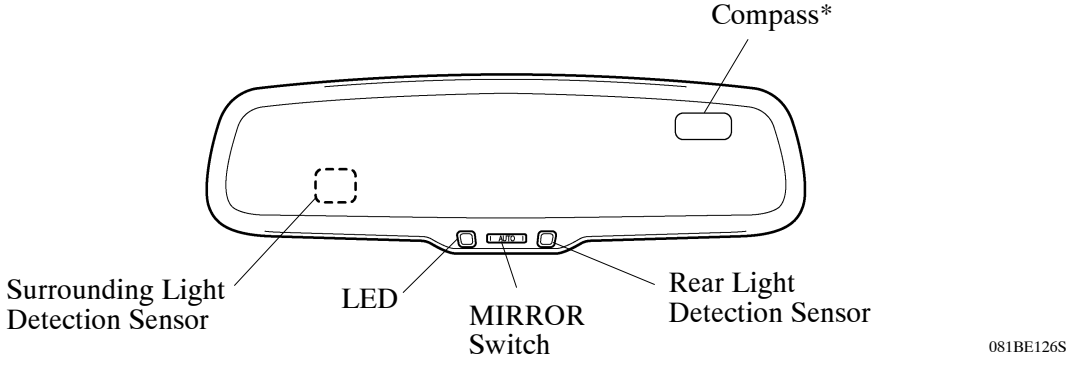
During nighttime driving, if a large difference in intensity exists between the surrounding light and the light reflected off the inner rear view mirror from the headlights behind, an automatic glare-resistant EC (Electro Chromic) mirror automatically reduces the reflection rate of the inner or outer rear view mirrors and thus dampens the glare from the mirror.

- This system uses 2 sensors (the surrounding light detection sensor and the rear light detection sensor) that are present in the inner rear view mirror to detect the difference between the intensity of light in the environment, and the light that the inner rear view mirror receives from the rear of the vehicle.
- When this system is provided with outer rear view mirrors, the EC mirror cells of the outer rear view mirrors are activated simultaneously when the inner rear view mirror is activated. However, in case of the vehicle has privacy glass, the inside EC mirror system provides higher voltage initially for outside mirror cell than for inside mirror cell because privacy glass cut off some of the glare light than normal glass.
- When the power source is changed from OFF to IG-ON, this system defaults to AUTO mode.
- AUTO mode or AUTO OFF mode can be selected by pressing the MIRROR switch for less than 3 seconds.

▶ System Diagram ◀



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081BE126S

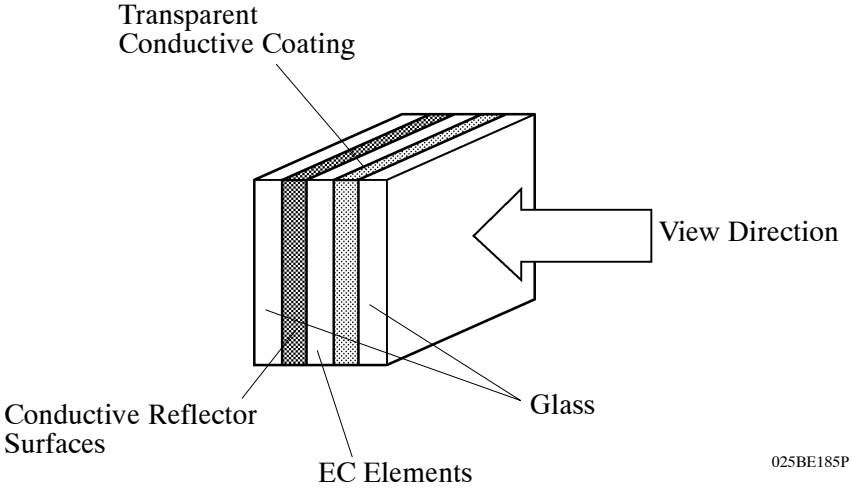
*: Only on models with the compass display

2. Function of Components

Component	Function
Surrounding Light Detection Sensor	Detects the intensity of the light surrounding the vehicle.
Rear Light Detection Sensor	Detects the intensity of the light that strikes the inner rear view mirror from behind the vehicle.
LED	Turns on to inform the driver that the AUTO mode is operating.
MIRROR Switch	Mirror modes can be selected and compass settings can be performed by pressing the MIRROR switch for a given length of time as follows: • Less than 3 seconds: AUTO mode / AUTO OFF mode • At least 3 seconds and less than 6 seconds: Compass display/compass clear • At least 6 seconds and less than 9 seconds: Compass region setting • 9 seconds or more: Compass system calibration
EC Mirror Cell	Varies the refection rate of the mirror using the EC element.
CPU	Controls the reflection rate in accordance with the signals from the 2 sensors.

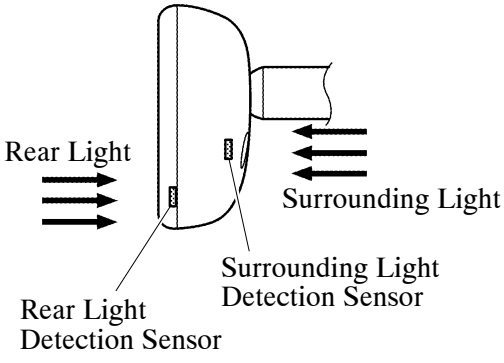
3. EC Mirror Cell

- The EC elements are placed between a layer of transparent conductive coating, and a layer of conductive reflector surfaces, which are placed between 2 sheets of glass.
- The EC elements have color changing characteristics. These characteristics are utilized to electronically vary the mirror reflection rate through an electro-chemical oxidation reduction reaction.

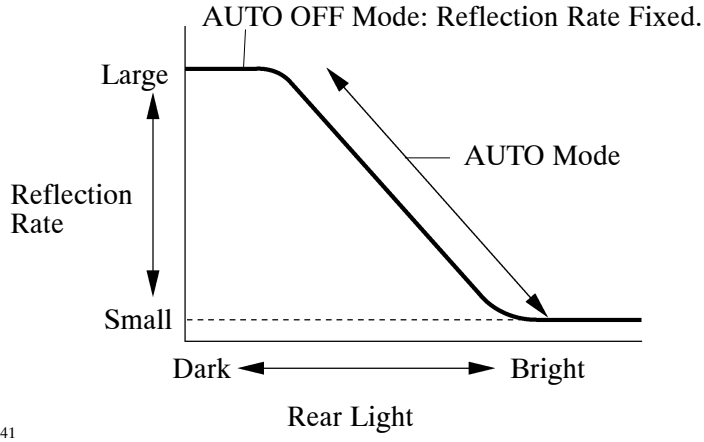


4. Reflection Rate Control

This CPU detects the surrounding light using its surrounding light detection sensor and the rear light using its rear light detection sensor, and determines whether it is day or night based on the intensity of the surrounding light. At the same time, the intensity of the glare from the rear is determined through the difference in intensity between the surrounding and rear light. In accordance with the intensity of the rear light, the reflection rate is varied steplessly.



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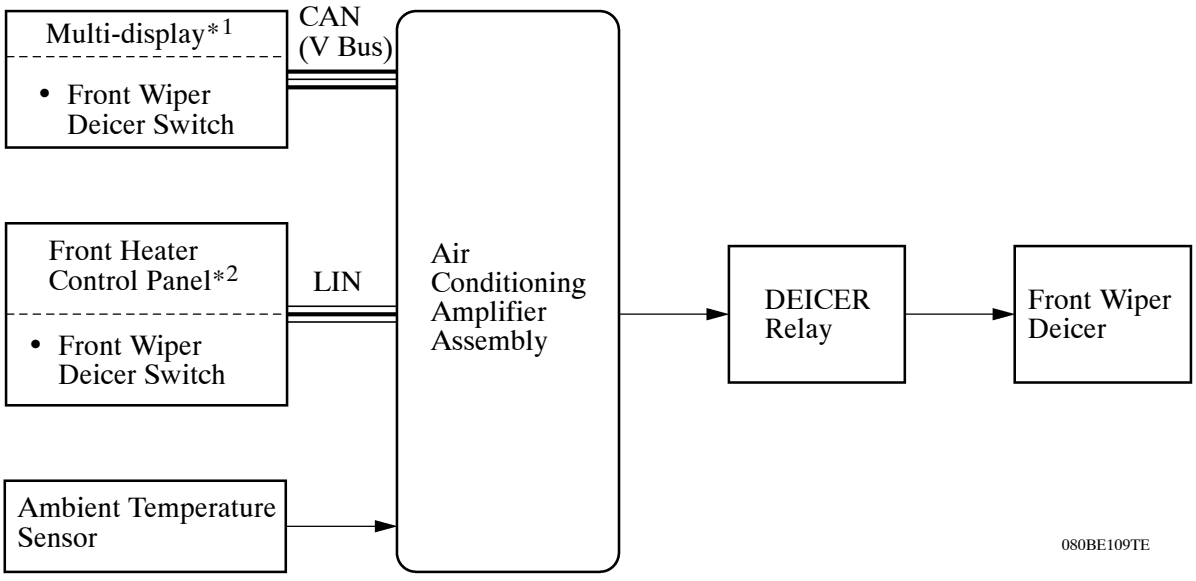
240BE136

FRONT WIPER DEICER SYSTEM

■ DESCRIPTION

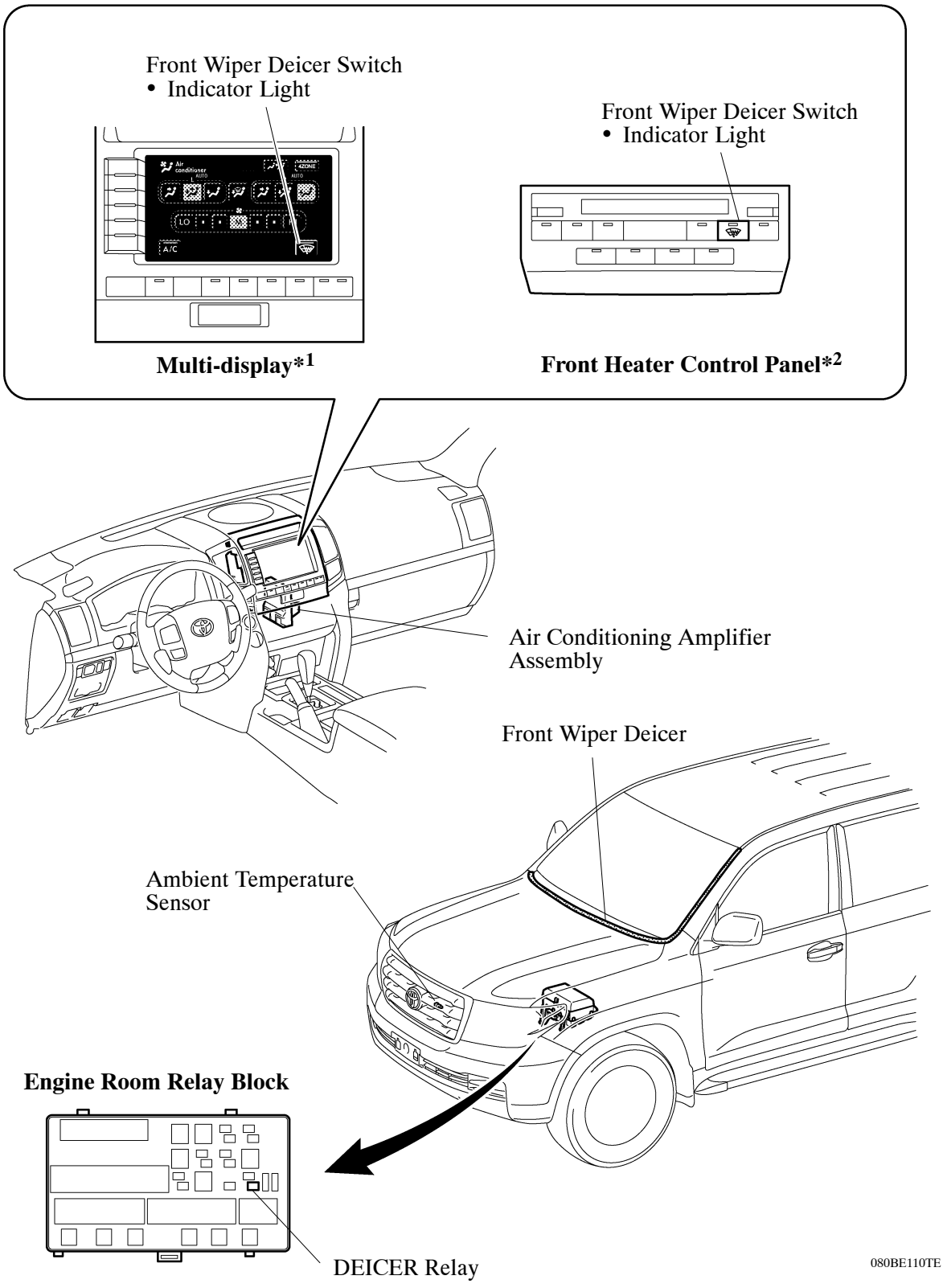
- The front wiper deicer system uses a heater element in the windshield glass to help to deice frozen front wipers.
- This system is available as an option on European models described below.
  - Cold area specification models
  - Models equipped with wiper system with rain sensing function

▶ System Diagram ◀



*1: On models with multi-display
*2: On models without multi-display

■ LAYOUT OF MAIN COMPONENTS



LHD Models

*1: On models with multi-display
*2: On models without multi-display

■SYSTEM OPERATION

The front wiper deicer system is turned on or off when the following conditions are met.

Operation	Conditions	Indicator Light
OFF to ON	The front wiper deicer switch is pressed to start deicing. The outside air temperature is 0°C (32°F) or below.	Illuminates
ON to OFF	When any of the following conditions is met: • The front wiper deicer switch is pressed to stop deicing. • The front wiper deicer has been operating for approximately 15 minutes. • The rear window defogger system is activated. For details about the rear defogger system, refer to page BE-262. • The outside air temperature is 5°C (41°F) or higher.	OFF

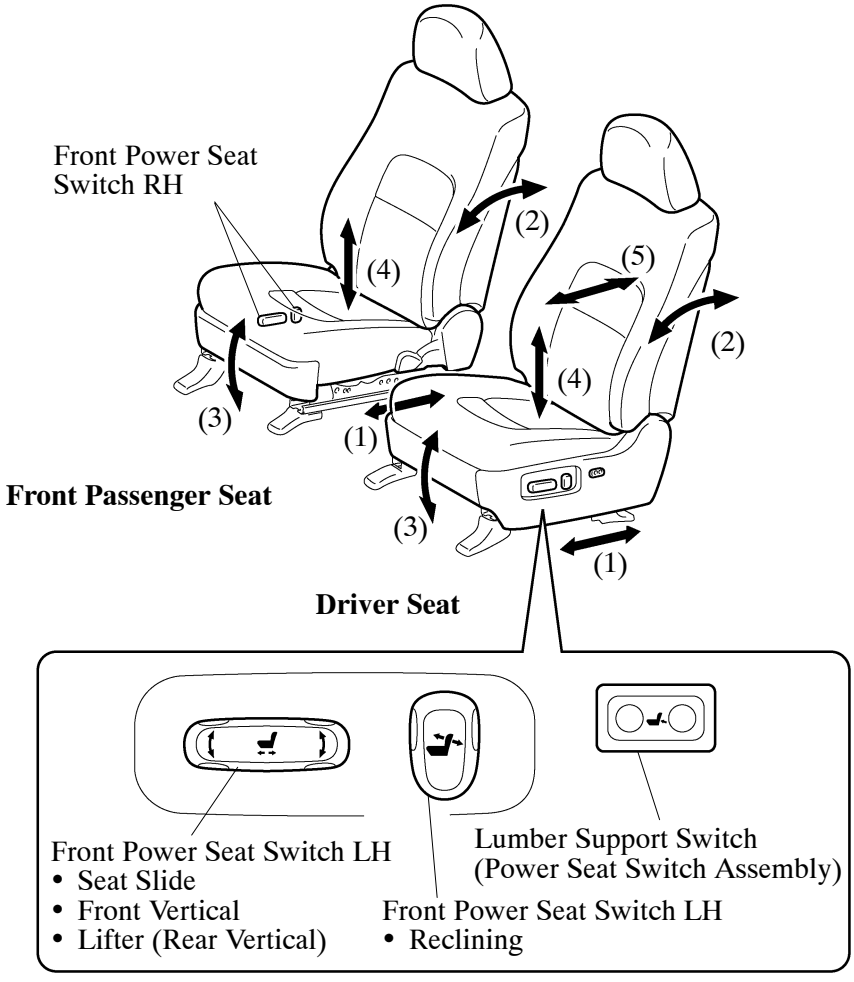
POWER SEAT SYSTEM

■ DESCRIPTION

- The power seat system is available as an option on European models and VX grade models.
- The driver seat has the memory function that can store and recall 3 different driver's settings. For details, refer to the Memory System section on page BE-256.
- The power seat system for the driver and front passenger seats has the following functions:

Function			Stroke	
			Driver	Front Passenger
(1)	Seat Slide	mm (in.)	240 (9.4)	←
(2)	Reclining	degrees	78	←
(3)	Front Vertical	mm (in.)	35 (1.4)	←
(4)	Lifter (Rear Vertical)	mm (in.)	50 (2.0)	←
(5)	Lumber Support	mm (in.)	35 (1.4)	Not available

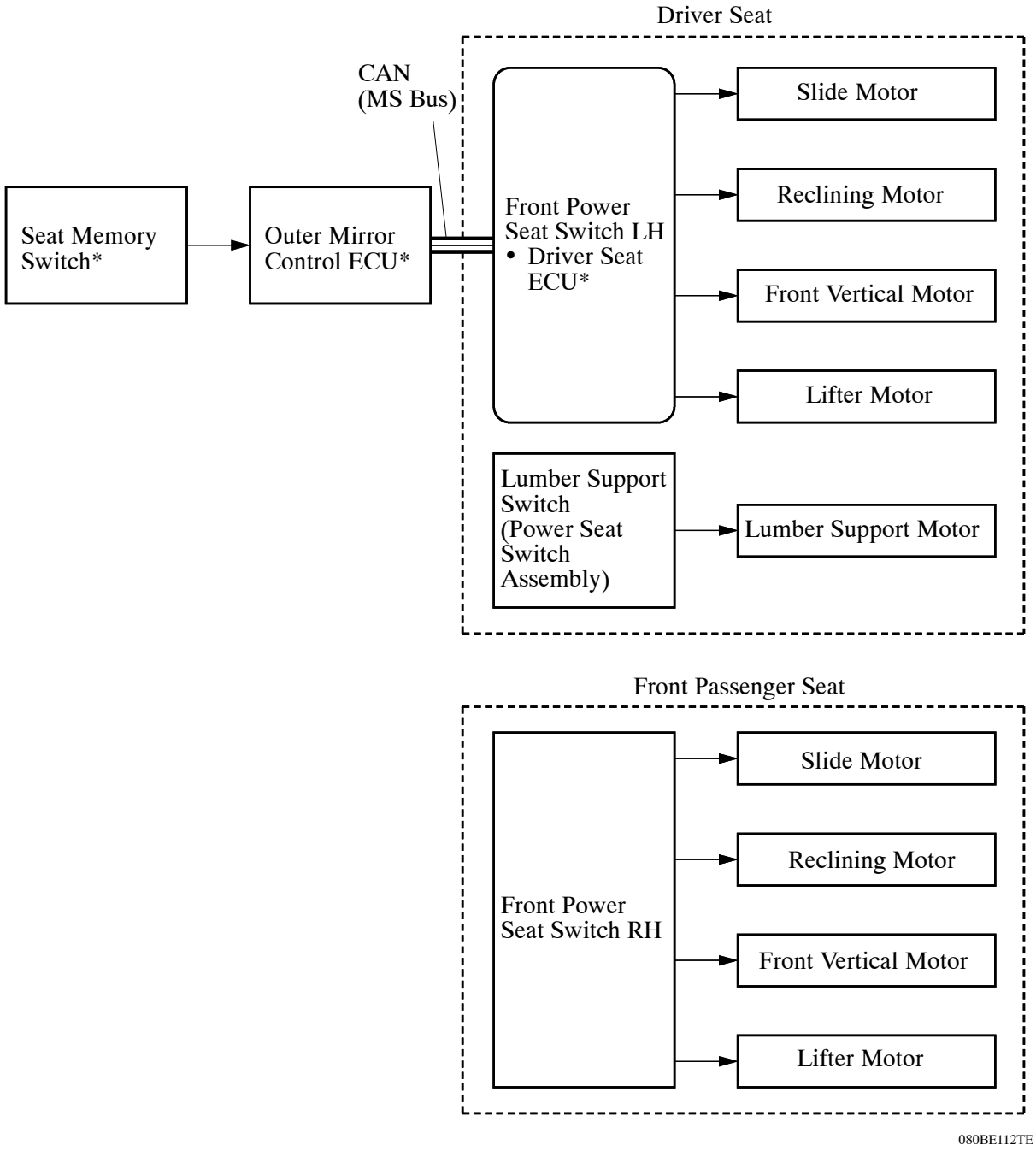
▶ LHD Models ◀



Front Power Seat Switch

080BE111TE

▶ System Diagram ◀



080BE112TE

*: Models with memory system

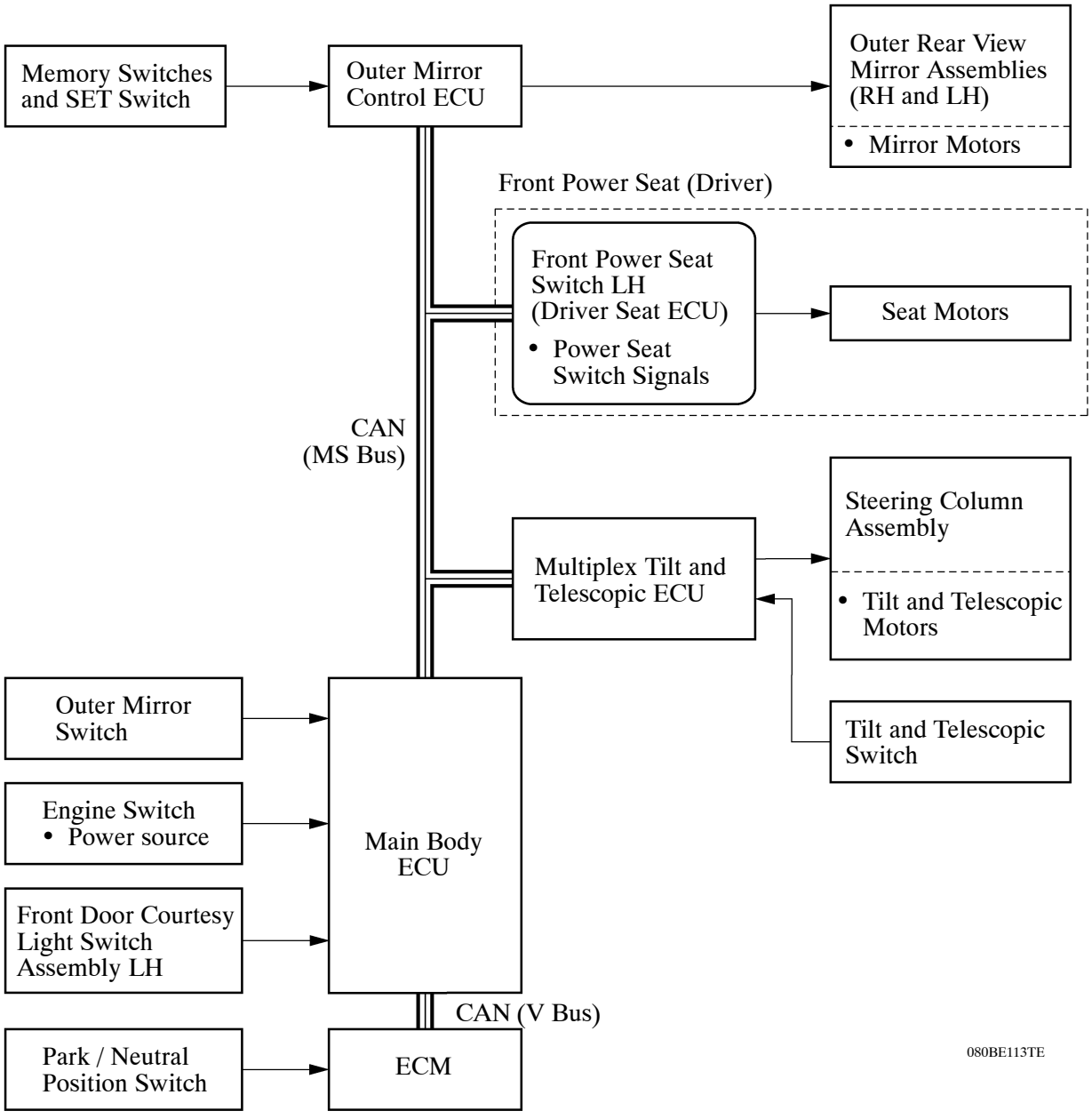
MEMORY SYSTEM

■ DESCRIPTION

- The memory system is standard equipment on Chinese VX grade models and optional equipment on European models.
- The memory system can store 3 positions for the driver seat, outer rear view mirror assembly, and steering column assembly respectively.
- The driver seat ECU stores seat slide, front vertical, rear vertical, and reclining positions in its memory.
- The outer mirror control ECU stores the outer rear view mirror position in its memory.
- The multiplex tilt & telescopic ECU stores the tilt and telescopic position in its memory.
- The driver seat ECU outputs a signal to each ECU to reproduce the stored settings.
- A memory call function, which utilizes the key IDs of the transmitter, is used to memorize and retrieve the optimal driving positions for a person possessing the key. (For details, see page BE-181.)
- The memory and recall conditions of this system are as follows.

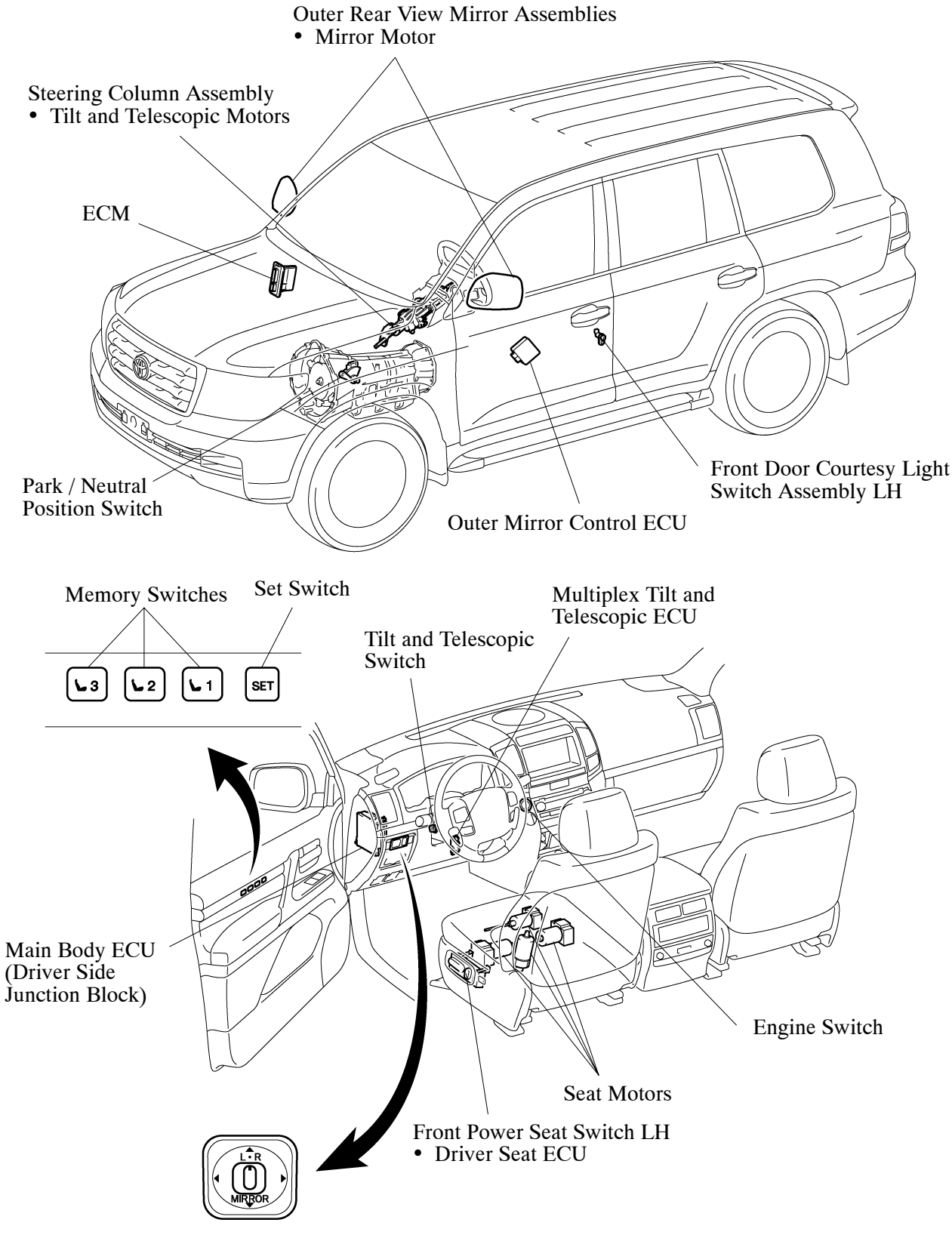
Function	Condition
Memory	Stores the positions when both conditions below have been met and switch 1, 2, or 3 is pushed while the SET switch is pushed. • Engine switch is on (IG). • Shift position is P. When the memory setting is completed, the buzzer will sound for approximately 0.5 seconds.
Recall	If switch 1, 2, or 3 is pressed when both conditions below have been met, the system operates to adjust the positions. • Engine switch is on (IG). • Shift position is P. If switch 1, 2, or 3 is pressed when both conditions below have been met and within 30 seconds, the system operates to adjust the positions. • Engine switch is off. • Driver door is opened. The buzzer sounds for approximately 0.1 seconds once the stored seat position is reproduced.

▶ **System Diagram** ◀



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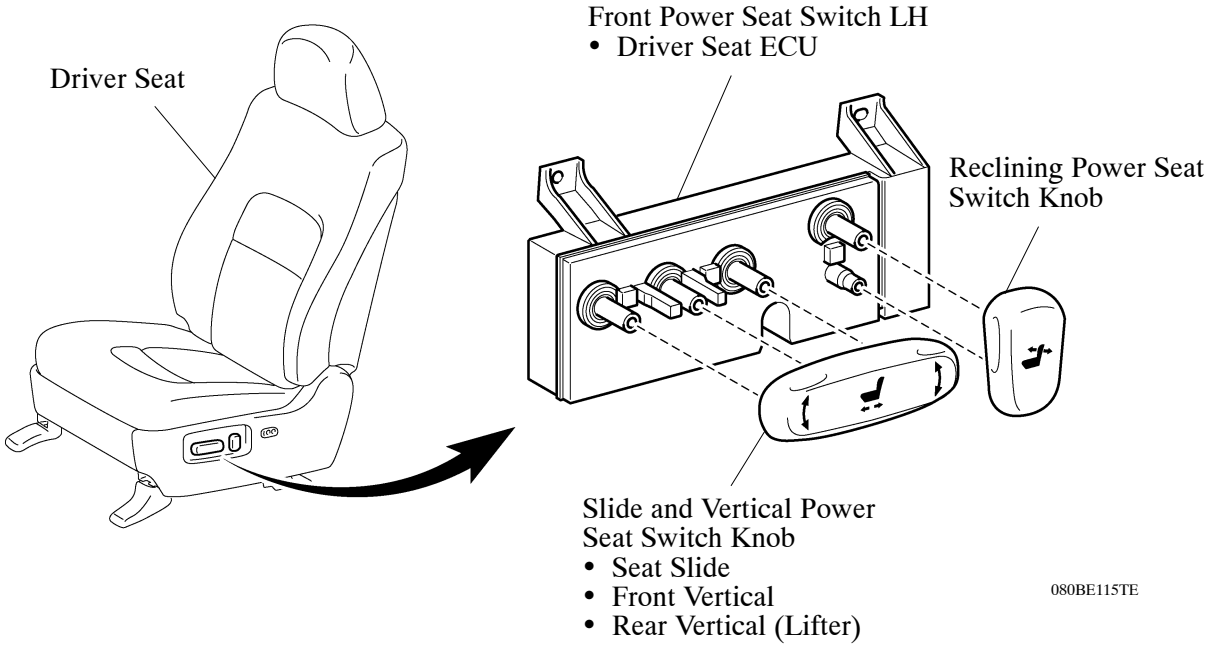
■ LAYOUT OF MAIN COMPONENTS



LHD Models

■DRIVER SEAT ECU

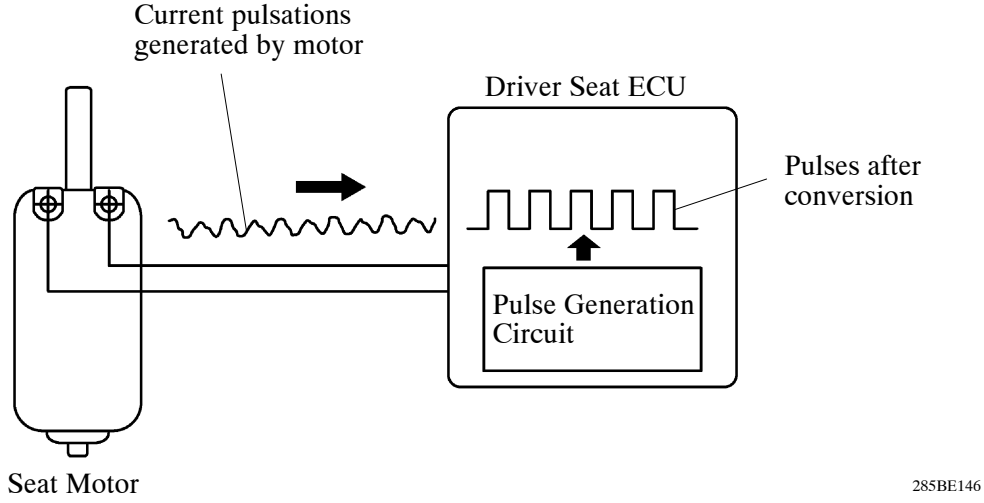
- The driver seat ECU is built into the front power seat switch.
- This ECU effects the main control of the memory system in order to memorize and recall the driver seat position. In addition, the driver seat ECU instructs the outer mirror control ECU, multiplex tilt & telescopic ECU, to start memorizing or recalling their respective positions.
- The driver seat position, outer rear view mirror position, and the tilt and telescopic steering position are memorized by their respective ECUs.
- The ECUs exchange the information that is necessary for memory control via the CAN.



LHD Models

■SEAT POSITION DETECTION METHOD

A pulse generation circuit in driver seat ECU converts the driving current pulsations that are generated by the rotation of the motor into pulse signals. These signals are then picked up in order to detect the seat position.

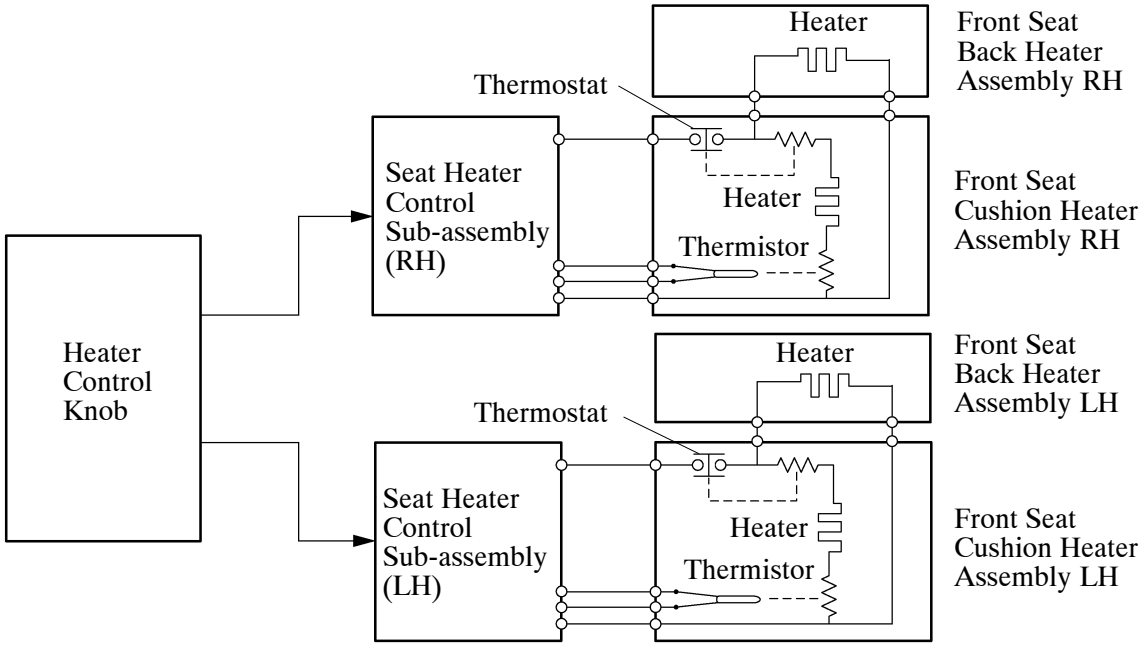


SEAT HEATER SYSTEM

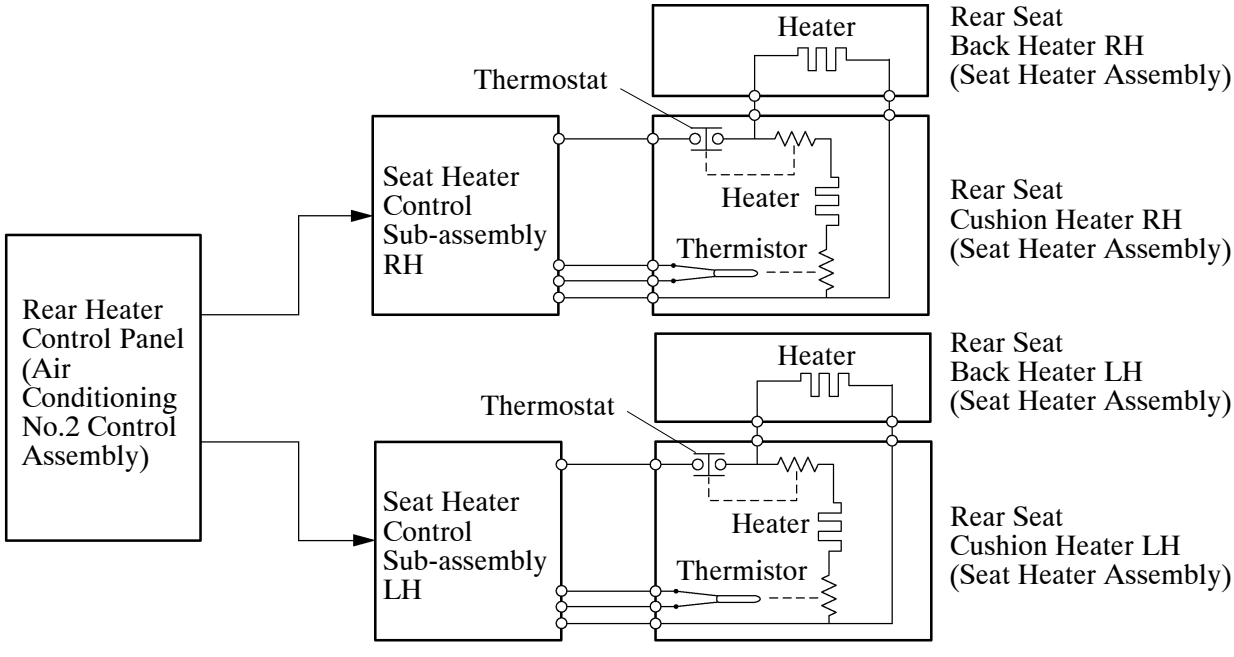
■ DESCRIPTION

- The settings of the seat heater system vary depending on the destinations and grades. For details, see the equipment list in Model Outline (see page MO-33).
- A seat heater switch with a built-in indicator light for checking the heater operation is provided.
- A heater control knob for front seats is a stepless temperature adjustment type.
- The output temperature of the seat heater is controlled by a thermostat and thermistor that are enclosed in the seat cushion.

▶ System Diagram for Front Seat ◀

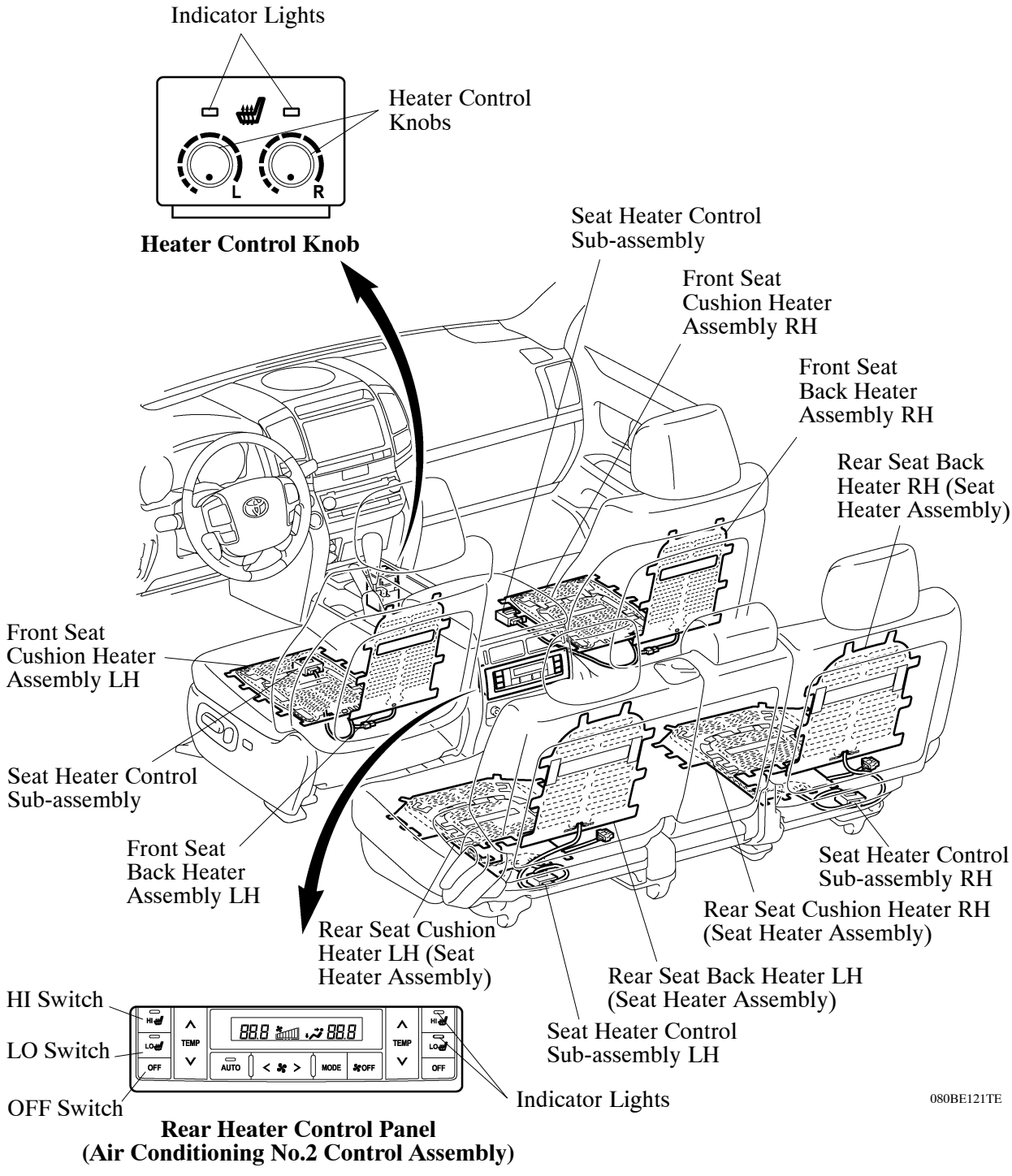


▶ System Diagram for Rear No.1 Seat ◀



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■LAYOUT OF MAIN COMPONENTS



Rear Heater Control Panel (Air Conditioning No.2 Control Assembly)

LHD Models

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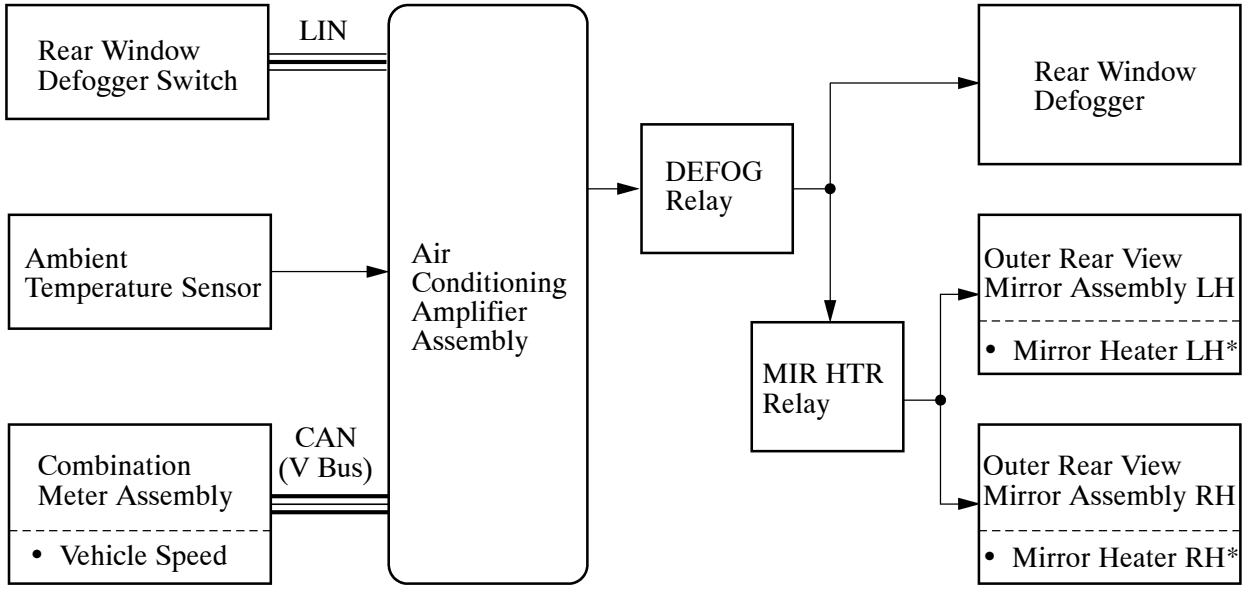
REAR WINDOW DEFOGGER SYSTEM

■ DESCRIPTION

- The rear window defogger system is standard equipment on all models.
- This system uses the heater wire on the rear window glass to defog the rear window glass.
- This system operates at the same time as the heater function of the outer rear view mirror assembly*.

*: Only for models with outer rear view mirror heater

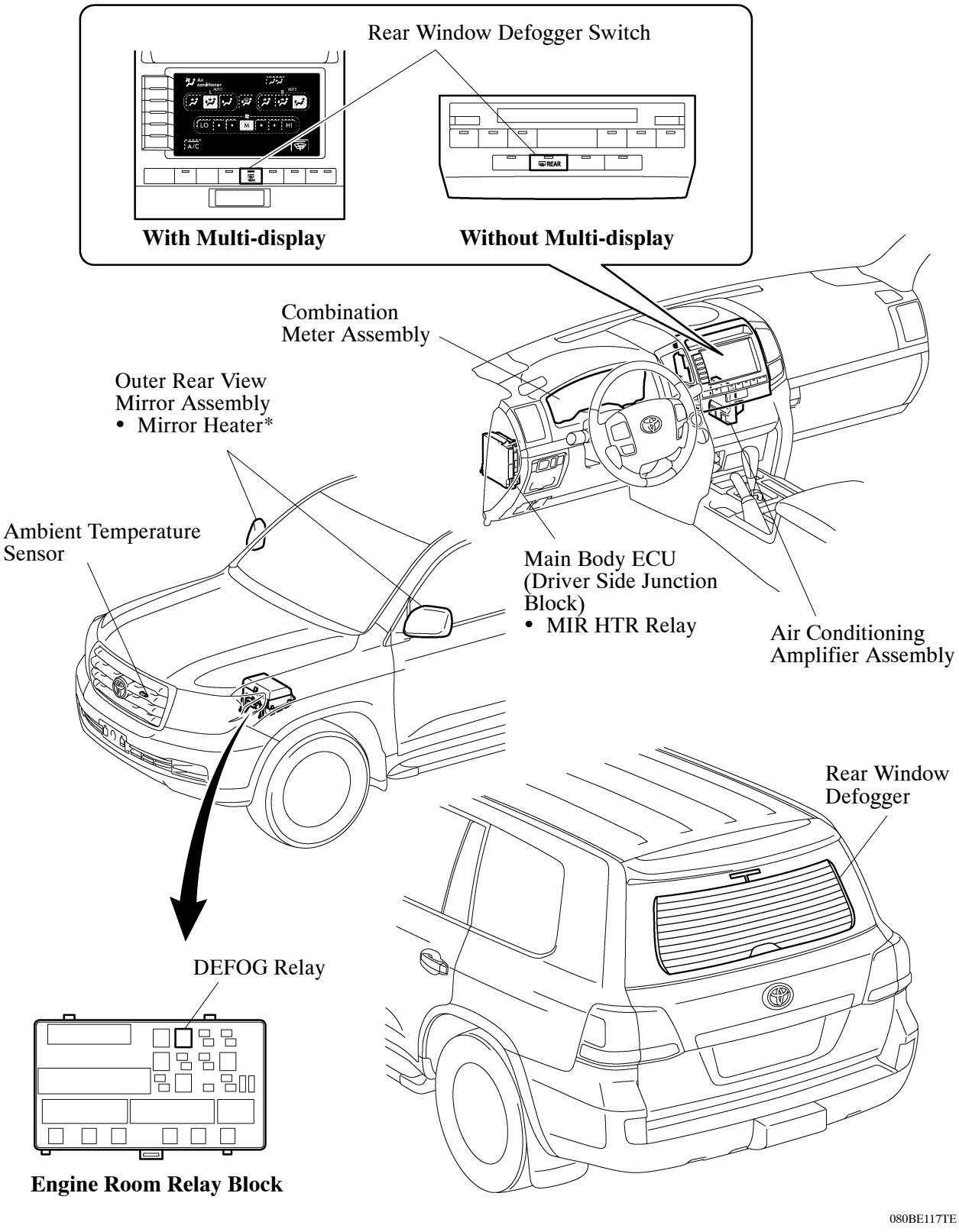
▶ System Diagram ◀



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*: Only for models with outer rear view mirror heater

■LAYOUT OF MAIN COMPONENTS



LHD Models

*: Only for models with outer rear view mirror heater

BE

■ SYSTEM OPERATION

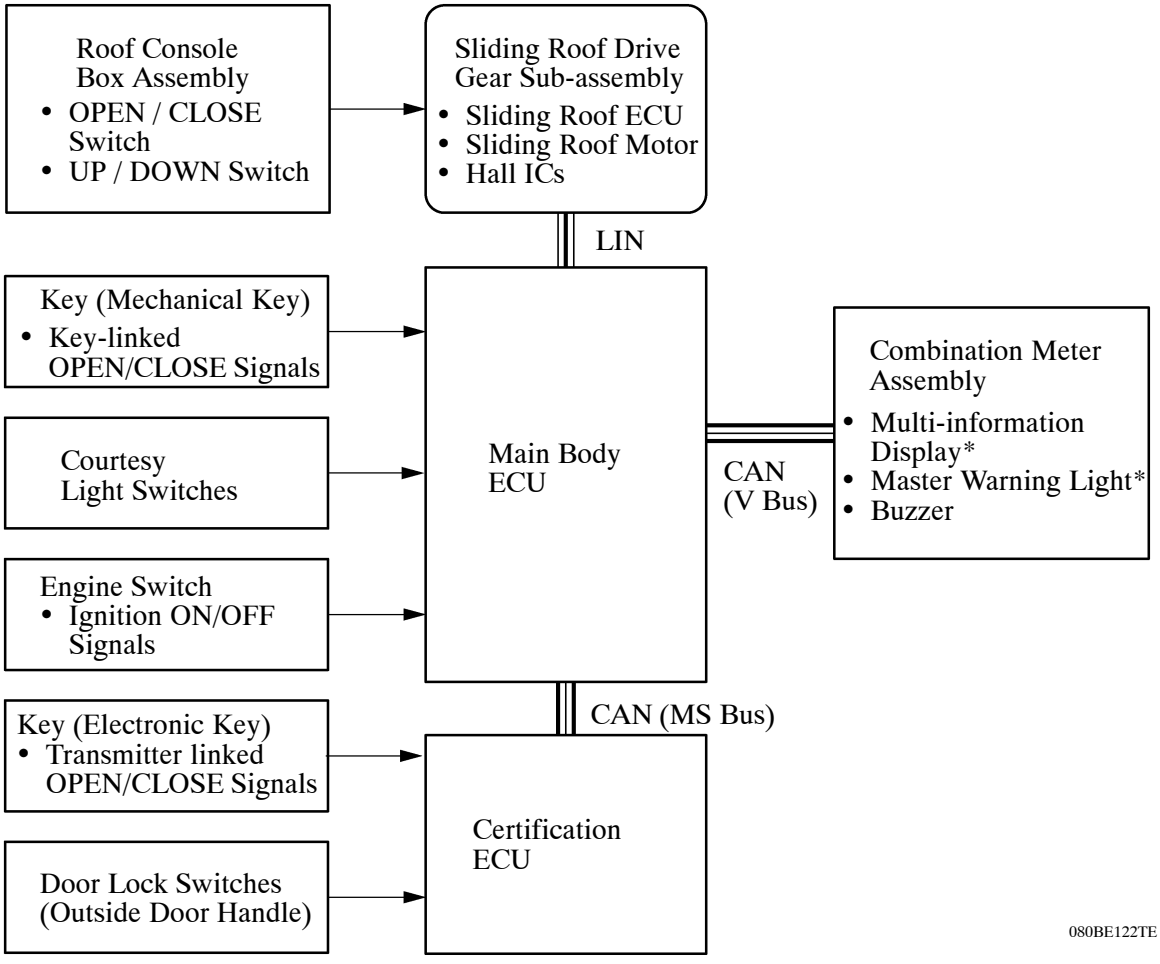
- The rear window defogger system is activated when the engine switch is turned on (IG), and the rear window defogger switch is pushed.
- The rear window defogger switch is provided with a timer function to turn off the defogger and outer rear view mirror heater after approximately 15 minutes.
- If both of the following conditions are met approximately 15 minutes after the defogger and outer rear view mirror heater was activated, the defogger and outer rear view mirror heater continues to operate up to 255 minutes. If the following conditions are not met, the rear window defogger system stops operating immediately.
  - The outside air temperature is -3°C (27°F) or below.
  - The vehicle speed is 50 km/h (31 mph) or more.

SLIDING ROOF SYSTEM

■ DESCRIPTION

- The settings of the sliding roof system vary depending on the destinations and grades. For details, see the equipment list in Model Outline (see page MO-33).
- This system uses a single glass panel to perform tilt up-and-down and open-and-close operations.
- The sliding roof ECU uses 2 Hall ICs to detect the position of the sliding roof. The sliding roof ECU and the 2 Hall ICs are integrated into the sliding roof drive gear sub-assembly.

▶ System Diagram ◀



*: Models with optitron display type combination meter

Service Tip

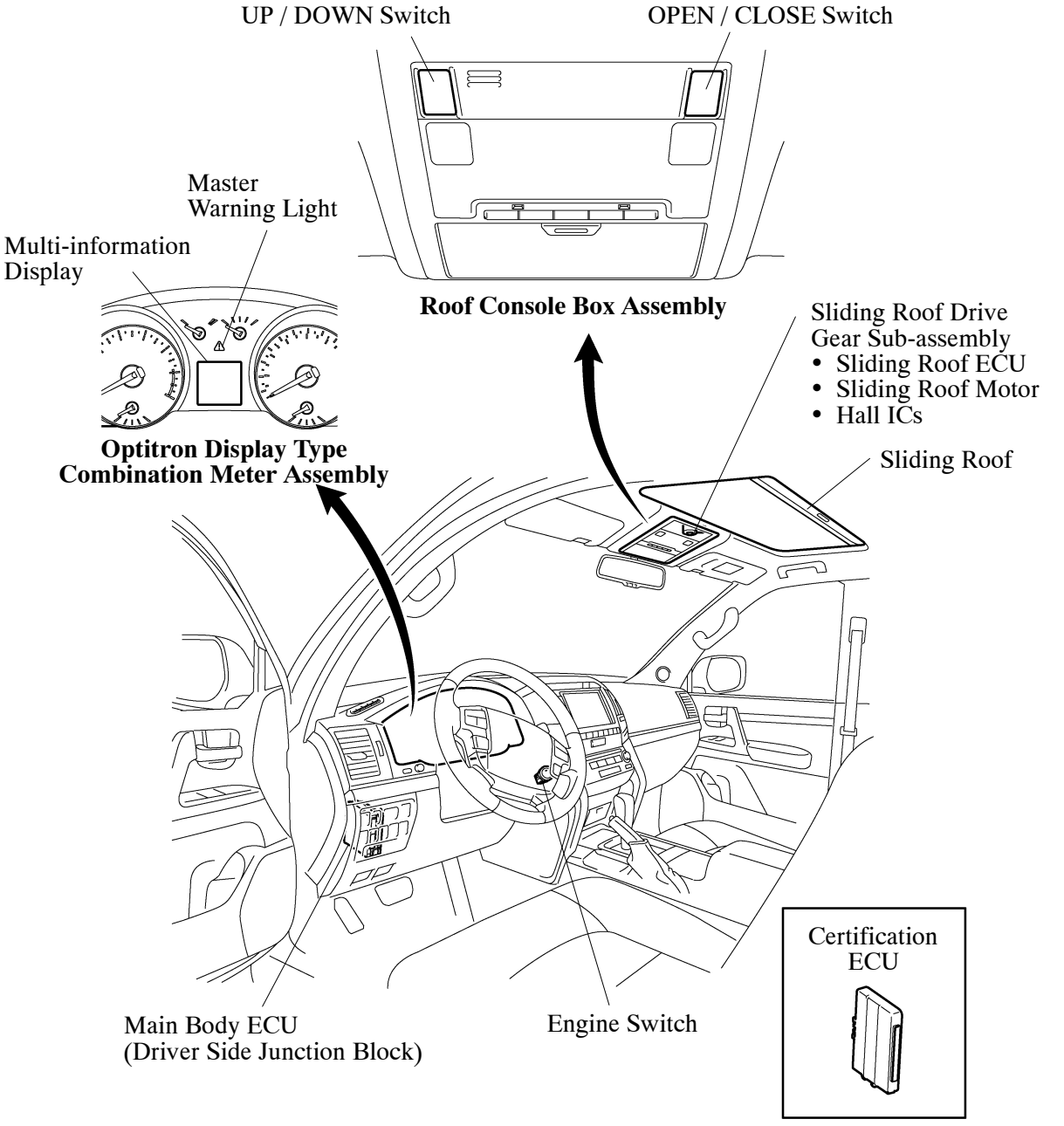
The memory is not cleared if battery terminals are disconnected. However, initialization is necessary after the sliding roof drive gear sub-assembly is replaced. Perform the initialization as follows:

1) Keep pressing the UP or CLOSE switch until the roof tilts up completely. This will enable the sliding roof ECU to start initializing and perform the tilt up, tilt down, open, and close operations of the sliding roof in sequence.
2) Keep the switch pressed for 1 second after the tilt up operation is completed.
3) The sliding roof ECU performs the tilt down, open, and close operations.
4) The initialization process ends when the close operation is completed.

Keep the UP or CLOSE switch pressed during initialization. If the UP or CLOSE switch is released during initialization, the system will not be able to complete the initialization. If this occurs, the aforementioned steps must be performed again.

For details, see the Land Cruiser (Station Wagon) Repair Manual (Pub. No. RM0810E).

■ LAYOUT OF MAIN COMPONENTS



LHD Models

081BE105TE

■ FUNCTION

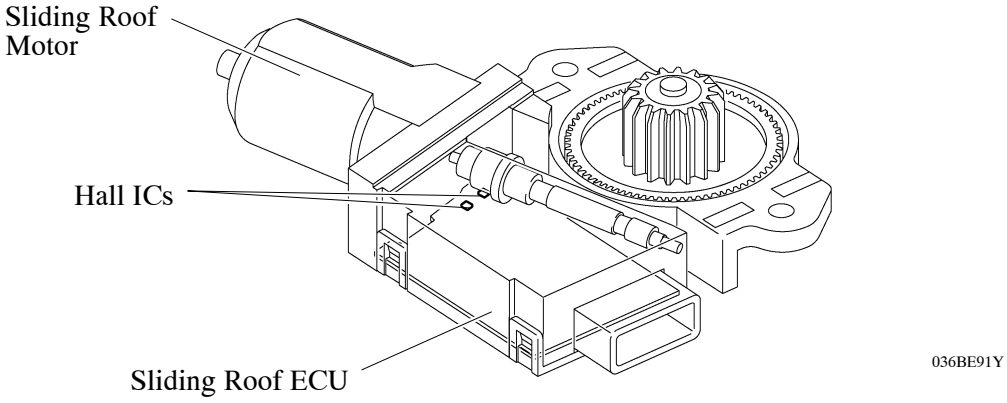
The sliding roof system has the following functions:

Function	Outline
Manual open-and-close	This function causes the sliding roof to open (or close) while the OPEN switch (or CLOSE switch) is pressed for less than 0.3 seconds. The sliding roof stops as soon as the switch is released.
One touch auto open-and-close	This function enables the sliding roof to be fully opened (or closed) by the OPEN switch (or CLOSE switch) for longer than 0.3 seconds.
Manual tilt up-and-down	This function causes the sliding roof to tilt up (or tilt down) while the UP switch (or DOWN switch) is pressed for less than 0.3 seconds. The sliding roof stops as soon as the switch is released.
One touch auto tilt up-and-down	This function enables the sliding roof to be fully tilt up (or down) by the UP switch (or DOWN switch) for longer than 0.3 seconds.
Jam protection	This function automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during close or tilt down operation.
Key off operation	This function enables the sliding roof to be operated within approximately 43 seconds of the engine switch being turned off. However, if either the driver door or front passenger door is opened within this 43 seconds, the power window operation will be disabled. If the sliding roof is currently operating when the 43 seconds have elapsed, the sliding roof will continue to move until it is fully open or closed.
Transmitter linked open*	When the main body ECU receives an unlock signal from the key (electronic key) continuously for longer than 2.4 seconds, the sliding roof ECU controls the sliding roof motor in accordance with the signal to open the sliding roof.
Transmitter linked close*	When the main body ECU receives a lock signal from the key (electronic key) continuously for longer than 2.4 seconds, the sliding roof ECU controls the sliding roof motor in accordance with the signal to close the sliding roof.
Lock switch linked close*	When the lock switch on the outside door handle is pressed for 3 seconds or more with the key in the detection area and all the doors locked, the sliding roof ECU activates the sliding roof motor to close the sliding roof while the lock switch is pressed.
Mechanical key linked open-and-close*	When the key (electronic key) is not in the detection area, the driver door is locked, and the key (mechanical key) in the driver door key cylinder is turned and maintained in the lock direction for 1.5 seconds or more, the sliding roof ECU activates the sliding roof motor to close the sliding roof while the key (mechanical key) is turned. Similarly, when the driver door is unlocked, turning and maintaining the key (mechanical key) in the driver door key cylinder in the unlock direction for 1.5 seconds or more will cause the sliding roof to be opened.
Sliding roof open warning	When the engine switch is turned from on (IG) to off and the driver door is opened with the sliding roof open, the buzzer in the combination meter assembly sounds once. Then, a warning message appears on the multi-information display.

*: These functions are only for VX grade models. The setting of functions can be changed using the customized body electronics system. For details, refer to the "Customized Body Electronics System" section on page BE-17.

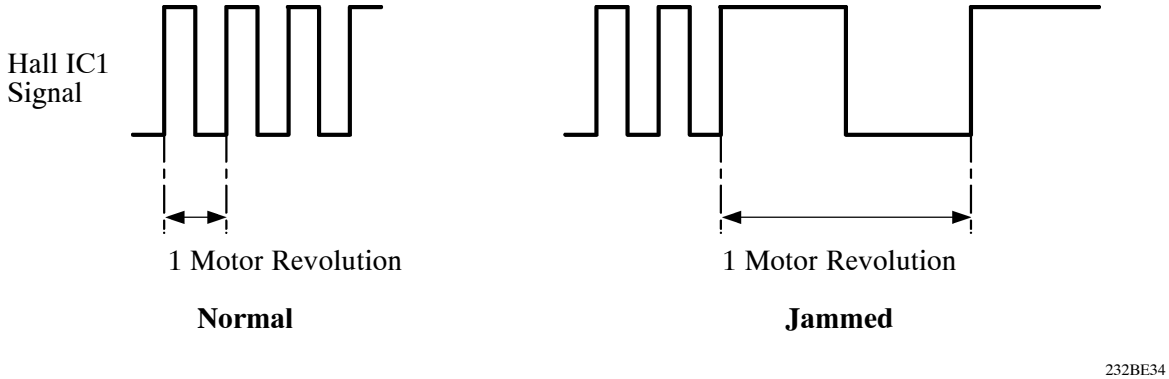
■ JAM PROTECTION

- The Hall IC converts the changes in the magnetic flux that occur due to the rotation of the worm gear into pulse signals and outputs them to the sliding roof ECU.

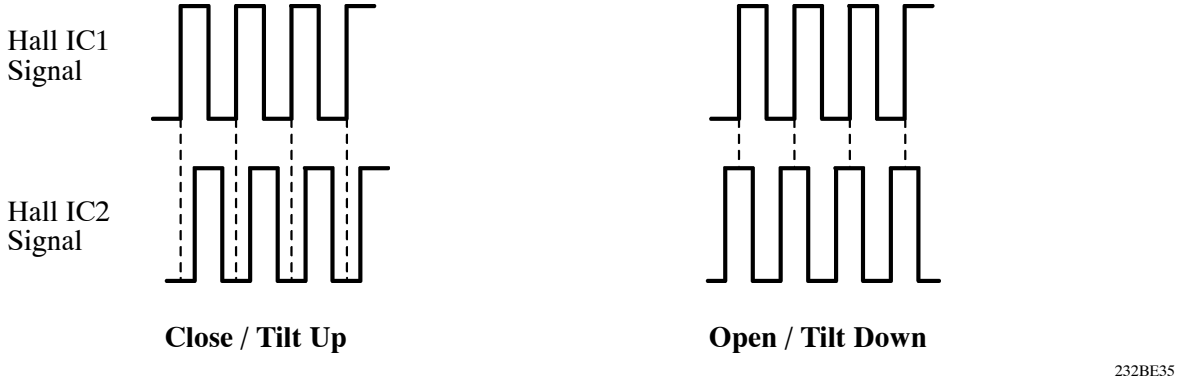


- To control the jam protection function, the sliding roof ECU monitors the amount of movement and judges jamming of the sliding roof based on the pulse signals from the Hall IC1, and the moving direction of the sliding roof from the phase difference between the pulsed from the Hall IC1 and Hall IC2.

▶ Monitoring Amount of Movement Judgment of Jamming ◀



▶ Judgment of Movement Direction ◀



■SLIDING ROOF OPEN WARNING

1. Optitron Display Type Combination Meter

When the engine switch is changed from on (IG) to off and the driver door is opened when the sliding roof is open, the sliding roof ECU turns on the master warning light and sounds the buzzer in the combination meter assembly. Then, a warning message appears on the multi-information display.

Warning Condition		The warning is activated if all of the following conditions are met: • Sliding roof is fully closed. • Engine switch off. • Driver door is closed.
Combination Meter Assembly	Multi-information Display	 080BE124TE
	 0150BE35C	Blinks
	Buzzer	Sounds
Warning Stop Condition		The warning is stopped when one of the following conditions is met: • Approximately 8 seconds have elapsed after the warning condition is detected. • Sliding roof is fully closed. • Engine switch on (IG). • Driver door is closed.

BE

2. Analog Type Combination Meter

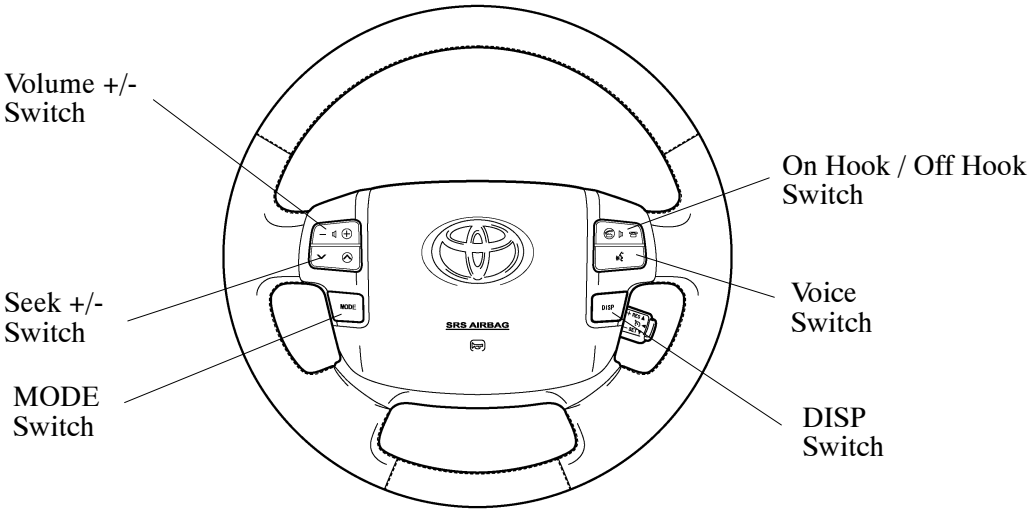
When the engine switch is changed from on (IG) to off and the driver door is opened when the sliding roof is open, the siding roof ECU sounds the buzzer in the combination meter assembly.

Warning Condition	The warning is activated if all of the following conditions are met: • Sliding roof is not fully closed. • Engine switch off. • Driver door is opened.
Buzzer	Sounds
Warning Stop Condition	The warning is stopped when one of the following conditions is met: • 8 seconds have elapsed after the warning condition is detected. • Sliding roof is fully closed. • Engine switch on (IG). • Driver door is closed.

STEERING PAD SWITCH

■ DESCRIPTION

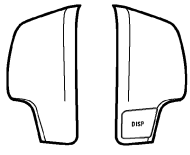
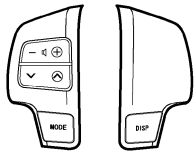
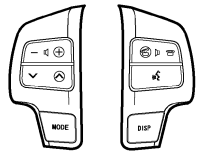
- The settings of the steering pad switches vary depending on the destinations and optional equipment.
- Since frequently used switches are fitted onto the steering pad, drivers can operate these switches without releasing their hands from the steering wheel.



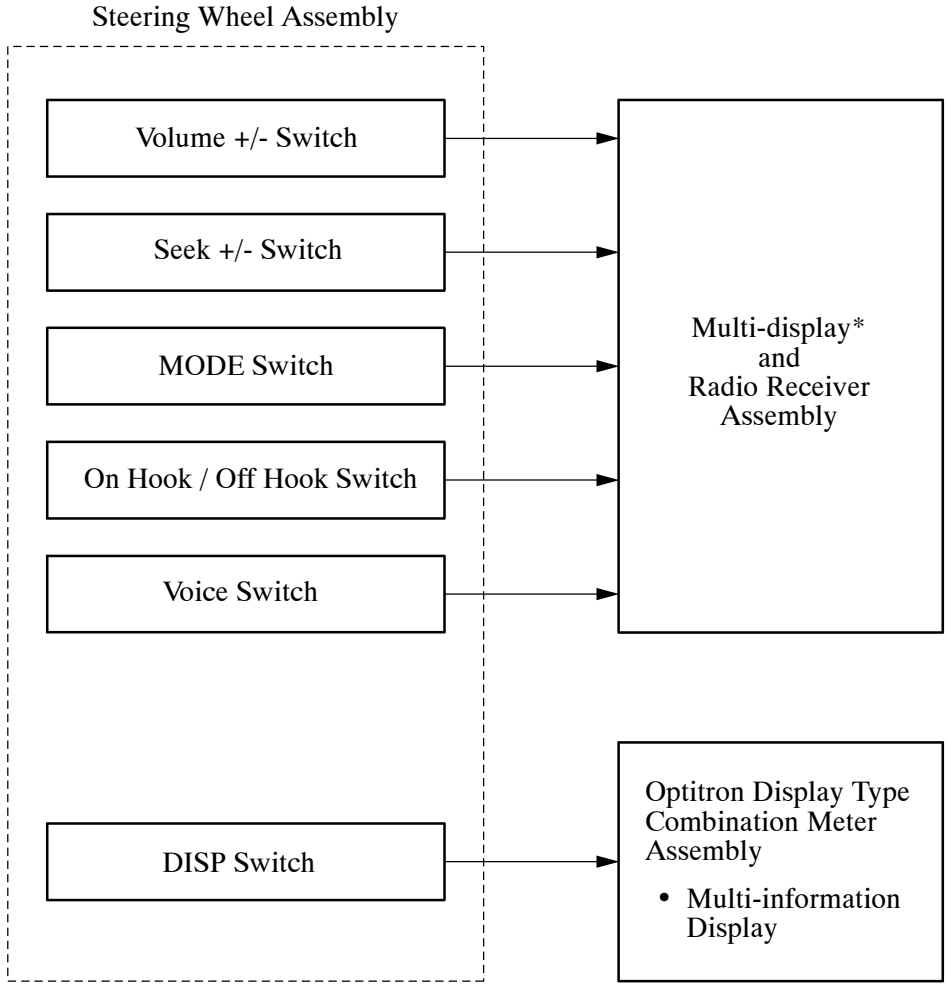
080BE125TE

▶ Switch Variation ◀

○: Available —: Not available

Switch / Item			Variation		
			 081BE106TE	 080BE126TE	 080BE127TE
Multi-information Display		DISP	○	○	○
Audio	Audio Operation	Volume +/ -	—	○	○
		Seek +/ -	—	○	○
		MODE	—	○	○
	Telephone Operation	On Hook / Off Hook	—	—	○
	Navigation Operation	Voice	—	—	○

■SYSTEM DIAGRAM



080BE128TE

*: Models with multi-display